CONCERTED ACTION
ENERGY PERFORMANCE OF BUILDINGS

Implementation of the EPBD Belgium - Walloon Region

Status in 2020

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NATIONAL WEBSITES
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1. Introduction

In Belgium, the implementation of the EPBD is the responsibility of the regional governments. This report focuses on implementing the EPBD in the Walloon Region; the Flemish and Brussels regions are responsible for implementing the EPBD within their respective material and territorial jurisdictions.

With the overall revision of the regulations (Decree of 28 November 2013[1] and its execution order of 15 May 2014[2]) carried out (in 2013) as part of the transposition of the Energy Performance of Buildings Directive, the Walloon Region has promoted several developments, such as the display of energy performance indicators within sale and rental advertisements (January 2015), the addition of technical building system requirements (May 2016), and the development of the levels of NZEB requirements (with an intermediate stage in January 2017).

Along with this amendment, the calculation method was extended to all non-residential buildings. This progress made it possible to set overall energy performance requirements for this building type (January 2017). It also set the basis for the certification of non-residential buildings.

Further achievements in the Walloon Region include systematised compliance checks with Energy Performance of Buildings (EPB) procedures and requirements, as well as certification and advertising requirements, including the quality of the services provided by accredited experts.

2. Current Status of Implementation of the EPBD

2.I. Energy performance requirements: NEW BUILDINGS

2.I.i. Progress and current status of new buildings (regulation overall performance)

The administrative procedure for new buildings, subject to an overall energy performance level requirement, is as follows:

At the time of the planning permission request:
• Initial *EPB* statement ('*déclaration PEB initiale*'). This is a document in which the applicant details the measures taken to meet the requirements. It requires a complete energy performance calculation. Compliance with the requirements is mandatory to obtain a building permit. This document is submitted to the administration and uploaded to a central *EPB* database.
At the end of works:
• Final *EPB* statement ('*déclaration PEB finale*'). In this document the applicant demonstrates compliance with the energy performance requirements. This document is also submitted to the administration and uploaded to the same *EPB* database.
• The EPC is then issued by the expert, based on the information provided in the final *EPB* statement.

The amendments to the regulation also set requirements for accrediting qualified experts, which include the requirement to undergo training and pass an examination. To ensure a smooth transition, all previously accredited experts[3] could directly attempt the examination without going through training up until the end of 2016.

Meanwhile, the administration put the necessary elements in place to prepare the sector for the arrival of the 2021 building regulation, which includes the NZEB requirements. Continuous training for qualified experts has been taking place since April 2017.

2.I.ii. Format of national transposition and implementation of existing regulations

Since January 2017, the level of regulatory requirements has been tightened. The previous reinforcement dates back to January 2014. A new reinforcement corresponding to NZEB has been applied on 1 January 2019 for public buildings and will be applied on 1 January 2021 for all other buildings. An overview of the requirements is presented in Table 1.

Requirements		Before EPBD		EPBD				
		Old requirements (2)	Requirements sept '08 - apr '10	Requirements may '10 - aug '11	Requirements sept '11 - dec '13	Requirements jan '14 - dec '16	Requirements jan '17 - dec '20 (dec '18)	Requirements jan '21 (jan '19) - ...
A - U_{max} values ($W/m^2.K$) - New and existing (1) houses, collective housing, hospitals, offices and schools New and existing shops, catering buildings, sports facilities, business and industry								
1.	Walls defining the protected volume, excluding dividing walls with an adjacent protected volume							
1.1.	Windows and other translucent walls, excluding doors, garage doors, curtain walls and glass brick walls	$U_{w,max} = 3.5$	$U_{w,max} = 2.5$ and $U_{g,max} = 1.6$	$U_{w,max} = 2.5$ and $U_{g,max} = 1.6$	$U_{w,max} = 2.2$ and $U_{g,max} = 1.3$	$U_{w,max} = 1.8$ and $U_{g,max} = 1.1$	$U_{w,max} = 1.5$ and $U_{g,max} = 1.1$	$U_{w,max} = 1.5$ and $U_{g,max} = 1.1$
1.2.	Opaque walls							
1.2.1.	Ceilings and roofs	0.4	0.3	0.3	0.27	0.24	0.24	0.24
1.2.2.	Walls without any contact with the ground, with the exception of walls covered in 1.2.4	0.6	0.5	0.4	0.32	0.24	0.24	0.24
1.2.3.	Walls in contact with the ground	0.9	0.9	$R_{min} = 1.0$	$R_{min} = 1.3$	$R_{min} = 1.5$	0.24	0.24
1.2.4.	Vertical walls and sloping walls in contact: - with underfloor spaces	0.6	0.6	$R_{min} = 1.0$	$R_{min} = 1.2$	$R_{min} = 1.4$	0.24	0.24
	- with cellars outside the protected volume	0.9	0.9					
1.2.5.	Floor in contact with the outside environment or above an underfloor space	0.6	0.6	0.6	0.35	0.3	0.24	0.24
1.2.6.	Others floors: - above a crawl space - above a cellar outside the protected volume - basement floors underground	0.9	0.9	$U_{max} = 0.4$ or $R_{min} = 1.0$	$U_{max} = 0.35$ or $R_{min} = 1.3$	$U_{max} = 0.3$ or $R_{min} = 1.75$	0.24	0.24
	- above the ground	1.2						
1.3.	Doors and garage doors	$U_{D,max} = 3.5$	$U_{D,max} = 2.9$	$U_{D,max} = 2.9$	$U_{D,max} = 2.2$	$U_{D,max} = 2.0$	$U_{D,max} = 2.0$	$U_{D,max} = 2.0$
1.4.	Curtain walls	3.5	$U_{CW,max} = 2.9$ and $U_{g,max} = 1.6$	$U_{CW,max} = 2.9$ and $U_{g,max} = 1.6$	$U_{CW,max} = 2.2$ and $U_{g,max} = 1.3$	$U_{CW,max} = 2.0$ and $U_{g,max} = 1.1$	$U_{CW,max} = 2.0$ and $U_{g,max} = 1.1$	$U_{CW,max} = 2.0$ and $U_{g,max} = 1.1$
1.5.	Glass brick walls	3.5	3.5	3.5	2.2	2.0	2.0	2.0
2.	Walls between 2 protected volumes located on adjacent properties	1.0	1.0	1.0	1.0	1.0	1.0	1.0
3.	Opaque walls inside a same protected volume or adjacent to another protected volume on the same property, except for doors and garage doors:							
3.1.	between distinct residential units	1.0	1.0	1.0	1.0	1.0	1.0	1.0
3.2.	between residential units and common spaces (staircase, entrance hall, passage)	-						
3.3.	between residential units and non-residential occupancy spaces	1.0						
3.4.	between industrial occupancy spaces and non-industrial occupancy spaces	1.0						

(1) Renovated buildings where a building permit is mandatory, and unheated buildings changing their occupancy
(2) These U-value requirements do not apply to shops, catering buildings, sports facilities, business and industry

Requirements	Before EPBD		EPBD				
	Old requirements (2)	Requirements sept '08 - apr '10	Requirements may '10 - aug '11	Requirements sept '11 - dec '13	Requirements jan '14 - dec '16	Requirements jan '17 - jan '21 (jan '19)	Requirements jan '21 (jan '19) - ...
B - K values (-) – Global insulation level (function of average U-value and compactness)							
New buildings:							
Houses	K55	K45	K45	K45	K35	K35	K35
Offices and schools	K65						
Collective housing, hospitals, shops, catering buildings, sports facilities and business	-						
Industry	-	K55	K55	K55	K55	K55	K55
Existing unheated buildings changing their occupancy to:							
Houses	K65	K65	K65	K65	K65	K65	K65
Offices and schools	K70						
Other uses (heated)	-						
Existing heated buildings (except industry) changing their occupancy to:							
Houses	K65	-	-	-	-	-	-
Offices and schools	K70						
Other uses (heated)	-						
Existing industry (heated or unheated) changing their occupancy to:							
Houses	K65	K65	K65	K65	K65	K65	K65
Offices and schools	K70						
Other uses (heated)	-						
Others	-	-	-	-	-	-	-

Requirements	Before EPBD		EPBD				
	Old requirements (2)	Requirements sept '08 - apr '10	Requirements may '10 - aug '11	Requirements sept '11 - dec '13	Requirements jan '14 - dec '16	Requirements jan '17 - jan '21 (jan '19)	Requirements jan '21 (jan '19) - ...
C - E_w (-) – Global energy performance level (calculated primary energy consumption divided by calculated primary energy consumption of a reference building) **D - E_{spec} ($kWh/m^2.year$) – Specific energy consumption** (calculated primary energy consumption per m^2 of heating floor area) **E - Overheating rating (K.h)**							
New buildings:							
Houses	-	-	Ew ≤ 100 Espec ≤ 170 Ioverh ≤ 17.500	Ew ≤ 80 Espec ≤ 130 Ioverh ≤ 17.500	Ew ≤ 80 Espec ≤ 130 Ioverh ≤ 17.500	Ew ≤ 65 Espec ≤ 115 Ioverh ≤ 6.500	Ew ≤ 45 Espec ≤ 85 Ioverh ≤ 6.500
Offices and schools	-	-	$E_w \leq 100$	$E_w \leq 80$	$E_w \leq 80$	Ew ≤ [65-90] cf. formula	Ew ≤ [45-90] cf. formula
Other destinations	-	-	-	-	-		
Existing buildings:	-	-	-	-	-	-	-

Table 1. Overview of regulatory requirements (continued on next page)

Requirements	Before EPBD		EPBD				
	Old requirements (2)	Requirements sept '08 - apr '10	Requirements may '10 - aug '11	Requirements sept '11 - dec '13	Requirements jan '14 - dec '16	Requirements jan '17 - jan '21 (jan '19)	Requirements jan '21 (jan '19) - ...
F - Ventilation							
New houses and buildings changing their occupancy to houses	Requirements are set in the annex C2 (based on NBN D50-001)						
New offices, schools and buildings changing their occupancy to offices or schools	Requirements on air outputs are function of premises use	Requirements are set in the annex C3 (based on NBN EN 13779)					
New collective housing, hospitals, shops, catering buildings, sports facilities, businesses and buildings changing their occupancy to these uses	-						
Renovated houses with a mandatory building permit	Partial system (only for supply air if windows are replaced in dry space)					Partial system (only for supply air if windows are placed/replaced in dry space – exhaust air in new wet space)	Partial system (only for supply air if windows are placed/replaced in dry space + exhaust air in new wet space)
Renovated offices and schools with a mandatory building permit	Partial system (only for supply air if windows are replaced in dry space)					Partial system (only for supply air if windows are placed/replaced in dry space – exhaust air in new wet space)	Partial system (only for supply air if windows are placed/replaced in dry space + exhaust air in new wet space)
Renovated collective housing, hospitals, shops, catering buildings, sports facilities and businesses with a mandatory building permit	-	Partial system (only for supply air if windows are replaced in dry space)				Partial system (only for supply air if windows are placed/replaced in dry space – exhaust air in new wet space)	Partial system (only for supply air if windows are placed/replaced in dry space + exhaust air in new wet space)
New and existing industry	-	-	-	-	-	-	-

Table 1. Overview of regulatory requirements.

Since 1 January 2017, all non-residential types of building units (called *PEN units*) and all residential building units (called *PER units*) are covered by a global calculation.

The threshold of the requirement for *PEN units* is variable (Table 2) and depends on the functional parts present in the unit and their respective sizes, according to the following formula:

$$E_{W,PEN,max} = \frac{\sum_f A_{ch,fct\,f} \cdot E_{W,max,fct\,f}}{A_{ch}}$$

with:

$E_{W,PEN,max}$ the threshold for the E_W level of the studied *PEN unit* (dimensionless);
$A_{ch,\,fct\,f}$ the total heated floor area of each function f of the *PEN unit*, in m²;
$E_{W,\,fcf\,f}$ the assumed requirement level per function, for each function *f* of the *PEN unit* (dimensionless);
A_{ch} the total heated floor area of the studied *PEN unit*, in m².

Non-residential units			2017	2021 (2019)
			$E_{W, fcf f}$	$E_{W, fcf f}$
FUNCTIONS	Accommodation		90	90
	Offices		65	45
	Schools		65	45
	Health care	With nocturnal occupation	90	90
		Without nocturnal occupation	90	90
		Operating theatre	90	90
	Meeting places	High occupancy	90	90
		Low occupancy	90	90
		Cafeterias / large dining rooms	90	90
	Kitchen		90	90
	Commerce		90	90
	Sports facilities	Sports hall / gymnasium	90	90
		Fitness Dance	90	90
		Sauna Pool	90	90
	Technical local		65/90	45/90
	Common		65/90	45/90
	Other		90	90
	Unknown		90	90

Table 2. The values of the requirement levels per function $E_{W, fcf f}$ ('2019' for public buildings only).

2.I.iii. Action plan for progression to NZEB for new buildings

NZEB requirements are based on the results of calculations on model geometry, statistical data and subsidy databases[4]. These new requirements were approved by the regional stakeholders of the building sector and adopted by the government on 28 January 2016[5]. They are presented in Table 2.

If Wallonia does not set intermediate targets in terms of the share of new NZEB buildings before 2021, it has nevertheless:

- set up two calls for projects for *Wallonian exemplary buildings* addressed respectively to residential and non-residential buildings, in order to prepare the building sector and citizens for future NZEB requirements. This action covers new buildings as well as the renovation of residential and non-residential buildings. Actual achievements are highlighted on the energy portal site but also in the print and audio-visual media (partnerships with the broadcast '*Une brique dans le ventre*' and '*Clé sur porte*' on the two main French-speaking television channels in Belgium);

- organised seminars with the Union of Towns and Municipalities of Wallonia (*Union des Villes et Communes de Wallonie*) to inform the municipalities of changes to the regulations (NZEB requirements, certification of public buildings, control of regulations related to planning permission, etc.).

Based on requirements for NZEB (see requirements in Tables 1 & 2), 5,719 residential buildings and 236 non-residential buildings included in the *EPB* database already meet the definition of NZEB, representing 11.6% and 18.2% respectively of total final *EPB* statements. All these building units were actually built by the end of 2019.

For residential buildings, the renewable solutions most commonly used to meet the NZEB requirements include the use of a combination of a heat pump and PV (22.6%), a heat pump (20.3%) and PV (15.7%). It is interesting to observe that, in 29.3% of cases, the net energy needs for heating and overheating set out in the NZEB requirements for primary energy consumption are met without the use of any RES system (Figure 1).

For non-residential buildings, the RES solutions most commonly used to meet the NZEB requirements include the use of a heat pump (36.0%), a combination of a heat pump and PV (15.7%) and PV (12.7%), while 34.8% meet the requirements without the use of any RES system (Figure 2).

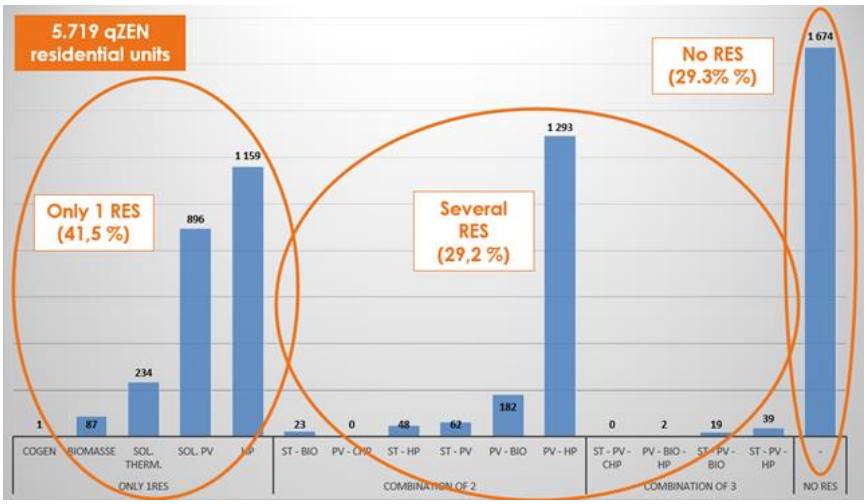

Figure 1. The number of residential built NZEB units and use of RES by the end of 2019.

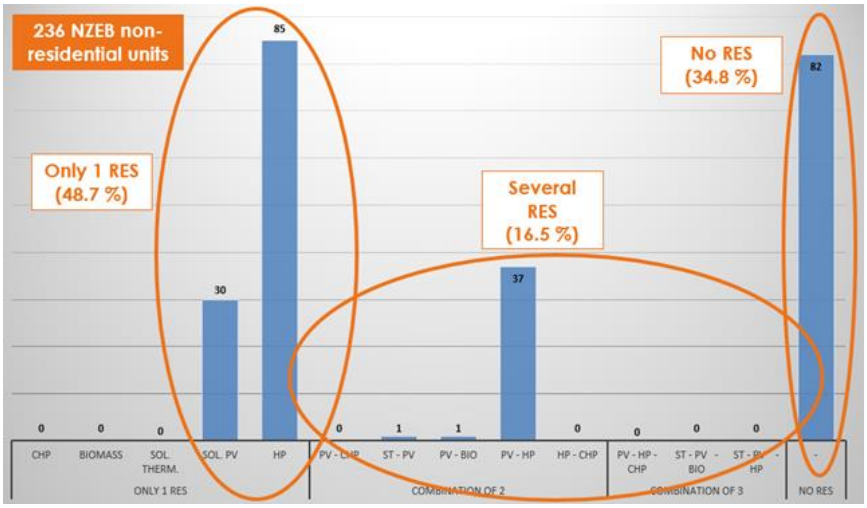

Figure 2. The number of non-residential built NZEB units and use of RES by the end of 2019.

2.I.iv. Requirements for building components for new buildings

As mentioned in Table 1 of section 2.I.ii., there are requirements relating to each element of the building envelope defining the protected building volume (U_{max}). In addition, requirements are also prescribed for the hygienic ventilation rates of the building.

2.I.v. Enforcement systems new buildings

Before starting the construction works, the 'Initial EPB statements' are systematically (100%) checked by the municipal officials who issue the building permits. The statement must comply in order to receive the permit.

The EPB service of the Walloon administration[6] has several controllers who carry out regulatory oversight. The 'Final EPB statements' are automatically and digitally screened and a statistically representative number are picked for human control. A certain number of controls also occur due to complaints (e.g.: from the buyer of turnkey housings).

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A 'Control web' application is used to automatically screen all the EPCs submitted to the database by flagging inconsistent data or out-of-range values and select EPCs to be controlled.

The Walloon EPB service performs different types of controls (See Table 3):

- Administrative controls: on basis of the 'Initial EPB statements' in the database, controllers check if the corresponding 'Final EPB statements' have actually been submitted in due time in the database.
- Technical 'Improvement' controls: the 'Final EPB statement' is checked and, if necessary, corrected with the corresponding impact on the building's requirements.
  The goal here is only to improve the knowledge of experts; no sanction is given.
- Technical 'Full' controls: the 'Final EPB statement' is checked and, if necessary, corrected with the corresponding impact on the building's requirements.
  In case of significant error, the EPB expert in called for a hearing.
  In case of proven fraud, a sanction is given.

When an expert is contacted within the framework of a control, the type of control is immediately specified.

Sanctions for new buildings cases are the following:

- A fine: starting from 250€ to 25,000€ per building unit, doubled in case of recurrence.
  Mean amount: 3,000€, which is generally higher than the mean expert's fee for a case.
- Suspension of accreditation: fine as above + the software account of the expert is blocked until they undertake the mandatory training + examination again. The suspended expert may not finish initiated EPB statements.
- Withdrawal of accreditation: fine as above + the software account of the expert is blocked. They can no longer act as an EPB expert for new buildings and must wait three (3) years before being allowed to retake the mandatory training + examination.

To date, no suspension or withdrawal of accreditation has been imposed to EPB experts for new buildings. Such a decision must be taken by the Minister of Energy and this has never been the case so far.

Year	Number of Initial EPB statements	Number of Administrative controls	Number of Technical 'Improvement' controls	Number of Technical 'Full' controls	Number of hearings	Number of fees
2018	12,802	56	531	209	123	35
2019	13,323	348	529	222	131	67
2020	14,284	98	216	148	87	22

Table 3. Number of EPB statements checked by the regional administration.

2.II. Energy performance requirements: EXISTING BUILDINGS

2.I.i. Progress and current status of existing buildings (regulation overall performance)

The performance of existing residential buildings is assessed by the building certification process. According to the database gathering all the certificates (approximately 600,000 by June 2020), the average energy performance of the Walloon residential units in 2019 corresponds to the EPC energy class F, i.e., a theoretical consumption of 459 kWh/m².year (Figure 3).

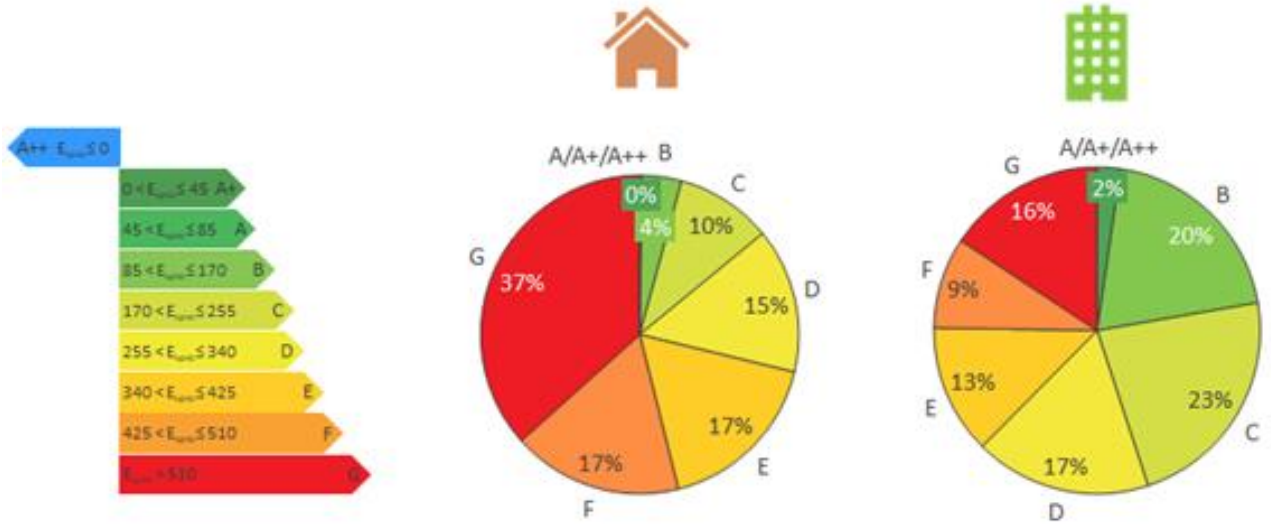
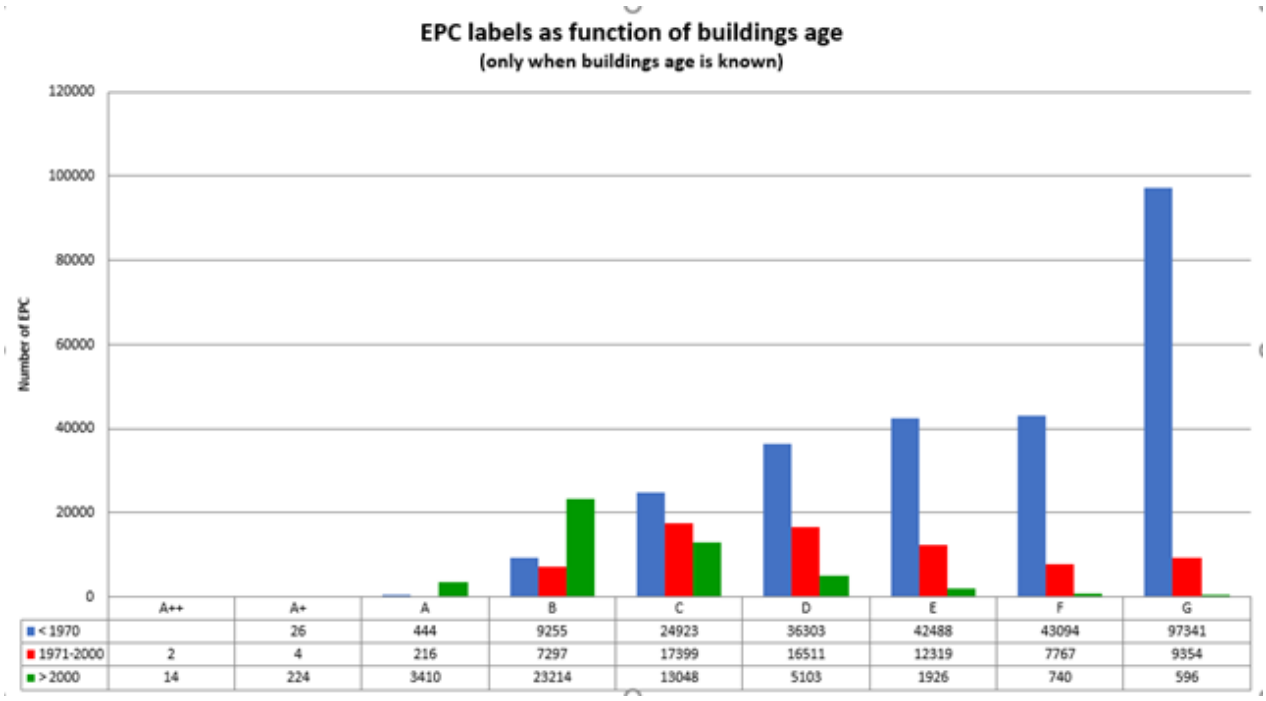
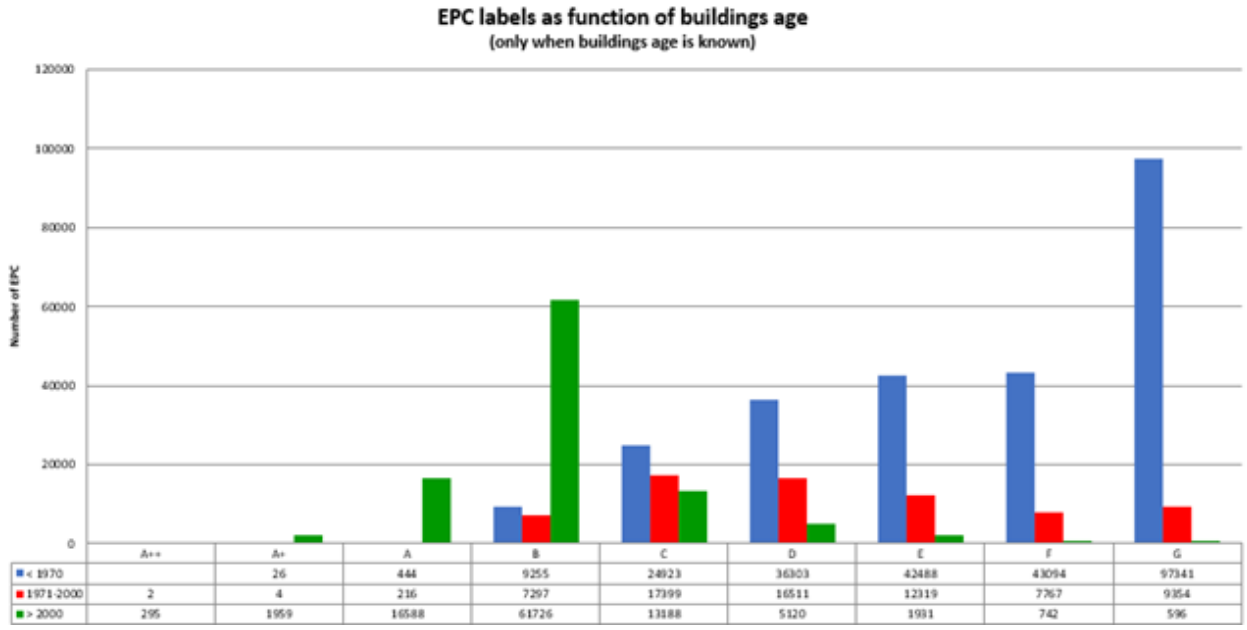


Figure 3. The distribution of Walloon residential buildings by energy performance (EPC database); housing (left) and apartments (right).

The majority of houses show a poor energy performance: 37% at level G, 17% at level F and 17% at level E (Figure 3). The Walloon housing stock is old; almost 25% of the houses were built before 1921 and about 80% date from before 1991. These old buildings consume the most energy (Figure 4).



	A++	A+	A	B	C	D	E	F	G
< 1970		26	444	9255	24923	36303	42488	43094	97341
1971-2000	2	4	216	7297	17399	16511	12319	7767	9354
> 2000	14	224	3410	23214	13048	5103	1926	740	596



	A++	A+	A	B	C	D	E	F	G
< 1970		26	444	9255	24923	36303	42488	43094	97341
1971-2000	2	4	216	7297	17399	16511	12319	7767	9354
> 2000	295	1959	16588	61726	13188	5120	1931	742	596

Figure 4. Repartitioning of EPC energy classes by age of building (by end 2019).
1st graph: existing residential buildings units. 2nd graph: existing + new residential buildings units.

In addition, the existing housing stock has a low rate of renovation; every year, applications for planning permission for refurbishments are submitted for just 1% of the houses.

The total residential energy consumption in 2013 is only 5% higher than its 1990 level, although the housing stock has grown by 16%, and the annual degree-days have increased by 24% during that period. Figure 5 shows the evolution of this consumption.

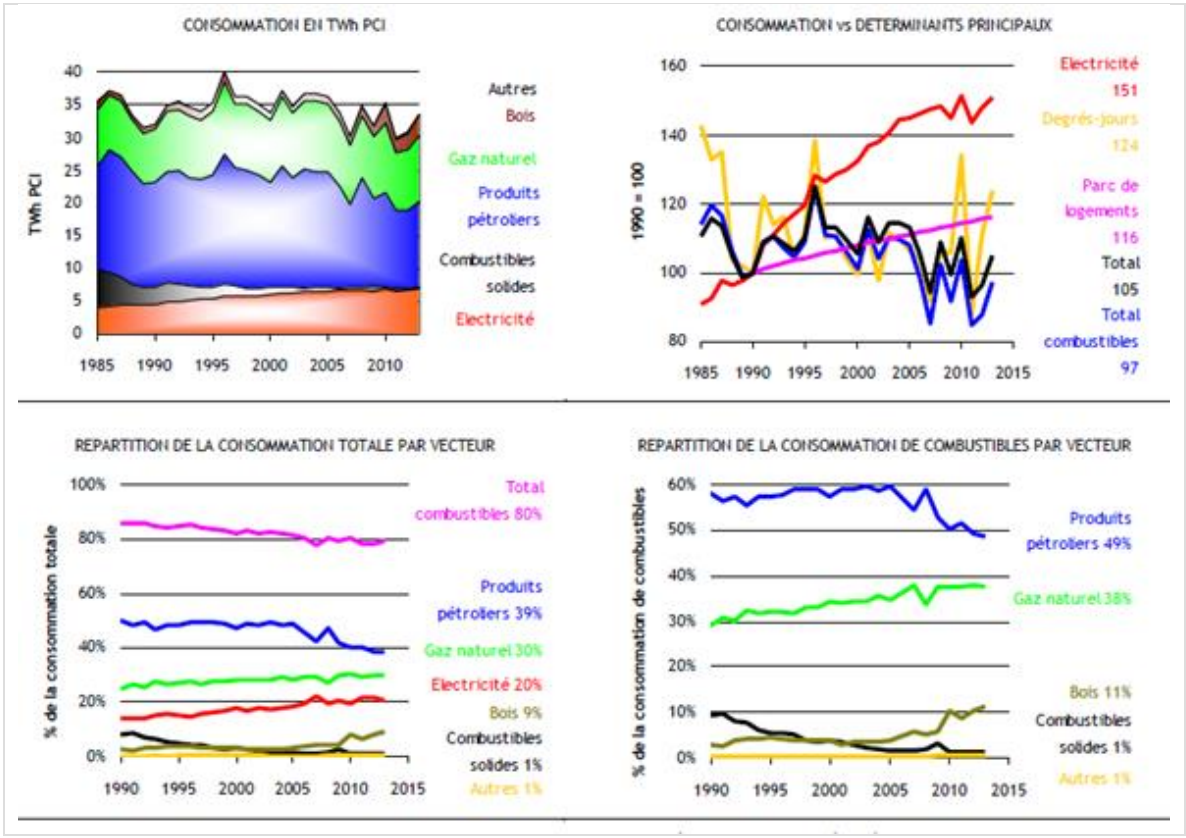


Figure 5. Evolution of the residential sector consumption by energy vector ("Bilans wallons" 2013).

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

The Walloon Region sets several requirements concerning the individual elements of the buildings.

For renovation works, the envelope, walls, window frames, glazings, floors and roofs must have a minimum thermal performance expressed with a U-value [W/m².K]. Since 1 January 2017, the U_{max} values for windows and floors have been strengthened and, up to now, are identical for the three (3) regions of Belgium.

Every time a window sash or glazing is installed or replaced, the room ventilation must foresee a minimum fresh-air-flow rate.

See Table 1 in section 2.I.ii.

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

The NZEB targets in the Walloon Region are closely linked to the planned objectives of the Walloon renovation strategy.

Although the NZEB definition of an existing building has not yet been fixed, the long-term objectives for renovating buildings implicitly include the NZEB targets. The building renovation strategy indeed sets the 2050 target of significantly improving the performance of residential units so that, on average, they will reach the EPC energy class A, whose threshold is set at 85 kWh/m².year, the level defined for new residential NZEB. The intention is to target an identical NZEB level for new and existing buildings.

Intermediate steps in 2020 and 2030 will verify progress and identify the necessary corrective actions for reaching these targets.

For non-residential buildings, the goal is to reach an energy-neutral building stock in 2050 for heating, sanitary hot water, cooling and lighting, which means that these buildings will produce as much energy as they consume.

To achieve its objectives, Wallonia plans to focus on deep renovations and develop tools such as a building passport and a renovation roadmap, enabling all renovation projects to be registered and guided to achieve the global energy refurbishment either in one or in several steps, with the NZEB level being the ultimate target.

Primarily, it will be a matter of utilising each opportunity for improvement (to the envelope or system) to place the building on a path towards the long-term NZEB objective, while at the same time giving priority to renovating the least efficient housing stock (levels G and F).

Concerning Article 5 of the EED, Wallonia has chosen to adopt an alternative approach to the required annual renovation of 3% of existing public buildings.

Wallonia decided to determine its target based on the pre-existing register of buildings' energy performance, with data collected by different institutions in the central government, which can then be compared to the cost-optimal energy performance. This sets the goal of primary energy savings, corresponding to the required 3% of annual savings that must be achieved by each official institution that must comply with this EED requirement (for 2018 results, cf. Table 4).

Obliged area 2013	258,426	m²	
Obliged area 2018	283,224	m²	
Non-compliant area 2013	36,562	m²	14% of obliged building stock
Non-compliant area 2018	23,075	m²	8% of obliged building stock
Surface made conform in 2018 compared to 2013	13,487	m²	37% of 2013 non-compliant building stock though increase of obligated area
Primary energy efficiency 2018 vs 2013	1,701,315	kWh	decrease of 2.3% vs 2013
Final energy efficiency 2018 vs 2013	512,827	kWh	decrease of 1.0% vs 2013

Table 4. 2018 results for Walloon government buildings.

The measures that Wallonia plans to take in order to achieve its energy savings objectives are those recommended by the existing Walloon energy audits[7].

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

The Long-Term Renovation Strategy for Wallonia, integrated into the 4th National Energy Efficiency Action Plan (NEEAP) in 2017, is based on the commitment made by Wallonia to reduce its greenhouse gas emissions by 80% to 95% (all sectors combined) by 2050 compared to the 1990 level (Climate decree - 20/02/2014).

It sets specific objectives for both residential and non-residential buildings as presented in the previous section.

These objectives require the consideration of renovating a building in a comprehensive manner, with a stable and long-term vision of the investments to be made.

To achieve this objective, the LTRS proposes a panel of actions staggered over short-term (2020), medium-term (2030) and long-term (2050) periods to stimulate deep renovations of residential and non-residential buildings.

In order to transpose the more recently introduced EPBD Article 2a, the LTRS will be adapted and completed in consultation with stakeholders.

Amendments and additions will include:

- updating the 2050 roadmap by integrating the decarbonisation objective, including milestones (2030, 2040, 2050) in line with the National Energy Climate Plan;
- the definition and identification of trigger points in the life cycle of the buildings and the specific actions that can be linked to those trigger points in terms of energy renovation;
- more actions targeting 'split incentives' and energy poverty, public authorities, the promotion of smart technologies and connected buildings, and actions to simplify access to support mechanisms for the mobilisation of investments;
- the quantification of the expected benefits in terms of energy savings and related co-benefits;
- measurable progress indicators.

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

Concerning residential buildings, there are two main forms of incentives aimed at improving energy performance:

- Allowances covering part of the cost of renovation works (Table 5). These basic allowances may be increased according to household income (Table 6).
  A new subsidy system ('*Primes Habitation*'[8]) has entered into force in June 2019 for residential buildings. It is based on an energy audit. For some allowances (mainly insulation), the amount of the support is calculated by comparison between the situations 'before and after works' stated in the audit.

- Short-term credit (*Ecopacks / Renopacks*[9]) or mortgage loans (*Accesspack*[10]) at preferential rates. The amount of allowances for the proposed works shall be deducted from the loan amount.

Eligible works	Criteria	Funding
Thermal insulation of roofs (by contractor)	U ≤ 0.20 W/m² K, for each roof section	0.15 c€ per kWh of 'transmission losses' saving stated by energy audit
Thermal insulation of walls (by contractor)	U ≤ 0.24 W/m² K, for each wall section	0.15 c€ per kWh of 'transmission losses' saving stated by energy audit
Thermal insulation of floor (by contractor)	U ≤ 0.24 W/m² K, for each floor section	0.15 c€ per kWh of 'transmission losses' saving stated by energy audit
Window frames & glazing (by contractor)	Uw ≤ 1.5 W/m² K, on average on all replaced windows Ug ≤ 1.1 W/m² K, for each glazing	0.15 c€ per kWh of 'transmission losses' saving stated by energy audit
Installation of heating system and/or sanitary hot water system (by contractor)	SHW heat pump (with criteria on minimum efficiency)	500 €
	Heat pump for heating and combination heat pump (with criteria on minimum efficiency)	1,000 €
	Biomass boiler (with criteria on minimum efficiency and maximum flue emissions)	1,000 €
	Biomass stove (with criteria on minimum efficiency and maximum flue emissions)	250 €
	Solar water heater (with minimum SHW annual coverage criteria)	750 €
	Small upgrades (pipe insulation, change of pipe/storage tank environment, installation of a variable speed circulation pump or of thermostatic valves, …)	0.15 c€ per kWh of the energy savings stated by energy audit
Installation of ventilation system (by contractor)	Full mechanical exhaust-only ventilation system with demand control functionality	500 €
	Full double flow mechanical ventilation with heat recovery unit	1,200 €
Performing of energy audit	By an assessor	110 €

Table 5. Types of eligible works for an energy allowance and amount of basic allowances (as of 1 June 2019).

Income category	Household reference income	Increase of basic premium
C1	Less than or equal to 23,000 €	Base allowance multiplied by **6**
C2	Higher than 23,000 € and less than or equal to 32,700 €	Base allowance multiplied by **4**
C3	Higher than 32,700 € and less than or equal to 43,200 €	Base allowance multiplied by **3**
C4	Higher than 43,200 € and less than or equal to 97,700 €	Base allowance multiplied by **2**
C5	Higher than 97,700 €	Base allowance multiplied by **1**

Table 6. Increase in basic allowances by household income categories (as of 1 June 2019).

2.II.vi. Information campaigns / complementary policies

A general communication campaign, called 'Walloreno'[11] has been launched in 2020, which aims to promote all the actions linked to the renovation of buildings in Wallonia and to raise citizens' awareness of energy renovation. It includes videos on several types of media, press articles, posters and flyers.

Meanwhile, the Walloon Region continuously provides information on EPCs, energy performance in buildings requirements, energy efficiency, etc. to the general public as well as to professionals through different communication tools:

The various publications available are:
• in the 16 energy information centres of the Department of Energy and Sustainable Buildings (*called "Guichet Energie Wallonie"*);
• in the 10 general information centres of the Walloon Region;
• in 10 annual fairs and exhibitions related to building and energy;
• on the website http://energie.wallonie.be (947,000 visits from 1 January 2019 to 31 December 2019).
A banner campaign to promote the EPC on the most relevant property sales & rentals website (*immoweb.be*)
Press articles in:
• "*Architrave*" (quarterly magazine for architects);
• "*SudPresse*" (daily press).
• 'Je vais construire'
• 'Les échos du logement' (Figure 6)
Video sequences are broadcasted on public and private Belgian television channels as well as YouTube®.

Figure 6. Information campaigns – Magazine 'Les échos du logement'.

2.III. Energy performance certificate requirements

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

a. Oversight and administration system

For existing residential buildings, a dedicated, stand-alone software called *PACE*[12] is used by assessors to input the building data collected, after which the server generates the EPC. The *PACE* software includes built-in validation rules which prevent incomplete EPCs from being sent to the database. It also contains validation rules for input data to prevent mistakes (with rules prohibiting or flagging certain values). The files with the building data and the EPC are recorded in a database before the certificate is sent to the assessors by e-mail in a PDF format.

b. How apartments are certified in apartment buildings

Certification is performed individually for each apartment. In case systems are collective (e.g., heating or cooling system, ventilation, and/or RES), an assessor performs an initial report regarding those collective systems, and data is collected and inputted into a database in order for the certificates for each connected apartment to be issued.

c. Format and content of the EPC

For residential buildings, the EPC (Figure 7) contains graphics regarding the global evaluation of energy performance, information on input data and recommendations. It also includes illustrations and comments as well as explanations of the importance and type of documentation that can be considered as acceptable evidence.

CERTIFICAT PEB

Certificat de Performance Énergétique (PEB)
Bâtiment résidentiel existant

Numéro :
Établi le :
Validité maximale :

Wallonie

Logement certifié

Rue : n° : boîte : /

CP : Localité :

Certifié comme : **Maison unifamilale**

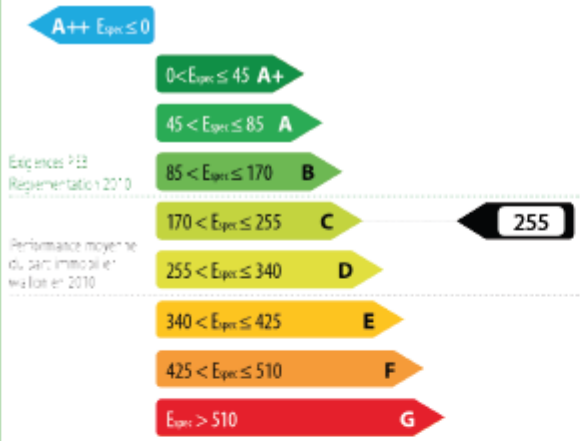
Date de construction : Entre 1971 et 1980

Performance énergétique

La consommation théorique totale d'énergie primaire de ce logement est de **57 105 kWh/an**

Surface de plancher chauffé : **224 m²**

Consommation spécifique d'énergie primaire : **255 kWh/m².an**



Indicateurs spécifiques

Besoins en chaleur du logement

excessifs | élevés | moyens | faibles | minimes

Performance des installations de chauffage

médiocre | insuffisante | satisfaisante | bonne | excellente

Performance des installations d'eau chaude sanitaire

médiocre | insuffisante | satisfaisante | bonne | excellente

Système de ventilation

absent | très partiel | partiel | incomplet | complet

Utilisation d'énergies renouvelables

sol. therm. | sol. photovolt. | biomasse | pompe à chaleur | cogénération

Certificateur agréé n° XXXXXX-XX-XXXXX

Nom / Prénom :
Adresse :
n° : boîte :
CP : Localité :
Pays :

Je déclare que toutes les données reprises dans ce certificat sont conformes au protocole de collecte de données relatif à la certification PEB en vigueur en Wallonie. Version du protocole 01-sept.-2014. Version du logiciel de calcul 2.1.0.

Date : 21/10/2014

Signature :

Le certificat PEB est un document obligatoire lors de tout acte de vente, location ou opérant un transfert de droit réel sur un bâtiment (voy. Article 237/28 du CWATUPE pour la liste exhaustive des actes visés). Il doit être fourni au plus tard lors du compromis de vente ou lors de l'acte de bail. Il donne des informations sur la performance énergétique du bien et indique les mesures générales d'améliorations qui peuvent y être apportées.
Ce certificat PEB est établi par un certificateur agréé conformément aux articles 583 et suivants du CWATUPE, sur base des informations et données récoltées lors de la visite du bâtiment.
Pour de plus amples informations, consultez le Guichet de l'énergie de votre région ou le site portail de l'énergie energie.wallonie.be

Figure 7. Graphic layout of the EPC.

d. EPC activity levels

Between June 2010 and late June 2020, more than 600,000 EPCs for existing residential buildings were registered in the database. This represents about 38% of the building stock. It is not possible to know how many EPCs have been issued for building renovations, since it is not a mandatory EPC input data.

For new residential buildings, 53,870 EPCs have already been issued and registered in the database.

e. Typical EPC costs

For existing residential buildings, the certification process is quick (about four hours), in order to keep the price – which is displayed on the certificate – low. In the early stages of certification, the average price for single-family houses was 480 € (VAT included). Currently, it is about 240 € (VAT included). The average price for an apartment was initially 250-350 € and is currently about 165 €.

The total turnover generated since the beginning of the certification of existing residential buildings in June 2010 is about 141 million € (VAT included).

f. Assessor corps

By June 2020, more than 1,780 assessors were accredited.

For a firm to be accredited, there must be at least one accredited expert working for the company.

g. Compliance levels by sector

From May 2015, an administrative fine of 1,000 € is due in the absence of an EPC at the time of the transaction. The fine will be doubled in the case of recidivism within three (3) years. From 1 January 2019 to 31 December 2019, this fine has been applied eleven (11) times. Other fines are also incurred, e.g., for failing to communicate EPC results to the buyer or tenant.

2.III.ii. Quality Assessment of EPCs

A '*Control web*' application is used to automatically screen all the EPCs submitted to the database by flagging inconsistent data or values and selecting a statistically representative number of EPCs to be manually controlled.

Its main functionalities are:

- screening of suspicious EPC data (based on improved data analysis feedback) and identifying the problematic certificates;
- randomly selecting EPCs to be checked so that each qualified expert gets regularly controlled;
- providing an interface for exchange between qualified experts and controllers;
- archiving control documents related to assessors.

The controller has access to a summary panel where information on each qualified expert can be found, e.g., the total number of EPCs submitted, the EPCs with inconsistencies and the EPCs selected for random control. The controller also has access to the EPC details and the list of inconsistencies.

If the investigation concludes that a control procedure should be launched, for example, due to frequently occurring errors, the controller notifies the qualified expert of their errors and requests that supporting documentary evidence are provided. If necessary, wrong EPCs are corrected. Table 7 shows the number of

EPCs selected by the control web application and the total EPCs available in the database, per year. Table 8 presents the number of EPCs checked by the administration.

Whether the qualified expert receives a sanction or not depends on the frequency, quantity and type of errors, as well as on their impact on the EPC outcome, particularly on the label of the building. The sanctions range from a simple warning to withdrawal of accreditation:

- 'Simple' warning: the rules are recalled to the expert during the hearing.
- Warning + mandatory training: the expert may continue to work but has some time to follow the mandatory training again (without having to pass the examination again). Training attendance is compulsory. If this is not done by the end of the allotted time, its approval is suspended (see below).
- Suspension of accreditation: the software account of the expert is partially blocked until he performs the mandatory training again (+ examination). The suspended expert may only finish the certificates already in progress and he cannot begin new ones.
- Withdrawal of accreditation: the software account of the expert is fully blocked. He can no longer act as an EPB expert and must wait three (3) years before being allowed to retake the mandatory training.

Table 9 shows the number of sanctions applied over the years.

		certificates with SI status			certificates with AI status		
Year	Number of certificates	SI	SI*	% (SI+SI*)	AI	AI*	% (AI+AI*)
2016	68,574	48,840	2,592	74%	16,783	858	26%
2017	62,029	42,151	2,189	71%	16,738	945	29%
2018	60,812	37,453	1,954	65%	20,329	1,071	35%
2019	60,299	37,912	2,043	66%	19,291	1,053	34%

AI means certificates with inconsistent data or values

AI* means randomly selected certificates with inconsistent data or values

SI means without inconsistent data or values

SI* means randomly selected without inconsistent data or values

Table 7. Number of EPCs selected by the Control web application and the total EPCs available in the database, per year.

Year	Certificates checked	Certificates with errors	Certificates without errors or with an insignificant error	Certificates with suspicion of errors (still under checking)
2016	2,146	1,548	596	2
2017	2,143	1,642	501	0
2018	881	704	177	0
2019	1,073	812	261	0

Table 8. Number of EPCs checked by the administration, per year.

Year	Hearings	Warnings	Warnings + training	Suspension of accreditation	Withdrawal of accreditation
2016	30	8	4	18	0
2017	22	8	3	11	0
2018	9	5	0	3	1
2019	7	3	1	3	0

Table 9. Number of hearings of EPC experts and number of sanctions applied, per year.

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

For public buildings visited by the public, a web software called *ECUS*[13] was created to input the collected building data.

The certificate indicates the energy class of the building according to its type. This is based on the operational rating being converted into primary energy per m^2. The certificate also contains a graph showing the real consumption of electricity and combustible fuel for the last three (3) years and other specific indicators.

The deadlines are as follows:

- Buildings occupied by European and international institutions, federal, regional, community, provincial and municipal authorities: 1 January 2021.
- Buildings occupied by organisations created, approved or controlled by the above institutions: 1 January 2022.
- Buildings intended for early childhood education or care: 1 January 2022.

There is not yet an energy register of public buildings.

It was estimated that +/- 11,000 public buildings had to be certified:

- +/- 4,500 buildings by the deadline of 1 January 2021.
- +/- 6,500 buildings by the deadline of 1 January 2022.

By the end of 2019, there were no public buildings certified as yet. Public authorities took a long time to launch public procurements to do so. The first certificates were established in 2020.

2.III.iv. Implementation of mandatory advertising requirement – status

The display modes of indicators are:

- the energy label
- E_{spec} expressed in kWh/m².year
- E_{total} expressed in kWh/year
- the EPC ID number

The need to display indicators and ID numbers varies depending on advertising supports (Table 10).

	Mention to be integrated in **GRAPHIC** form	Mentions to integrate in **TEXT** format (or orally)			
	Energy Label 	**Energy Label "PEB: C" "PEB: from G to A++"**	**EPC ID "PEB No. ..."**	**Specific Primary Energy Consumption (kWh/m² per year) "E_{spec}: 123 kWh/m².year"**	**Primary Energy Consumption (kWh per year) "E_{total}: 12345 kWh/year"**
Ads (newspapers, magazines, etc.)					
in text format only	Not required	Mandatory	Mandatory	Recommended	Recommended
with pictures	Mandatory	Not required	Mandatory	Recommended	Recommended
Posters					
in text format only	Not required	Mandatory	Mandatory	Not required	Not required
with pictures	Mandatory	Not required	Mandatory	Recommended	Recommended
Real Estate Listings					
in text format only	Not required	Mandatory	Recommended	Not required	Not required
with pictures	Mandatory	Not required	Mandatory	Not required	Not required
Brochures and leaflets					
relating to a building, unit lot or apartment building	Mandatory	Recommended	Mandatory	Mandatory	Mandatory
Internet & mobile apps					
index pages	Mandatory	Not required	Not required	Not required	Not required
detailed pages	Mandatory	Not required	Mandatory	Mandatory	Mandatory
Direct Marketing					
emailings, newsletters	Mandatory	Recommended	Mandatory	Mandatory	Mandatory
Broadcast chanel					
	Mandatory	Not required	Mandatory	Not required	Not required
Radio					
	Not applicable	Mandatory	Not required	Not required	Not required

Table 10. Mandatory advertising requirements.

The display of indicators is primarily the responsibility of the owners (seller or lessor) as well as professional representatives (lawyers or real estate agents). Publishers and third parties involved in the sales process do not have any responsibility.

Failure to display energy performance indicators in advertising is a punishable offence. This provision should be interpreted broadly so that poor communication in achieving the regulation objectives is also punishable (e.g., having a display too small to be readable).

The decree foresees a fixed administrative fine of 500 € if the energy performance indicator(s) of the EPCs are absent from the advertisement. The fine is doubled in case of recidivism within three (3) years. Controls are performed by the Regional Administration of Energy. From 1 January 2017 to 31 December 2019, fines have been applied 133 times.

2.IV Smart buildings and building systems

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

By the end of 2019, Wallonia has no policies in place concerning the management of smart buildings.

However, in some aspects of the regulations, there are punctual requirements for regulation systems (i.e., a minimum regulation scheme for non-residential ventilation systems). The EPB calculation methodologies also encourage the building projects to be equipped with regulating systems or optimisers but it is not mandatory to fulfil the EPB requirements.

Proposals for new actions will be made in the yet-to-come update of the region's LTRS.

2.IV.ii. Regulation of system performance

Every time a heating, AC or ventilation system is installed, replaced or upgraded in existing residential and non-residential buildings, it must fulfil some minimum requirements related to energy. These requirements entered into force on 1 May 2016 (Table 11).

The transposition of Article 9.3 of the EED requires meters to also be placed in case of centralised distribution of heat and/or cold between several buildings and between several building units within a building. These specific requirements also apply to new buildings.

Wallonia intends to extend the scope of the technical building system requirements to new buildings.

Works submitted or not as part of a building permit	Performance	Insulation	Energy metering
Existing buildings	• Gas boiler • Oil boiler • Electrical heat pumps • Direct electric heating • Ice-water cooling machines • Ventilation heat recovery unit	• Hot water pipes • Ice-water pipes • Air ducts	• Large installations • Central source servicing multiple buildings • Central source servicing multiple units within a building
New buildings and assimilated	Accounted for in global performance calculation	Accounted for in global performance calculation	• Central source servicing multiple buildings • Central source servicing multiple units within a building

Table 11. Energy-related requirements for installed, replaced or upgraded heating, AC or ventilation systems.

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

By end 2019, it is not mandatory to install any kind of system regulation for heating and/or cooling. Nevertheless, a system for automatic regulation is set up most of the time on the field (from basic to evolved ones).

Along with the transposition process of Directive (EU) 2018/844, a mandatory system regulation requirement with two levels will be set:

- A 'standard' level, which will be applied to all heating and/or cooling systems when a generator is installed or replaced. This level will include the self-regulating devices requirement of Directive (EU) 2018/844, Article 8.1;

- An 'advanced' level, which will be applied to bigger systems. This level will include the buildings automation and control devices required by Articles 14 & 15 of Directive (EU) 2018/844. The nominal thermal power threshold will be 290 kW.

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

It is mandatory through the technical building system requirements to ensure that energy metering is undertaken for large installations. An overview is given in Table 12. The meters need to comply with harmonised standards and be readable either on-site or remotely. Smart metering is not yet mandatory.

Type of installation	Condition	Type of meter
Gas and liquid fuel boiler	> 100 kW thermal output	Fuel meter
Gas and liquid fuel boiler	> 400 kW thermal output	Calorimeter
Solid fuel boilers	> 100 kW thermal output	Calorimeter
Electrical heat pumps	> 12 kW thermal output	Electricity meter
Electrical heat pumps	> 100 kW thermal output	Calorimeter
Solar thermal panel	> 10 m²	Calorimeter
Cooling (ice-water)	> 12 kW thermal output	Electricity meter
Cooling (ice-water)	> 100 kW thermal output	Calorimeter
Cooling tower / External dry cooler		Electricity meter
Mechanical ventilation	> 10,000 m³/h	Electricity meter
Central heating or cooling source servicing multiple buildings		Calorimeter at each building*
Central heating or cooling source servicing multiple units within a building		Calorimeter at each unit or heat cost allocator on each radiator*
*If technically and economically feasible.		

Table 12. Energy metering requirements for large installations.

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

The choice made regarding inspections for heating and AC systems was to carry out inspections as described in sections 1 and 2 of Articles 14 and 15 of the EPBD.

For heating, the inspection consists of a boiler efficiency assessment, called 'periodic control', and a boiler sizing assessment, called 'in-depth diagnosis'. The former is mandatory at least every year for oil and solid fuel boilers, every two years for gas boilers with a rated power higher than 100 kW, and every three years for gas boilers with a rated power less than or equal to 100 kW. The latter is performed at the same time and need not be repeated as long as the heating system or the heating needs of the building remain the same.

Accreditations are managed by the Walloon Air Climate Agency (AwAC[14]). Their internal certification management system has recently been reviewed. Currently, 18 training centres are accredited for providing training to technicians inspecting liquid fuel boilers, and 15 for inspecting gas fuel boilers. At the end of December 2019, 2,625 technicians were certified to inspect gas fuel boilers, and 2,559 for liquid fuel boilers.

Participating administrations (DGO4[15] & AwAC) are currently reviewing the regulation. Wallonia plans to add a certification for solid fuel boilers and a carbon monoxide level check for the indoor air of the boiler room. The inspection reports will also be systematically computerised to simplify the control of certified

technicians. Those digital reports will serve as input data or as update data for the yet to come building passports.

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

For AC, two executive orders are in force and concern, among other things, leakage checks. A legal text modification containing energy aspects still needs to be developed.

On the field, there are already professionals who audit AC systems. These inspections are not mandated by regulation.

After the revision of the executive orders is published and in force, accredited AC experts will have to complete specific training at an accredited training centre in order to be allowed to carry out energy inspections on AC systems. Energy-related trainings will complement this scheme.

Accreditations will also be managed by the AwAC to keep a simple and coherent pattern for the recognition procedures of professionals for both heating and AC inspections.

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

a. Enforcement and penalties

According to the Walloon Environmental Code[16], compliance control in accordance with the relevant executive orders is the responsibility of the Department of Environmental Police and Controls of the Walloon Region. This decree also defines the penalties that may be imposed on persons violating these regulations.

The owner of a boiler is punishable for not performing inspections. The category of the infraction is set in the '*Loi relative à la lutte contre la pollution atmosphérique*'[17] (Federal Law of 28 December 1964). Sanctions are provided in the Environmental Code[18] Decree of 27 May 2004 and Executive Order of 17 March 2005. The associated penalties are a fine ranging from 100 to 100,000 € or from 8 days to 6 months of imprisonment. The issuance of a statement for infringement is rare (about two (2) to three (3) statements per year).

Due to a lack of human resources, controls operated by the pollution repression unit of the Walloon Region up until now mainly occur in response to complaints.

b. Quality control of inspection reports

For heating, as regards inspections on specific energy aspects, no inspection reports have yet been validated.

Quality assurance for AC will be the same as for heating systems, but inspections have not yet begun (see section 2.IV.v., above).

c. Impact assessment

No impact assessment has been made for heating inspections. The goal for Wallonia is to perform such an assessment when the new systematic electronic data input for inspection reports is operational.

No energy impact evaluation can be made regarding AC system inspections as inspections have not yet begun.

3. A success story in EPBD implementation

The Walloon Region has initiated different projects with the aim of giving actors, ranging from individual house owners up to governmental officials, a better understanding of the possibilities of energy efficiency measures, thereby empowering them to undertake relevant actions.

Some key elements of such projects include:

1. Cost Optimal Tool

A review of the cost-optimal study has been performed in 2018.

In addition to the report to be sent to the Commission, this study has also developed a software tool to automate the simulations necessary for its input. Indeed, one of the parameters influencing the accuracy and representativeness of the cost-optimal study is the number of simulations applied to the reference buildings and the number of reference buildings themselves. To circumvent the burden resulting from encoding large numbers of simulations, a software tool was developed via a public tender. This tool allows *EPB*-related data to be systematically analysed and cross-referenced with economic data.

The tool makes it possible to automatically apply a large number of variants to the reference buildings modelled using the regulatory *EPB* software. It also makes it possible to extract energy performance results which are then automatically processed in a calculation cost unit. All possible simulations can therefore be tested. The tool then presents the results in terms of the global cost of the energy measures under consideration (Figure 8 and Figure 9).

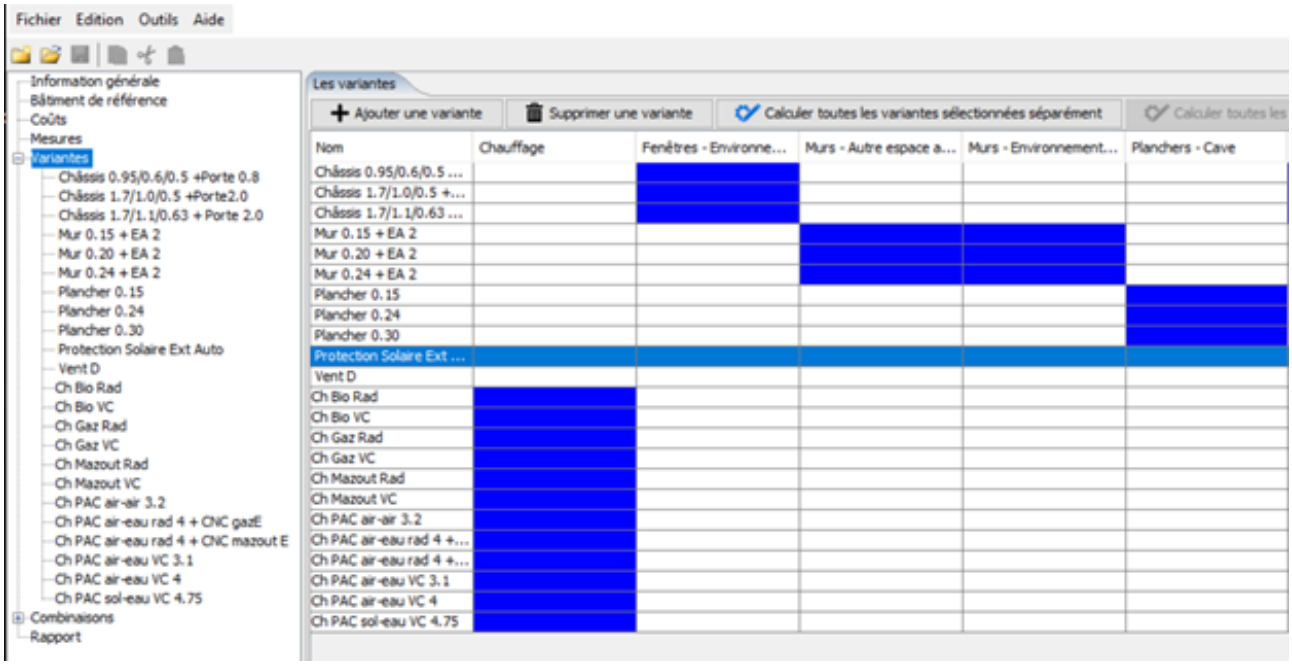


Figure 8. Cost-optimal tool software: Definition of scenario's to be simulated.

Figure 9. Cost-optimal tool software: Results.

2. "Quickscan" Tool

Quickscan is a new tool developed within the framework of the integrated LIFE project BE REEL[19]. It is an awareness and communication tool for citizens. It is a free application, usable on smartphones, tablets and PCs, allowing citizens to quickly assess the energy level of their home without professional help, taking into account the improvements already made.

The tool also provides standardised recommendations for renovating housing in order to achieve the energy class A.

Intended to make the owners of a property not having an EPB certificate aware of the potential for improving their home, it will be the gateway to other support tools such as the housing energy audit, the energy information centres of the Department of Energy and the accredited energy advisors. The tool is available on www.monquickscan.be.

3. The energy roadmap

Also covered by the framework of the integrated LIFE project BE REEL, the housing audit was supplemented by the energy roadmap, which summarises the building's renovation path, in the form of individual steps to be followed to achieve A label. The tool provides personalised recommendations to achieve this, accompanied by the respective cost.

The roadmap allows:

- a visualised glance at the potential for energy improvement of the building compared to the overall entire building stock objective (label A). If this objective cannot be achieved, the auditor will explain the reasons in the report;
- to determine the path of renovation to be followed to achieve this objective;

- to chart the phases of the works while having a global vision of the renovation project, so as to anticipate future works and a good coordination thereof, avoiding the lock-in effects resulting from a poorly planned renovation;
- to quantify the costs of the works and the gains generated by them;
- to highlight the co-benefits of renovation linked to comfort, health, the property's real estate value or environmental impacts.

4. Conclusions, future plans

Since the Walloon Government took note of an ambitious Walloon renovation strategy on 20 April 2017 and integrated it into the 4th NEEAP (currently being updated and expected by 10 March 2020), the Walloon Region will work on following the priorities identified in the strategy:

- adapting all incentive schemes, in order to focus more on energy performance improvements and on GHG emissions reduction (NB: already done for the 'Primes Habitation' regime);
- certifying professionals involved in energy efficiency improvement works;
- pursuing the ongoing development of the passport tool, in order to allow an integrated and long-term renovation projects approach, linking with incentives schemes, EPCs, AC & heating inspections and technical building systems requirements;
- ensuring that the various actions and policies currently being carried out by the administration are consistent with the objectives set by the strategy and serve the achievement of these objectives;
- defining indicators to verify the correct trajectory pursued by the administration to achieve the objectives of the strategy;
- strengthening the new LTRS to reach a decarbonised building stock by 2050.

Endnotes

1. Décret relatif à la performance énergétique des bâtiments; https://wallex.wallonie.be/contents/acts/19/19400/6.html
   NB: This legal text in currently under revision in line with the EPBD 2018 transposition.

2. Arrêté du Gouvernement wallon portant exécution du décret du 28 novembre 2013 relatif à la performance énergétique des bâtiments; https://wallex.wallonie.be/contents/acts/20/20131/8.html
   NB: This legal text in currently under revision in line with the EPBD 2018 transposition.

3. Experts with a master's degree in architecture or engineering sciences

4. Subsidy databases contain information such as physical characteristics and costs regarding currently constructed buildings in which the energy performance is much better than the current requirements and comparable to the foreseen NZEB requirements.

5. Arrêté du Gouvernement wallon portant exécution du décret du 28 novembre 2013 relatif à la performance énergétique des bâtiments; https://wallex.wallonie.be/contents/acts/3/3459/2.html

6. Service public de Wallonie, Département de l'Energie et du Bâtiment durable, Direction des Bâtiments Durables

7. '*Procédure d'avis énergétique - PAE2'* is a dwelling energy audit.
   '*Audit énergétique UREBA*' concerns public buildings, educational buildings and buildings of the non-market sector.

8. '*Primes Habitation*' webpage: https://energie.wallonie.be/fr/primes-habitation-a-partir-du-1er-juin-2019.html?IDC=9792

9. swcs.be/

10. flw.be/

11. 'Wallonreno' website: https://www.walloreno.be/fr/

12. 'PACE' software: https://certification.energie.wallonie.be/

13. 'ECUS' software: https://energie.wallonie.be/fr/exoneration-de-la-redevance-voirie.html?IDC=8790

14. 'AwAC' website: http://www.awac.be/

15. 'DGO4' website: https://energie.wallonie.be
    Note: For heating inspections, all information is centralised on this unique site: https://awac.be/guichet-technique/agrements-3/reglementation-relative-aux-installations-de-chauffage/

16. 'Code du droit de l'environnement. - Livre I^{er}. - Dispositions communes et générales' https://wallex.wallonie.be/index.php?doc=4549

17. 'Code du droit de l'environnement. - Livre I[er]. - Dispositions communes et générales' https://wallex.wallonie.be/index.php?doc=4549

18. *Article D151 of Environmental Code:* « Les infractions de troisième catégorie sont punies d'un emprisonnement de huit jours à six mois ou d'une amende d'au moins 100 euros et au maximum 100.000 euros ou d'une de ces peines seulement. »

19. 'LIFE project BE REEL' website: www.be-reel.be

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)	Buildings occupied by: 1 ° European and international institutions, federal, regional, community, provincial and municipal authorities; 2 ° any organisation meeting the following conditions: a) created or approved by the authorities referred to in 1 °; b) responsible for a public service; c) not part of the legislative or judicial power; d) controlled or determined in its operation by the authorities referred to in 1 °	
01.02	Definition of public buildings used by the public (according to article 13)	Public buildings (see 01.01) are frequently visited by the public when their access to the public is free, without any condition other than a possible registration or a possible payment of an entrance fee.	
01.03	Number of residential buildings	+/- 1,600,000 dwellings +/- 1,348,000 buildings	
01.04	Number of non-residential buildings	+/- 75,400 buildings	
01.05	If possible, share of public buildings included in the number given in 01.04	+/- 31,700 buildings	
01.06	If possible, share of commercial buildings included in the number given in 01.04	+/- 19,400 buildings	
01.07	Number of buildings constructed per year (estimate)	+/- 8,100 buildings	
01.08	If possible, share of residential buildings constructed per year (estimate, included in the number given in 01.07)	+/- 6,800 buildings	
01.09	If possible, share of non-residential buildings constructed per year (estimate, included in the number given in 01.07)	+/- 1,300 buildings	
01.10	Useful floor area of buildings constructed per year in million square meters (estimate)	+/- 3 Mm²	

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_2), reference building or other?	Residential: absolute kWh/m² primary energy indicator (E_{spec}) + relative primary energy indicator (E_W) Non-residential: relative primary energy indicator (E_W)	
02.02	Requirements for energy performance of residential buildings in current building code	$E_{spec} \leq 115$ kWh/m² and $E_W \leq 65$	
02.03	Requirements for energy performance of non-residential commercial buildings in current building code	Interpolation based on surfaces between $E_W \leq 65$ and $E_W \leq 90$, depending on functional parts present in the unit	
02.04	Requirements for energy performance of non-residential public buildings in current building code	Interpolation based on surfaces between $E_W \leq 45$ and $E_W \leq 90$, depending on functional parts present in the unit	
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)	$E_{spec} \leq 85$ kWh/m² and $E_W \leq 45$	
02.07	Year / date for nearly zero energy (NZEB) as level for residential buildings (as indicated in 02.04)	For building permits from 1 January 2021 onwards	
02.08	Nearly zero energy (NZEB) level for all non-residential buildings (level for building code)	Interpolation based on surfaces between $E_W \leq 45$ and $E_W \leq 90$, depending on functional parts present in the unit	
02.09	Year / date for nearly zero energy (NZEB) as level for non-residential buildings (as indicated in 02.06)	For building permits from 1 January 2021 onwards	
02.10	Are nearly zero energy buildings (NZEB) defined using a carbon or environment indicator?	No	
02.11	Is renewable energy a part of the overall or an additional requirement?	No RES requirement	
02.12	If renewable energy is an additional requirement to NZEB, please indicate level	N.A.	
02.13	Specific comfort criteria for new buildings, provide specific parameters for instance for airtightness, minimum ventilation rates	• Types of eligible ventilation systems are described, and minimum flow rates are prescribed • Overheating criterion • No specific criteria for airtightness	

Key Indicators & Decisions – 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	The next LTRS version (10 March 2020) will set an average criterion on the building park. This strategy will have to be approved by the Walloon Government in 2020
03.02	Is the level of nearly zero energy (NZEB) for existing buildings similar to the level for new buildings?	Yes. For existing buildings, this will be an average requirement for the building stock that must be fulfilled by 2050. It will be the same E_{spec} value as for new buildings.	Other new buildings criteria (by example: K-level, …) will not be set for existing buildings.
03.03	Definition of nearly zero energy (NZEB) for existing residential buildings (if different from new buildings)	Same as for new buildings	
03.04	Definition of nearly zero energy (NZEB) for existing non-residential buildings (if different from new buildings)	NZEB requirement for non-residential needs to be reshaped to use E_{spec} instead of E_W.	
03.05	Overall minimum requirements in case of major renovation	The building unit should aim to reach Class A ($E_{spec} \leq 85$ kWh/m²) by 2050.	An individual renovation roadmap will show the way to go for the building. The building passport will monitor the path taken by the buildings' stock on its way to 2050.
03.06	Minimum requirements for individual building parts in case of renovation	Same U_{max} values as for new buildings. Partial ventilation flow rates in case of wall replacement and addition/replacement of windows	It is planned that every building will have an individual renovation roadmap with a Class A goal. The auditor performing the analysis must justify if Class A is not reachable and needs to stay as close as possible to Class A. Works on individual building parts will have to be coherent with the roadmap.
03.07	National targets for renovation in connection to Long Term Renovation Strategy (number or percentage of buildings)	The residential building stock must be 'Class A' ($E_{spec} \leq 85$ kWh/m²) on average; impact expected on all buildings.	
03.08	National targets for renovation in connection to Long Term Renovation Strategy (expected reductions and relevant years)	Reduction of the energy consumption (EPB-related uses of energy) of residential buildings by 62% compared to 2005.	

Key Indicators & Decisions – 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)	2019: 60,299 2018: 60,807 2017: 62,023	
04.02	Number of EPCs since start of scheme	By late 2019: existing residential buildings: 596,904 new residential buildings: 53,870	
04.03	Number of EPCs for different building types	Residential buildings (new + existing): 650,774	
04.04	Number of assessors	Existing residential buildings: +/- 1,780 Public buildings: 160	
04.05	Basic education requirements for assessors	Several specific diplomas, mainly: Architects, Engineer, Bachelor's in construction, or two (2) years of relevant experience in the energy aspects of buildings	
04.06	Additional training demands for assessors	Mandatory training + examination	
04.07	Quality assurance system	Performed by administration	
04.08	National database for EPCs	Yes	
04.09	Link to national information on EPCs / Database	Not publicly available	

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	
05.03	Are there currently specific requirements for technical building systems (for instance in building codes)?	Yes	Heating, DHW, AC & Ventilation - only for existing buildings
05.04	Are there current requirements for automatics (for instance in building codes)?	No	There will be something by 2020 due to transposition of Directive (EU) 2018/844.
05.05	Chosen option A or B for heating systems (inspection or other measures)	Option A	
05.06	Number of heating inspections; reports per year (if option A)	About 760,000 reports must be issued per year for boilers.	
05.07	Chosen option A or B for cooling systems (inspection or other measures)	Option A	
05.08	Number of air-conditioning / cooling system inspections; reports per year (if option A)	Inspection has not yet begun	
05.09	Is there a national database for heating inspections?	No	It is planned, with a link to the building passport.
05.10	Is there a national database for cooling / air-conditioning inspections?	No	It is planned, with a link to the building passport.
05.11	Are inspection databases combined with EPC databases for registration of EPCs and inspection reports?	No	EPC & Inspections will be registered in independent databases.
05.12	Link to national information on Inspection / Database	Not yet	The building passport will summarise and give access to all the information about a building unit.

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