



CONCERTED ACTION

ENERGY PERFORMANCE OF BUILDINGS

# Implementation of the EPBD Belgium - Brussels Capital Region Status in 2020

## AUTHORS

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## NATIONAL WEBSITES

[www.environnement.brussels](http://www.environnement.brussels), [www.leefmilieu.brussels](http://www.leefmilieu.brussels)

## 1. Introduction

In Belgium, the EPBD implementation is a regional responsibility. In the Brussels-Capital Region, the EPBD is under the authority of the Minister of the Government of the Brussels-Capital Region, responsible for Climate Change, Environment, Energy and Participatory Democracy.

The first relevant ordinance (EPB ordinance) dates from June 2007, whereas in May 2013, the Brussels-Capital Region Government adopted a new ordinance for the Brussels Air, Climate and Energy Code (COBRACE), which entered into force on 1 January 2015. This ordinance transposes Directive 2010/31/EU<sup>1</sup> and Directive 2018/844/EU.

## 2. Current Status of Implementation of the EPBD

### 2.1. Energy performance requirements: NEW BUILDINGS

#### *2.1.i. Progress and current status of new buildings (regulation overall performance)*

The energy performance requirements have been mandatory since July 2008 for new buildings and for renovations in which a building permit is requested. The applicable energy performance requirements are set for primary energy consumption, insulation level, ventilation rate, overheating, technical installation, etc. These requirements are different for new or renovated buildings and units depending on the function (residential, office, educational, other non-residential). The requirements have been strengthened over the years, and in 2011, the energy performance requirement (E-level<sup>2</sup>) was tightened to become E70 (for housing) and E75 (for offices and schools). Moreover, a requirement regarding thermal bridges was introduced. The reduction in energy consumption linked to this reinforcement of requirements has been estimated by simulation to be 25%.

In 2014, although the global insulation requirement for the envelope (K-level<sup>3</sup>) K40 (for housing) and K45 (for offices and schools) did not change, some maximum U-values were tightened for all new or retrofitted elements of the building envelope.

In 2015, the E-level and K-level requirements for housing, offices and schools were replaced by two new requirements, referred to as 'very high performance' requirements, one concerning the total primary energy consumption (PEC), and the other concerning the net heating requirement (NHR). The requirements by type of unit are presented in Table 1.

Building/Unit	Net Heating Requirement (NHR)	Primary Energy Consumption (PEC)
<b>Residential</b>	15 kWh/m <sup>2</sup> .year or X kWh/m <sup>2</sup> .year	45 + max(0 ; 30-7.5°C) + 15 * max(0 ; 192/V <sub>EPR</sub> -1) kWh/m <sup>2</sup> .year
<b>Offices and Schools</b>	15 kWh/m <sup>2</sup> .year or X kWh/m <sup>2</sup> .year	95-(2.5°C) kWh/m <sup>2</sup> .year or (95-(2.5°C)) + (1,2*(X-15)) kWh/m <sup>2</sup> .year
<b>Other</b>	-	-
<p>** The 'X' is an alternative requirement that has been designed for EPB-units whose poor orientation or compactness makes it unfeasible to enforce compliance with a net heating energy requirement of 15 kWh/m<sup>2</sup>.year.</p> <p>EPB units are defined in the COBRACE as a set of rooms in the same protected volume, which is designed or altered to be used separately.</p>		

*Table 1. Requirements applicable from 2015 to 2017 for new units by unit type\*.*

Units considered as new<sup>7</sup> (>75% change in the envelope and replacement of all technical installations) are subject to the same requirements as new units, with the exception of the net energy use for heating and the total primary energy consumption, for which the requirement is lowered by 20%.

Since 1 July 2017, the requirement for the total energy consumption (PEC) is extended to all non-residential buildings and units (offices, schools, shops, healthcare facilities, courts, laboratories) and the net heating requirement (NHR) for non-residential units was abandoned.

In 2019, the total primary energy consumption (PEC) for non-residential units was reinforced, and a new reinforcement is planned in 2021 in order to achieve NZEB requirements for all unit types. Those requirements will be further strengthened in 2022. The reinforcements are applied to all functional units of public and private buildings.

The requirements as planned for 2021 are presented in Table 2 by unit type.

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<b>Non-Residential</b>	-	$\frac{\sum_f A_{gross\ fct\ f} \cdot PEC_{max\ fct\ f,Uref}}{A_{gross}}$ kWh/m <sup>2</sup> .year Where $PEC_{max\ fct\ f,Uref} = Y \cdot E_{spec\ ann\ prim\ en\ cons,ref}$ $E_{spec\ ann\ prim\ en\ cons,ref}$ : the primary energy consumption of the reference building/unit Y: <table border="1" data-bbox="721 584 1351 1373"> <thead> <tr> <th>Functions</th> <th>Y (2017)</th> <th>Y (2021)</th> <th>Y (2021)</th> </tr> </thead> <tbody> <tr><td>Accommodations</td><td>0.9</td><td>0.9</td><td>0.80</td></tr> <tr><td>Offices</td><td>0.6</td><td>0.45</td><td>0.45</td></tr> <tr><td>Teaching</td><td>0.6</td><td>0.45</td><td>0.45</td></tr> <tr><td>Healthcare with night-time occupancy</td><td>0.9</td><td>0.9</td><td>0.80</td></tr> <tr><td>Healthcare without night-time occupancy</td><td>0.9</td><td>0.9</td><td>0.80</td></tr> <tr><td>Healthcare, operating room</td><td>0.9</td><td>0.9</td><td>0.60</td></tr> <tr><td>Low-occupancy gathering</td><td>0.9</td><td>0.9</td><td>0.80</td></tr> <tr><td>Large-occupancy gathering</td><td>0.9</td><td>0.9</td><td>0.80</td></tr> <tr><td>Gathering, cafeteria / dining room</td><td>0.9</td><td>0.9</td><td>0.70</td></tr> <tr><td>Kitchen</td><td>0.9</td><td>0.9</td><td>0.70</td></tr> <tr><td>Shops</td><td>0.9</td><td>0.9</td><td>0.70</td></tr> <tr><td>Sporting facilities, gymnasium</td><td>0.9</td><td>0.9</td><td>0.65</td></tr> <tr><td>Sporting facilities, fitness / dance</td><td>0.9</td><td>0.9</td><td>0.65</td></tr> <tr><td>Sporting facilities, sauna / swimming pool</td><td>0.9</td><td>0.9</td><td>0.65</td></tr> <tr><td>Technical spaces</td><td>0.6</td><td>0.45</td><td>0.45</td></tr> <tr><td>Common areas</td><td>0.9</td><td>0.9</td><td>0.45</td></tr> <tr><td>Others</td><td>0.9</td><td>0.9</td><td>0.85</td></tr> <tr><td>Unknown</td><td>0.9</td><td>0.9</td><td>0.85</td></tr> </tbody> </table>	Functions	Y (2017)	Y (2021)	Y (2021)	Accommodations	0.9	0.9	0.80	Offices	0.6	0.45	0.45	Teaching	0.6	0.45	0.45	Healthcare with night-time occupancy	0.9	0.9	0.80	Healthcare without night-time occupancy	0.9	0.9	0.80	Healthcare, operating room	0.9	0.9	0.60	Low-occupancy gathering	0.9	0.9	0.80	Large-occupancy gathering	0.9	0.9	0.80	Gathering, cafeteria / dining room	0.9	0.9	0.70	Kitchen	0.9	0.9	0.70	Shops	0.9	0.9	0.70	Sporting facilities, gymnasium	0.9	0.9	0.65	Sporting facilities, fitness / dance	0.9	0.9	0.65	Sporting facilities, sauna / swimming pool	0.9	0.9	0.65	Technical spaces	0.6	0.45	0.45	Common areas	0.9	0.9	0.45	Others	0.9	0.9	0.85	Unknown	0.9	0.9	0.85
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Table 2. As of 1 July 2017, requirements for new units by unit type\*.

### 2.1.ii. Format of national transposition and implementation of existing regulations

In 2013, COBRACE<sup>4</sup> replaced the 2007 EPB ordinance and transposed Directive 2010/31/EU. Several decrees (available at the Brussels Environment website<sup>5</sup>) describe the procedures to be followed and the calculation method and requirements to be met. A set of resources, e.g., a handbook, info-sheets and FAQ, are available at the Brussels Environment website<sup>6</sup> for professionals in the construction sector. An evaluation of the EPB-legislation in the Brussels-Capital Region was carried out in 2015. In November 2015, the government approved the recommendations made by the real estate and construction sectors.

The calculation procedure is defined in an executive order adopted on 21 February 2013. The method is similar to those established in the Flemish and Walloon Regions respectively, and has been modified on 1 July 2017. The calculation method for primary energy already included the RES input, e.g., solar energy (thermal and photovoltaic), biomass heating, geothermal heating and heat pump systems, as well as passive cooling techniques. Changes implemented in July 2017 are integrated into the calculation, among others, for the prescriptions of the 'Ecodesign' Directive 2009/125/EC.

All new or considered as new<sup>7</sup> residential building-units must respect the same primary energy requirement (PEC) expressed in kWh/m<sup>2</sup>. For all new or considered as new non-residential buildings and units, the primary energy requirements are specified by means of a virtual reference building or unit, which coincides with the actual unit in geometry, floor area, orientation and functionality. Due to this reference building approach, each new building or unit has an individual energy performance requirement that takes its specific details into account. This requirement is also expressed in kWh/m<sup>2</sup> (Table 2).

The compliance of the procedure and energy performance requirements are checked by the Brussels Environment Office. The percentage of buildings not meeting one or more of the requirements is less than 2%. The fines are established in the COBRACE Art. 2.6.1. Most of the fines are imposed for not meeting ventilation requirements, whereas non-compliance with the primary energy requirement (E-level before 2015, PEC after 2015) is extremely rare.

Professionals responsible for monitoring new buildings and major renovation projects (called EPB advisors) must be accredited. To become accredited, they must have an architecture or engineering degree and have followed five (5)-day training sessions as well as retraining sessions when requested by the Brussels Environment Office.

Since 2017, an independent organisation performs an inspection of the quality of the work on a randomly selected sample of EPB-advisors. The EPB-advisor can be suspended if the requirements are not met.

### ***2.1.iii. Action plan for progression to NZEB for new buildings***

In the Brussels-Capital Region, the NZEB obligation implemented to comply with Article 9 of Directive 2010/31/EU has been integrated into COBRACE and will make NZEB obligatory by 2021. The new office and teaching buildings (public or not) had to be NZEB as of 2019.

The Brussels-Capital Region has set up ambitious energy standards for new constructions, which were applied starting in 2015. These standards target nearly zero or very low energy consumption and are inspired by the passive standard, where high-energy performance is first achieved similarly to the NZEB requirements. These standards are presented in Table 2.

For residential units, the 2015 EPBD requirements are very ambitious for an urban context and comply with the nearly zero-emission objective. The energy losses are in fact reduced to their minimum (from a cost-optimal perspective) and the need for compensation by renewable energy is implied by the requirement to fulfil the maximum primary energy consumption requirement (45 kWh/m<sup>2</sup>.year); however, the specific RES share is not quantified.

### ***2.1.iv. Requirements for building components for new buildings***

Requirements for building components are the same for new buildings as for renovations. Walls, windows and other parts of the building envelope must meet U<sub>max</sub>/R<sub>min</sub> requirements, which are listed in Table 3.

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However, in order to meet the envelope global performance requirements, the maximum mean U-value for the opaque wall is around  $0.12 \text{ W/m}^2\cdot\text{K}$  and the maximum mean U-value for windows is around  $1 \text{ W/m}^2\cdot\text{K}$ . Moreover, a good sealing of the building is also required to achieve envelope performance requirements with an airtightness around  $1.5 \text{ m}^3/\text{h}\cdot\text{m}^2$ . This is not an obligation but is a consequence of the net heating demand requirement for new residential units.

### ***2.1.v. Enforcement systems new buildings***

The enforcement of building codes starts with the building permit which will be used to determine requirements depending on the use of the building and its characteristics.

Together with the building permit, the EPB advisor must submit, for approval, an EPB proposal. This proposal includes all the projects' details and states if it is compliant with the regulation regarding EPB requirements.

When construction works start, a notification must be sent to the administration.

During construction, the EPB advisor supervises compliance with the EPB requirements on the construction site and collects evidence that all necessary measures to achieve EPB requirements are implemented.

At the end of the construction phase, the EPB declaration and software file must be sent to the administration. All acceptable evidence must be attached to the declaration.

The administration will control the declaration using the provided evidence (photos, technical files, etc.) and in case the requirements are not being met, may apply a fine.

## **2.II. Energy performance requirements: EXISTING BUILDINGS**

### ***2.II.i. Progress and current status of existing buildings (regulation overall performance)***

All types of building units (residential, commercial and public buildings) undergoing renovations are required to obtain a building permit and have to comply with the same U-value requirement level as a new building unit. They also need to comply with a minimum requirement of ventilation rate. In addition, a building undergoing renovation of more than 75% of its surface is subject to the requirements of primary energy consumption (PEC) (considered as new units<sup>7</sup>).

### ***2.II.ii. Regulation on individual parts, distinct from whole building performance***

The walls, windows and other parts of the building envelope must meet the following  $U_{\text{max}}/R_{\text{min}}$  requirements:

Construction part	$U_{\max}$ ( $W/m^2K$ )
<b>1. WALLS DEFINING THE PROTECTED VOLUME, with the exception of the walls forming the separation with an adjacent protected volume.</b>	
1.1. TRANSPARENT / TRANSLUCENT WALLS, except garage doors and doors (see 1.3), curtain walls (see 1.4) and glass bricks (see 1.5)	$U_{W,\max} = 1.8$ (1) $U_{g,\max} = 1.1$ (2)
1.2. OPAQUE WALLS, except doors and garage doors (see 1.3) and curtain walls (see 1.4)	
1.2.1. Roofs and ceilings	$U_{\max} = 0.24$
1.2.2. Walls not in contact with the ground, with the exception of the walls referred to in 1.2.4.	$U_{\max} = 0.24$
1.2.3. Walls in contact with the ground	$R_{\min} = 1.5$ (3)
1.2.4. Vertical and sloping walls in contact with a crawl space or with a cellar outside the protected volume	$R_{\min} = 1.4$
1.2.5. Floors in contact with the outside environment or above an unheated adjacent space	$U_{\max} = 0.3$
1.2.6. Other floors (floors on a median, above a crawl space or above a cellar outside the protected volume, underground cellar floors)	$U_{\max} = 0.3$ or $R_{\min} = 1.75$ (3)
1.3. DOORS and GARAGE DOORS (including frame)	$U_{D,\max} = 2.0$
1.4. CURTAIN WALLS	$U_{CW,\max} = 2.0$ $U_{g,\max} = 1.1$ (2)
1.5. GLASS BRICKS	$U_{\max} = 2.0$
1.6. TRANSPARENT / TRANSLUCENT WALLS OTHER THAN GLASS, except garage doors and doors (see 1.3), curtain walls (see 1.4)	$U_{\max} = 2.0$ (1) $U_{tp,\max} = 1.4$
<b>2. WALLS BETWEEN 2 PROTECTED VOLUMES (4) except garage doors and doors</b>	$U_{\max} = 1.0$
<b>3. THE FOLLOWING OPAQUE WALLS WITHIN THE PROTECTED VOLUME (5) with the exception of garage doors and doors:</b>	
3.1. BETWEEN UNITS 'PEB INDIVIDUAL HOUSING' AND ALL OTHER PEB UNITS	$U_{\max} = 1.0$
3.2. BETWEEN UNITS 'PEB OTHER' AND ALL OTHER PEB UNITS	

Table 3 -  $U_{\max}/R_{\min}$  requirements.

A revision of these values with a reinforcement and a homogenisation of the requirement is currently studied and planned for 2021.

### **2.II.iii. Initiatives/plans to improve the existing building stock**

Actions taken to combat climate change include a revision of energy premiums to encourage renovation works. The resources are concentrated on auditing, insulation and heating works for the benefit of all (households, businesses, communities and public authorities); setting up a programme to equip regional and communal public roofs with photovoltaic solar panels (SolarClick); strengthening the Energy Efficiency Assistance Programme for Public Buildings (NRClick); setting up a programme to support companies and organisations for benefitting energy use throughout society (Energy Pack); adopting tools to support the deployment of solar energy in Brussels, including the mechanism of green certificates, the implementation of freely available standard contracts, the reinforcement of the Brussels green loan, an [online map of Brussels solar potential](https://geodata.environnement.brussels/client/solar/) (<https://geodata.environnement.brussels/client/solar/>) and more.

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Based on all of these actions, the Brussels-Capital Region has laid a solid foundation for energy transition and has defined the building renovation strategy<sup>10</sup>, which is included in the Brussels-Capital Region's Climate Energy Plan 2030<sup>11</sup>, in line with the Regional Air-Climate-Energy Plan. This strategy corresponds to the Region's contribution to the Belgian National Integrated Climate Energy Plan 2021-2030, adopted in October 2019.

### **2.II.iv. Long Term Renovation Strategies, status**

The Brussels renovation strategy<sup>10</sup> was adopted on 25 April 2019 and is aimed at drastically reducing the building stock environmental impact. Its three major cornerstones are:

- increasing the building renovation rate;
- improving the quality of building renovations;
- promoting the rational use of energy within the building.

The strategy consists of a summary document and 34 concrete and detailed action sheets grouped within 5 themes:

- energy performance and sustainability requirements;
- financing and incentives;
- target audience support;
- administrative simplification;
- the so-called 'document, experiment, innovate'.

Concretely, the strategy sets a consumption target of 100 kWh(EP)/(m<sup>2</sup>.year) on average for housing by 2050, i.e., an average level of performance equivalent to a PEB C+ for the entire housing stock.

One of the strategy's action sheets will result in the compulsory establishment of an EPC for each dwelling by 2025; the EPC will list the priority measures, specific to each accommodation, which must be applied in order to improve energy performance and to ultimately achieve the highest level of performance possible.

The dwelling owners will have to carry out at least every five years one of the recommended works (e.g., insulation of walls-roofs-floors, replacement of the windows, replacement of the heating system, etc.).

Goal	Achievement
2025	Realisation of the EPC
2030	Deadline for one of the 5 compulsory measures of the owner's choice
2035	Deadline for the second of the 5 compulsory measures of the owner's choice
2040	Deadline for the third of the 5 compulsory measures of the owner's choice
2045	Deadline for the fourth of the 5 compulsory measures of the owner's choice
2050	Deadline for the fifth of the 5 mandatory measures

*Table 4 Timeline for mandatory renovation works in residential buildings, in compliance with the EPCs.*

For condominiums, the roof, façades and other common areas will be addressed through a report based on all the measures recommended in the EPC for all building units. The co-ownership will be responsible for implementing recommendations relating to the common areas.

By 2050, the tertiary sector must move towards an energy-neutral goal for heating, domestic hot water production, cooling and lighting.

The regulations and tools necessary for its implementation must be available by 2025.

<https://environnement.brussels/news/presentation-de-la-strategie-renovation-aux-horizons-2030-2050-bruxelles>

### **2.II.v. Financial instruments and incentives for existing buildings**

A green loan with a 0-% rate, can be obtained for renovation works in residential buildings for insulation, ventilation or an efficient heating system. More information is available at <http://homegrade.brussels/> (<http://homegrade.brussels/>).

Since 2004, energy premiums are given for renovation works on insulation, mechanical ventilation, efficient heating systems and thermal regulation. The premium level is defined based on the income of the applicant and the type of building (single-family house, multi-family house, non-residential/industrial).

Financial year energy premiums	Number of premiums granted	Amounts granted
<b>2004</b>	1,840	€ 160,200
<b>2005</b>	15,419	€ 1,767,486
<b>2006</b>	18,381	€ 3,797,638
<b>2007</b>	15,126	€ 10,399,637
<b>2008</b>	16,489	€ 15,658,545
<b>2009</b>	25,951	€ 34,267,573
<b>2010</b>	16,652	€ 11,441,477
<b>2011</b>	19,526	€ 14,862,834
<b>2012</b>	13,787	€ 12,354,840
<b>2013</b>	15,169	€ 22,370,360
<b>2014</b>	15,528	€ 23,588,272
<b>2015</b>	17,345	€ 20,022,273
<b>2016</b>	10,925	€ 15,868,296
<b>2017</b>	7,642	€ 11,960,607
<b>2018</b>	9,980	€ 14,565,250
<b>2019</b>	10,394	€ 16,995,334
<b>TOTAL</b>	<b>222,512</b>	<b>€ 218,120,015</b>

*Table 5: Subsidies for energy efficiency improvements in buildings.*

Since 2007, the Brussels-Capital Region calls for exemplary projects in order to enhance and support renovations and new constructions. The purpose is to demonstrate that it is possible to achieve high performing and environmentally friendly buildings within a reasonable budget. Overall, the calls for projects launched between 2007 and 2013 have seen 243 selected projects (for a total of 621,000 m<sup>2</sup>), 189 of which were completed, with financial support for 27 million € from the Region.

### **2.II.vi. Information campaigns / complementary policies**

A new campaign was run during 2019 regarding inspection of heating systems to promote the advantages of complying with the mandatory inspection. The campaign was broadcasted on the radio and through colourful posters displayed in public places (subways, bus stops, bars) (Figure 1).

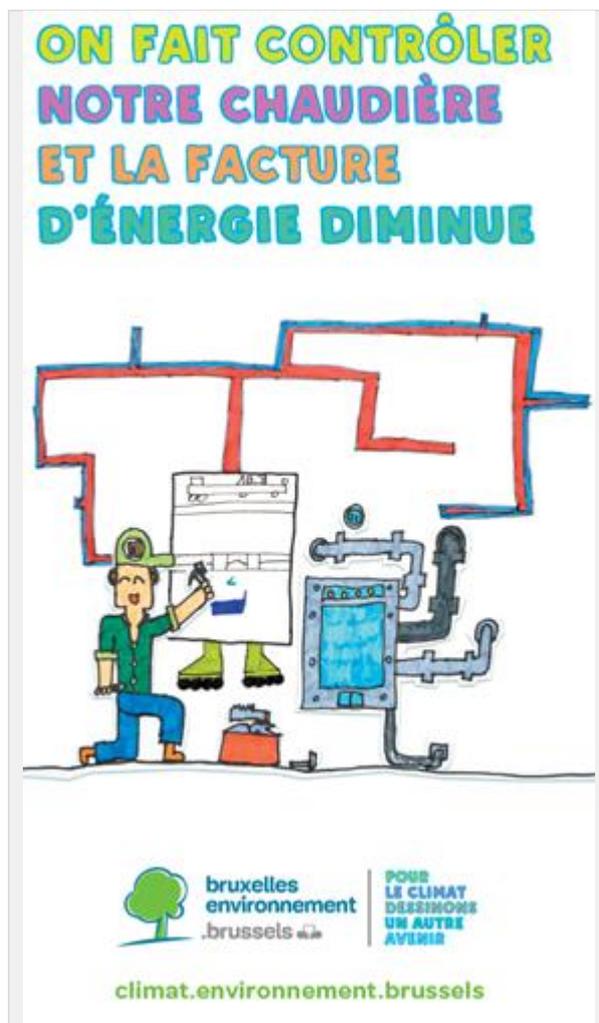


Figure 1. Information campaign for citizens about the mandatory control of boilers.

Regarding certification, no campaign has been launched yet, but a public online register of EPCs was implemented. The aim of this register is to allow potential buyers or tenants to check the validity of the paper-version EPC and to allow landlords to find out whether an EPC exists and is still valid for their own dwelling.

Details on EPCs can be obtained through the EPC unique number or the address which makes information more accessible. The development of the register required a fair amount of legal work.

The register is available on: <https://www.peb-epb.brussels/certificats-certificaten/> (<https://www.peb-epb.brussels/certificats-certificaten/>).

## 2.III. Energy performance certificate requirements

### 2.III.i. Progress and current status on EPCs at sale or rental of buildings

A complete update of the various systems in place for some years has been carried out since 2017. This includes:

- An improved methodology and a [new software](https://www.peb-epb.brussels/certibru-res/certibru-res.jnlp) (https://www.peb-epb.brussels/certibru-res/certibru-res.jnlp) programme incorporating cost-effective recommendations for dwellings.
- A new EPC template for houses and apartments. The new template is more attractive and clear, and highlights the recommendations for both common and private areas in condominiums.
- New software and an enhanced methodology for public buildings developed in early 2017.
- Establishment of a structural dialogue and increased participation of accredited experts.

### **2.III.ii. Quality Assurance of EPCs**

Control on the quality of EPCs in the first six (6) years of implementing the regulation showed that despite communication around frequently made mistakes and modifications carried out on the software, there was no dramatic improvement to EPC quality for dwellings.

A mandatory refresher training to update knowledge has therefore been planned for experts already accredited. They were given a time window of 15 months to attend this refresher training and to pass the subsequent examination before mid-2018 in order to keep their accreditation. In early 2018, as a result of requests from some experts, working groups for some accredited experts were organised to review the terms as well as the contents of the tools of the refresher training.

By the end of 2019, only 345 out of 1,249 accredited experts chose to take the exam, of which 138 were successful (a success rate of 40%).

Those that do not pass the exam lose – in most cases temporarily – their accreditation and get a final chance to take the exam. By the end of 2020, we expect between 150 and 200 experts to remain accredited for residential buildings. Meanwhile, new experts take courses in order to receive the accreditation. This dramatic reduction is worrying; however, the quality of the EPC data is becoming more and more important, as it will trigger huge compulsory investments. While the remaining experts have important work to do, new experts will be motivated and training centers are getting ready for it.

### **2.III.iii. Progress and current status of EPCs on public and large buildings visited by the public**

Buildings occupied by public authorities must display an EPC; this must be updated yearly on the basis of real consumption if more than 250 m<sup>2</sup> of the building is occupied by public authorities.

### **2.III.iv. Implementation of mandatory advertising requirement - status**

The information required in advertisements is the energy consumption in kWh/(m<sup>2</sup>.year) and the energy class.

From the beginning, the mean compliance rate of advertisements with the required information increased from year to year. However, by the end of 2016, it was limited to about 60%. By the end of 2016, a large control campaign with zero tolerance began in order to quickly reach a better rate of compliance. After sending fines to recidivist non-compliant real estate agencies in 2017-2018, the compliance rate reached 84% (92% for real estate agencies and 64% for private sellers/owners) and has remained steady since then.

Therefore, some restricted checks are still carried out to ensure that this higher rate of compliance is maintained.

## **2.IV. Smart buildings and building systems**

### ***2.IV.i. Status and plans on smart buildings***

After an assessment of the current cost/benefit ratio of implementing the Smart Readiness Indicator, taking into account the regulations currently in force in the Brussels-Capital Region and the changes currently being made to them, the Brussels-Capital Region will not implement this indicator, but will incorporate additional regulatory requirements and information in the regulations on technical installations and on the EPB certificate.

### ***2.IV.ii. Regulation of system performance***

The regulations on technical installations in the Brussels-Capital Region provide for technical requirements and control acts carried out by approved professionals.

The technical requirements are aimed at obtaining efficient systems and concern:

- for boilers and water heaters: requirements relating to emissions, minimum efficiency, safety devices etc.;
- for heating and AC systems: requirements for insulation of pipes and accessories, control and automation, metering, energy accounting, heat recovery, partitioning etc.

These regulations also provide for the following acts: the periodic inspection of boilers and water heaters, the control of heating systems after the installation of a boiler, the diagnosis (audit) of heating and AC systems, and a minimum maintenance programme for the systems.

### ***2.IV.iii. Building Automation and Controls (BACs)***

The regulations on technical installations in the Brussels-Capital Region establish requirements in terms of control and automation both at the level of heat/cold production, distribution and heat/cold emitters.

These requirements currently apply when a boiler is installed or replaced.

However, in order to comply with Article 14(4) of Directive 2018/844, a preliminary draft has been drawn up to extend the regulation requirements currently in force and, in particular, to include a requirement for an automation and control system for heating and AC systems with a capacity exceeding 290 kW located in buildings where more than 50% of the floor area is occupied by non-residential EPB units.

### ***2.IV.iv. Status and encouragement of intelligent metering***

Since 2012, an annual subsidy of 368,188 € is provided for the development and availability of the tool NRClick<sup>8</sup> for the Brussels Region's communes. NRClick's goal is to assist public authorities in their energy management (purchase, distribution, use, monitoring). NRClick helps public authorities to achieve their goals – mandatory or not – regarding energy efficiency. The programme is divided in three complementary sections:

- an energy accounting tool, NRClick Scan;
- a service that allows public authorities to access lucrative contracts regarding energy purchase and works of energy efficiency improvement;
- support in the organisation and monitoring of energy efficiency improvement projects.

The energy metering requirements of the installation regulations stipulate that all meters must be equipped with a device that allows remote data recording or reading, in order to facilitate automatic reading and processing of the measured data.

#### ***2.IV.v. Progress and current status on heating systems (Inspection / Equivalence)***

The Brussels Capital Region has adopted the inspection option for heating and AC systems.

The regulations on heating systems have been thoroughly revised in 2018 to take into account developments in the EPBD and the Energy Efficiency Directive. Each requirement has been reformulated to take into account technical and economic feasibility criteria. In making these changes, harmonisation is sought for respective regulations within other regions in Belgium. Professionals can complete a software application to easily encode control attestations and administer all attestations carried out within the framework of these regulations.

Current developments concern:

- the introduction of non-reversible heat pumps;
- the addition of an automation requirement;
- reinforcement of counting requirements;
- the extension of the combined ventilation systems taken into account by these regulations;
- lighter inspections of heating systems in the presence of an energy performance contract;
- extension of the minimum maintenance programme from AC systems to heating systems;
- amendments to assess feedback given since the last revision of these regulations.

#### ***2.IV.vi. Progress and current status on AC systems (Inspection / Equivalence)***

The regulations for AC systems provide for regular diagnosis and for implementing a minimum maintenance programme.

The minimum maintenance programme describes all the operations to be carried out at a minimum on all the equipment of an AC system, as well as their minimum frequency. A preliminary draft is being drawn up to extend this programme to heating and ventilation systems.

The technical requirements were revised in 2018 to take into account technical and economic feasibility criteria. These regulations and the regulations on heating systems, domestic hot water production systems and combined ventilation systems are now considered as a single EPB regulation on the performance of technical installations.

### **2.IV.vii. Enforcement and impact assessment of inspections**

Approximately 2,400 professionals carry out acts within the framework of the regulations on technical installations in Brussels; among them, 5,200 approvals have been processed (5 approvals possible per professional depending on the type of regulatory act; a professional can therefore achieve multiple approvals).

Out of an estimated 350,000 boilers in the Brussels-Capital Region (the precise number of water heaters is not known):

- Approximately 5,000 heating systems are subject each year to a control after installation or replacement of a boiler, which means that these systems are efficient (estimated at 80% efficiency calculated on the higher heating value – also known as gross calorific value – taking into account losses linked to production, distribution, heat emission and regulation).
- From 1 January 2020, all attestations of periodic inspections are processed by the administration. This will soon allow the assessment of the impact of such a control system.

Theoretically, 10% of the boilers and water heaters should be declared non-compliant and therefore adapted or replaced by more efficient systems (see point on the control after placement or replacement of a boiler).

## **3. A success story in EPBD implementation**

In Brussels, the Passive House standard was adopted as the building code in 2015, making it the first region in the world to require such a stringent standard. Recognised then as a leader regarding high-performance building standards, Brussels representatives were invited to New York to show the world what Brussels had to offer in that area of expertise during the Brussels Days 2018<sup>9</sup>. The conclusion of this event culminated in the revealing of the results of the [Ice Box Challenge](http://brusselsdays.brussels/kick-off-event-ice-box-challenge-nyc/) (<http://brusselsdays.brussels/kick-off-event-ice-box-challenge-nyc/>), organised in New York City during the same time. This challenge demonstrated the performance (with no energy added) of a highly efficient envelope.

New York City and Brussels share a common vision – both cities want to achieve a sustainable and renewable future for their communities through ambitious energy saving goals and programmes. Recognising the two cities' expertise, New York City and Brussels aim to build upon their exchange of knowledge and provide mutual support. Together, these two cities, in conjunction with cities around the world, will continue to be leaders in enacting climate legislation and paving the way for a more sustainable future for our children and the environment.

## **4. Conclusions, future plans**

Through the daily experience gained from implementing the different parts of the EPBD legislation operationally, the stakeholders acknowledged more and more the importance of setting ambitious requirements and of building bridges between the different acts provided by the EPBD legislation, its calculation methods, and the data it generates.

## Endnotes

1. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32010L0031&from=EN>  
(<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32010L0031&from=EN>)
2. E-level is the annual primary energy consumption divided by a reference consumption.
3. K-Level is a function of the average U-value of the building envelope weighted by areas and correlated with compacity.
4. <http://www.ejustice.just.fgov.be/eli/ordonnance/2013/05/02/2013031357/justel>  
(<http://www.ejustice.just.fgov.be/eli/ordonnance/2013/05/02/2013031357/justel>)
5. <https://environnement.brussels/thematiques/batiment/la-performance-energetique-des-batiments-peb/construction-et-renovation-5>  
(<https://environnement.brussels/thematiques/batiment/la-performance-energetique-des-batiments-peb/construction-et-renovation-5>)
6. <https://environnement.brussels/thematiques/batiment/la-performance-energetique-des-batiments-peb/construction-et-renovation-7>  
(<https://environnement.brussels/thematiques/batiment/la-performance-energetique-des-batiments-peb/construction-et-renovation-7>)
7. A unit is considered as new when construction and/or demolition-reconstruction works exceed 75% of the area of loss including the placement and/or replacement of all technical installations
8. <https://nrclick.be/nrclick> (<https://nrclick.be/nrclick>)
9. <http://brusselsdays.brussels> (<http://brusselsdays.brussels>)
10. [https://environnement.brussels/sites/default/files/user\\_files/strategie\\_reno\\_fr.pdf](https://environnement.brussels/sites/default/files/user_files/strategie_reno_fr.pdf)  
([https://environnement.brussels/sites/default/files/user\\_files/strategie\\_reno\\_fr.pdf](https://environnement.brussels/sites/default/files/user_files/strategie_reno_fr.pdf))
11. [https://document.environnement.brussels/opac\\_css/elecfile/Plan\\_Energie\\_climat\\_Klimaatplan\\_2030\\_FR](https://document.environnement.brussels/opac_css/elecfile/Plan_Energie_climat_Klimaatplan_2030_FR)  
([https://document.environnement.brussels/opac\\_css/elecfile/Plan\\_Energie\\_climat\\_Klimaatplan\\_2030\\_FR](https://document.environnement.brussels/opac_css/elecfile/Plan_Energie_climat_Klimaatplan_2030_FR))

## Annexes -Key Indicators & Decisions

## Key Indicators & Decisions - General Background

no	Key Implementation Decisions – General Background	Description / value / response	Comments
01.01	Definition of public buildings (according to article 9 b)	Public buildings are those occupied by legal entities defined in COBRACE (see Comments).	Ordinance (COBRACE) of 2013/05/02, art. 2.4.2 §3 With a definition for public authority in art. 1.3.1_4° of the ordinance
01.02	Definition of public buildings used by the public (according to article 13)	The building units used by one or more public authorities in the same building	Ordinance (COBRACE) of 2103/05/02, art. 2.2.14 §2 With a definition for public authority in art. 1.3.1_4° of the ordinance
01.03	Number of residential buildings	164,025 buildings (534,968 units)	Numbers in 2019 <a href="https://statbel.fgov.be/en/themes/housing/building-stock#figures">https://statbel.fgov.be/en/themes/housing/building-stock#figures</a> ( <a href="https://statbel.fgov.be/en/themes/housing/building-stock#figures">https://statbel.fgov.be/en/themes/housing/building-stock#figures</a> )
01.04	Number of non-residential buildings	30,664	Numbers in 2019 <a href="https://statbel.fgov.be/en/themes/housing/building-stock#figures">https://statbel.fgov.be/en/themes/housing/building-stock#figures</a> ( <a href="https://statbel.fgov.be/en/themes/housing/building-stock#figures">https://statbel.fgov.be/en/themes/housing/building-stock#figures</a> )
01.05	If possible, share of public buildings included in the number given in 01.04	630	Numbers in 2019 <a href="https://statbel.fgov.be/fr/themes/construction-logement/occupation-du-sol-selon-le-registre-cadastral#figures">https://statbel.fgov.be/fr/themes/construction-logement/occupation-du-sol-selon-le-registre-cadastral#figures</a> ( <a href="https://statbel.fgov.be/fr/themes/construction-logement/occupation-du-sol-selon-le-registre-cadastral#figures">https://statbel.fgov.be/fr/themes/construction-logement/occupation-du-sol-selon-le-registre-cadastral#figures</a> )
01.06	If possible, share of commercial buildings included in the number given in 01.04	15,887	Numbers in 2019 <a href="https://statbel.fgov.be/en/themes/housing/building-stock#figures">https://statbel.fgov.be/en/themes/housing/building-stock#figures</a> ( <a href="https://statbel.fgov.be/en/themes/housing/building-stock#figures">https://statbel.fgov.be/en/themes/housing/building-stock#figures</a> )
01.07	Number of buildings constructed per year (estimate)	204	Average over 2011-2019 <a href="https://statbel.fgov.be/en/themes/housing/building-stock#figures">https://statbel.fgov.be/en/themes/housing/building-stock#figures</a> ( <a href="https://statbel.fgov.be/en/themes/housing/building-stock#figures">https://statbel.fgov.be/en/themes/housing/building-stock#figures</a> )
01.08	If possible, share of residential buildings constructed per year (estimate, included in the number given in 01.07)	87.6%	Average over 2011-2019 <a href="https://statbel.fgov.be/en/themes/housing/building-stock#figures">https://statbel.fgov.be/en/themes/housing/building-stock#figures</a> ( <a href="https://statbel.fgov.be/en/themes/housing/building-stock#figures">https://statbel.fgov.be/en/themes/housing/building-stock#figures</a> )
01.09	If possible, share of non-residential buildings constructed per year (estimate, included in the number given in 01.07)	12.4	Average over 2013-2015 (240 residential + 30 non-residential) <a href="http://statbel.fgov.be/en/statistics/figures/">http://statbel.fgov.be/en/statistics/figures/</a> ( <a href="http://statbel.fgov.be/en/statistics/figures/">http://statbel.fgov.be/en/statistics/figures/</a> )
01.10	Useful floor area of buildings constructed per year in million square meters (estimate)	/	

**Key Indicators & Decisions - New Buildings**

no	Key Implementation Decision – New Buildings	Description / value / response	Comments
02.01	Are building codes set as overall value, primary energy, environment (CO <sub>2</sub> ), reference building or other	The main indicator is the primary energy consumption; a CO <sub>2</sub> indicator must also be present (without requirement level) and the requirement in non-residential buildings is a function of a reference building primary energy consumption.	
02.02	Requirements for energy performance of residential buildings in current building code	$45 + \max(0; 30 - 7.5 * C) + 15 * \max(0; 192 / VEPR - 1)$ kWh/m <sup>2</sup> .year	C= compactness V= volume of the building-unit
02.03	Requirements for energy performance of non-residential commercial buildings in current building code	Cf table 2	At this point in time, with non-residential units we refer to offices and schools only. C= compactness The 'X' is a reference net heating requirement that has been designed for EPB-units whose poor orientation or compactness makes it unfeasible to enforce compliance with a net heating energy requirement of 15kWh/m <sup>2</sup> .year
02.04	Requirements for energy performance of non-residential public buildings in current building code	Cf table 2 No specific requirement for public buildings, as every building must be NZEB	
02.05	Is the performance level of nearly zero energy (NZEB) for new buildings defined in national legislation?	Yes	
02.06	Nearly zero energy (NZEB) level for residential buildings (level for building code)	$45 + \max(0; 30 - 7.5 * C) + 15 * \max(0; 192 / VEPR - 1)$ kWh/m <sup>2</sup> .year	C= compactness V= volume of the building-unit
02.07	Year / date for nearly zero energy (NZEB) as level for residential buildings (as indicated in 02.04)	2015 (Residential only)	
02.08	Nearly zero energy (NZEB) level for all non-residential buildings (level for building code)	Cf table 2	
02.09	Year / date for nearly zero energy (NZEB) as level for non-residential buildings (as indicated in 02.06)	2019 (offices and teaching buildings) 2021 (All other building uses)	
02.10	Are nearly zero energy buildings (NZEB) defined using a carbon or environment indicator?	No, only Primary Energy Requirement in kWh/m <sup>2</sup> .year	

no	Key Implementation Decision – New Buildings	Description / value / response	Comments
02.11	Is renewable energy a part of the overall or an additional requirement?	Is part of the overall requirement	
02.12	If renewable energy is an additional requirement to NZEB, please indicate level		
02.13	Specific comfort criteria for new buildings, provide specific parameters for instance for airtightness, minimum ventilation rates	Ventilation rate requirements: YES <ul style="list-style-type: none"> <li>• Residential (Annex XIX)</li> <li>• Non-Residential (Annex XX)</li> </ul> Overheating: Yes, for residential units In case of overheating, the temperature shall not exceed 25°C for more than 5% of the year	Defined in the execution order of 2007/12/21 fixing the requirements in matter of energy performance and indoor climate of buildings

## Key Implementation Decision - Existing Buildings

no	Key Implementation Decision – Existing Buildings	Description / value / response	Comment
03.01	Is the level of nearly zero energy (NZEB) for existing buildings set in national legislation?	No	
03.02	Is the level of nearly zero energy (NZEB) for existing buildings similar to the level for new buildings?	Above a certain level, major renovation NZEB requirements are the 'same as for new buildings'. Other existing buildings should reach the target defined in the long-term renovation strategy.	
03.03	Definition of nearly zero energy (NZEB) for existing residential buildings (if different from new buildings)	Same as new buildings with the $PEC_{max}$ level requirement multiplied by 1.2	
03.04	Definition of nearly zero energy (NZEB) for existing non-residential buildings (if different from new buildings)	Same as new buildings with the $PEC_{max}$ level requirement multiplied by 1.2	
03.05	Overall minimum requirements in case of major-renovation	<p><b>For renovations with a less than 75% change in the envelope and replacement of all technical installations:</b></p> <p>U-value requirement (Annex XIV): (Table 3) Ventilation rate:</p> <ul style="list-style-type: none"> <li>Residential (Annex XIX)</li> <li>Non-residential (Annex XX)</li> </ul> <p><b>Definition for units considered as new:</b> A greater than 75% change in the envelope and replacement of all technical installations</p> <p>Requirements: U-value requirement (Annex XIV) (Table 3) Ventilation rate (Annexes XIX &amp; XX) Net Heating Requirement (for residential buildings only): <math>1.2 * \max(15; X)</math> kWh/m<sup>2</sup>.year Primary Energy Requirement (for residential and non-residential buildings): Same as new buildings with the <math>PEC_{max}</math> level requirement multiplied by 1.2</p>	
03.06	Minimum requirements for individual building parts in case of renovation	<p>U-value requirement (Annex XIV): (Table 3) Ventilation rate:</p> <ul style="list-style-type: none"> <li>Residential (Annex XIX)</li> <li>Non-residential (Annex XX)</li> </ul>	Annexes of the execution order of 2007/12/21 fixing the requirements concerning energy performance and indoor climate of buildings
03.07	National targets for renovation in connection to Long Term Renovation Strategy (number or percentage of buildings)	All residential units will have to meet a $PEC_{max}$ requirement of 100 kWh/(m <sup>2</sup> .y) on average.	

no	Key Implementation Decision – Existing Buildings	Description / value / response	Comment
03.08	National targets for renovation in connection to Long Term Renovation Strategy (expected reductions and relevant years)	The target has to be reached by 2050 but the renovation will be planned from 2025 until 2050 in order to achieve this goal. In compliance with the EPC, renovation works must happen for each dwelling/unit every five (5) years from 2025 until the target is met.	

## Key Implementation Decision - Energy Performance Certificates

no	Key Implementation Decision – Energy Performance Certificates	Description / value / response	Comment
04.01	Number of energy performance certificates per year (for instance average or values for of 3-5 years)	3,206 EPC/year for new building units 92 EPC/year for existing non-residential buildings 25,000 EPC's/year for existing houses and apartments	Average (2016-2019)
04.02	Number of EPCs since start of scheme	180,070 of units with an EPC <b>Residential unit:</b> <ul style="list-style-type: none"> <li>• New: 18,055</li> <li>• Existing: 244,600</li> </ul> <b>Non-residential unit:</b> <ul style="list-style-type: none"> <li>• New: 419</li> <li>• Existing: 1,294</li> </ul>	
04.03	Number of EPCs for different building types		
04.04	Number of assessors	565 EPB advisors (for new or renovated) 1,246 EPB certicators (for existing residential buildings), of which in 2018 only 408 completed at least 1 EPC and 246 completed at least 10 EPCs 115 EPB certicators (for existing non-residential buildings)	
04.05	Basic education requirements for assessors	Architecture, architectural engineering, civil engineering, bioengineering or industrial engineering degree or equivalent degree delivered in another state for EPB advisors. EPB certicators may consider the assessor's energy experience in allowing their participation in the courses	
04.06	Additional training demands for assessors	Five (5) days + retraining sessions when requested by the authority. Mandatory refresher training of five (5) days for EPB certicators (for existing residential buildings)	
04.07	Quality assurance system	Quality assurance is set with external quality experts. On a yearly basis, they control 1.5% of issued EPCs. One (1) out of four (4) consists of doing the same EPC in situ.	
04.08	National database for EPCs	Regional	EPBD is a regional competence in Belgium
04.09	Link to national information on EPCs / Database	<a href="https://www.peb-epb.brussels/certificats-certificaten/">https://www.peb-epb.brussels/certificats-certificaten/</a> ( <a href="https://www.peb-epb.brussels/certificats-certificaten/">https://www.peb-epb.brussels/certificats-certificaten/</a> )	

## Key Indicators & Decisions - Smart Buildings and Building Systems

no	Key Implementation Decision – Smart Buildings and Building Systems	Description / value / response	Comment
05.01	Is there a national definition of smart buildings?	No	
05.02	Are there current support systems for smart buildings?	No	Analysis in progress
05.03	Are there currently specific requirements for technical building systems (for instance in building codes)?	Yes	
05.04	Are there current requirements for automatics (for instance in building codes)?	Yes	For control systems
05.05	Chosen option A or B for heating systems (inspection or other measures)	A	
05.06	Number of heating inspections; reports per year (if option A)	Unknown +/- 5,000 attestations/year after the installation of a boiler	The administration only receives periodic inspection attestations for installations that do not comply with the requirements. This situation changes from 2020 onwards: all control attestations must be sent to the administration.
05.07	Chosen option A or B for cooling systems (inspection or other measures)	A	
05.08	Number of air-conditioning / cooling system inspections; reports per year (if option A)	+/- 100/year	
05.09	Is there a national database for heating inspections?	Regional database for the attestations of acceptances and periodic inspection (for periodic inspection, only when the installation does not meet the requirements.)	EPBD is a regional competence in Belgium. This situation changes from 2020 onwards: all control attestations must be sent to the administration.
05.10	Is there a national database for cooling / air-conditioning inspections?	No real regional database	Given the 'small' number of facilities involved, administrative follow-up is carried out on the basis of an excel table.
05.11	Are inspection databases combined with EPC databases for registration of EPCs and inspection reports?	Not yet but scheduled	
05.12	Link to national information on Inspection / Database		



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