Implementation of the EPBD in Belgium

STATUS IN DECEMBER 2014
Flemish Region

1. Introduction

In Belgium, the implementation of the EPBD is the responsibility of the regional governments. The Flemish Energy Agency (VEA) and the Ministry of Environment, Nature and Energy are the responsible public bodies in the Flemish Region. They are also in charge of managing the certification scheme and the accreditation of experts, as well as the compliance checking. A central register is used to archive all certificates, as well as the calculations of new building requirements.

In 2012, an evaluation process of the Flemish legislation was finalised. The Nearly Zero-Energy Building (NZEB) requirements and the path towards 2021 were imposed by the Flemish government in 2013. In general, this path is well accepted and the sector is gradually evolving towards more demanding low and NZEB standards for new buildings. New requirements for Technical Building Systems (TBS) will come into force in 2015. Changes to the expert accreditation system for new and renovated buildings are planned for 2015 as well.

This report presents an overview of the current status of implementation and plans for the evolution of EPBD implementation in the Flemish region. It addresses, among other issues, certification and inspection systems, including quality control mechanisms, training of qualified experts (QE) and information campaigns.

2. Current status of Implementation of the EPBD

I. ENERGY PERFORMANCE REQUIREMENTS

In Belgium, regulations on building energy performance are set at the regional level. However, the three regions cooperate to establish a common methodology for new and refurbished buildings, leaving each region free to define its own requirements. Also, the three regions use a jointly developed single software tool (Figure 1). VEA is the responsible public organisation for the energy performance requirements in the Flemish Region.

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NATIONAL WEBSITES
Energy performance requirements for builders: www.energiesparen.be/epb/energieprestatieregelgeving
Energy performance requirements for professionals: www.energiesparen.be/epb/prof/home
Energy performance certificates: www.energiesparen.be/epc
Regular inspections of heating installations: www.stook-zuining.be
Audit of heating installations: www.energiesparen.be/verwarmingsaudit
Inspection of air-conditioning (AC) systems: www.lne.be/themas/erkenningen/airco-energiedeskundige
I.i. Progress and current status

The most important requirement concerns energy performance. The dimensionless E-level (the annual primary energy consumption divided by a reference consumption) is the maximum allowed energy performance level for new residential buildings, offices and schools. Flemish regulations do not yet cover the global energy performance of other non-residential functions. The introduction of an E-level for other residential buildings (hotels, hospitals, retail) is planned in 2017. From 2006 till 2009, the maximum E100-level represented a reference package of measures. Up to 2014, it was subsequently reduced by 40% to E60, based on cost-optimal studies (Figure 2).

Since 2006, all U-values requirements have been strengthened for all new and renovated buildings and the global insulation level was decreased from K45 to K40\(^1\). A new requirement on the net energy demand for heating was introduced in 2012 for residential buildings (max. 70 kWh/m\(^2\)). A new requirement on the share of renewables was introduced in 2014, according to which new buildings need a minimum share of at least 10 kWh/m\(^2\).year) of energy derived from renewable energy.

\[^1\] Non-residential buildings and industrial buildings that do not have an E-level requirement must also fulfil this K-level, U-value and ventilation requirements.
sources. Alternatively, residential buildings can choose one of six specific and quantitative measures (a thermal solar energy system, a photovoltaic (PV) solar energy system, a biomass boiler, stove or qualitative combined heat & power (CHP), a heat pump, a connection with district heating or cooling on renewable energy, or a participation in a renewable energy project) (Figure 3).

Until 2014, almost 170,000 final declarations (calculations of the energy performance requirements in as-built situations) were sent to the central register (Figure 4). The analysis by the VEA[2] indicates that the average E-level decreases every year. This evolution is most evident for new single-family houses. The amount of single-family houses with an E-level higher than E60 drops from nearly 95% for building permits in 2006 to 65% for building permits in 2010 and 50% for building permits in 2012 (Figure 5). The average E-levels of flats, offices and schools decrease more slowly. These results are shown in (Figure 6).

Another key to success is the alignment of the requirements with targeted support mechanisms. Data on energy performance shows that the support mechanisms are a driver for early-adopters of low E-level building. As shown in Figure 7, in 2011, subsidies for E60 and E40 contributed to the improvement of the E-levels of new residential buildings.

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

Energy performance requirements for new and renovated buildings in the Flemish Region first started in January 2006. The legislation was consolidated in the energy decree of 2009 and the energy law of 2010. Each new building must fulfill requirements on energy performance (E-level)[3], on insulation (U-values and global insulation 'K-level') and on the indoor air quality and thermal comfort (risk of overheating and ventilation). Renovated buildings must meet requirements on insulation and indoor air quality and, from 2015 onwards, requirements on TBS (see Chapter II).

The energy performance level or E-level sets the maximum allowed primary energy use for a building. The calculation


www.energiesparen.be/vlaamsenieuwbouw

[3] The E-level in the Flemish Region for residential buildings differs from the Ew-level in the Walloon Region, since the reference is calculated differently and the Ew-level is additionally adjusted for the heated floor area. The E-level is the same as in the Brussels Capital Region for residential buildings and identical in the three regions for schools and offices.
includes, e.g., thermal bridges, shading devices and infiltration rate. The airtightness measurement has to comply with the requirements of a quality assurance scheme. Two energy performance methodologies are described in the energy law: one for residential buildings, and the other for offices and schools (including public offices and schools). The primary energy factor for electricity is 2.5, and for other sources it is 1.

A methodology for all non-residential functions based on EN standards, has been developed and will be implemented in software during 2015. An updated method including cooling is in use since 2014.

The VEA checks the compliance with the procedures (submitting, to a central database, a calculation at the start and again at the as-built situation) and with the requirements. The amount of calculations submitted at the start of the construction and in the as-built situation is still growing (Figure 8). The evolution of the average E-level shows clear progress in the new building stock over recent years. The small increase in 2011 is due to the obligation then newly imposed to calculate the impact of thermal bridges (Figure 9). In case of non-compliance with the procedures (sample check), the builder receives a warning to submit the calculation to the central database. The number of such warnings amounted 2,000 in the year 2012 and increased to 3,400 in 2013. The central database checks that each individual building meets all the requirements. The compliance rate of new buildings with the E-level and for most other requirements is very high (> 99% for E-level) (Figure 10). For the ventilation requirements however, the compliance rate is lower. In most cases, the ventilation systems are incomplete (e.g., extraction in some rooms is missing). Still, the evolution of the compliance rate since 2006 shows improvement, whereas the tightening of the requirements does not influence the compliance rate. Those responsible for buildings that, after being warned, do not comply with the procedures, or that do not meet the requirements, receive an administrative fine (Table 1).

The VEA checks a building sample on the quality of the as-built calculations. In 2013, 173 calculations (0.5%) were checked, 31 penalties were issued and a limited number of experts were suspended (Table 1).
I.iii. Cost-optimal procedure for setting energy performance requirements

The cost-optimal study of 2012 showed a cost-optimal E-level of E50 for new residential buildings, offices and schools (Figures 11 and 12). The cost-optimal study results were also used to develop a plan for further incremental tightening of the requirements until 2021.

A part of the study investigated the E-level for renovated buildings. Subsequently, a new requirement is set for ‘thorough energetic renovations’. From 2015, all major building renovations (residential, offices and schools) involving 75% or more of the building shell or replacement of the whole HVAC system will have to meet the E90 level.

Some U-values were sharpened for all new and renovated buildings. A new set of U-values was created for existing insulated walls (e.g., existing cavity walls). The overview of the required U-values since 2006 is shown in Table 2.

In 2014, a tendering procedure was set up for carrying out cost-optimal studies and evaluating requirements for residential buildings, as well as for all types of non-residential buildings.
I.iv. Action plan for progression towards Nearly Zero-Energy Buildings (NZEBs)

National application of the NZEB definition

The cost-optimal study established two NZEB-levels that had an equivalent overall life-cycle cost as the 2012 requirements: the E30 for residential buildings and the E40 for offices and schools. With current costs, the NZEB level is thus beyond cost-optimal, i.e., it is the solution that is closest to zero energy among those that are cost-effective.

On 29 November 2013, the Flemish government imposed requirements to tighten the energy performance indicator (E-level) as follows:

a. for residential buildings: E50 in 2016, E40 in 2018, E35 in 2020 and E30 (=NZEB-level) in 2021;

This incremental tightening (Figure 2) is based on the cost-optimal study for NZEBs, updated in 2012 and 2013, taking into account the methodology framework provided by the European Commission in 2012.

Apart from the E-level, the NZEB definition for new buildings includes additional requirements and an obligation for a minimal share of energy from renewable energy sources (RES).

The NZEB definition for new buildings is thus:

> energy performance: E-level ≤ 30 (residential buildings) or E-level ≤ 40 (offices and schools);
> insulation: K-level ≤ 40 and $U_{\text{max}}$ as shown in Table 2, column ‘from 2016’;

<table>
<thead>
<tr>
<th>Table 2: Overview of maximum U-values since 2006.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum U-value (in W/m²·K)</td>
</tr>
<tr>
<td>from 2006 to 31/12/2009</td>
</tr>
<tr>
<td>Roofs, ceilings to attics</td>
</tr>
<tr>
<td>Outer walls</td>
</tr>
<tr>
<td>Floors on the ground, or above cellars</td>
</tr>
<tr>
<td>Windows (profile + glazing)</td>
</tr>
<tr>
<td>Glazing</td>
</tr>
<tr>
<td>Insulated existing walls (outside)</td>
</tr>
<tr>
<td>Insulated existing walls (cavity)</td>
</tr>
<tr>
<td>Insulated existing roofs</td>
</tr>
<tr>
<td>Insulated existing floors in contact with outdoor environment</td>
</tr>
</tbody>
</table>
> net energy demand for heating ≤ 70 kWh/m²;
> ventilation and overheating requirements;
> minimum-level of renewable energy, as described earlier.

More information on the Flemish NZEB-definition can be found online[4].

In 2015, further studies will be executed to produce a NZEB definition for existing residential buildings. This definition will probably be more flexible than the one for new buildings.

**Figures and statistics on existing NZEBs**

In 2012, one in 25 new single-family houses fulfilled the NZEB requirements (Figure 13). Following completion of the NZEB-definition and promotional initiatives undertaken by the government (Figure 14) and the building industry, it is expected that this share will increase.

NZEB demonstration projects are becoming more widespread. Two interesting case studies are the ‘Sustainable Quarter’ in Waregem (Figure 15) with a focus on the affordability of NZEB-houses (E13, total primary energy use of 6 kWh/m².year), and the ‘Zero Energy Bank Office’ in Gooik (Figure 16).


The Flemish strategy for the renovation of buildings (EED Article 4) consists of two parts. The basic part of the strategy is the Energy Renovation Program 2020. The ambition of this program is that by 2020, every citizen of the Flemish Region lives in an energy-efficient house with roof insulation, no single glazing and an efficient heating installation. If, in an existing house, the roof insulation is missing, single glazing is still present or the heating installation is older than 25 years, then the priorities for the energy performance certificate (EPC) are the insulation of the roof, and the replacement of the single glazing and boiler.

The Energy Renovation Program is completed with the strategy ‘On the road to NZEB’, supporting early adopters. In the coming years, a long-term strategy, to be applied until 2050, will be put in place.

For the implementation of EED Article 5, the Flemish government has chosen the alternative approach. In the Flemish Region from 1 January 2015. They are part of the energy performance requirements for renovated buildings, as described in Chapter 2.I.

**II. REQUIREMENTS FOR TECHNICAL BUILDING SYSTEMS (TBS)**

**II.i. Coverage of heating, domestic hot water, air-conditioning and large ventilation systems**

New regulations for the energy performance of TBS in existing buildings come into force in the Flemish Region from 1 January 2015. They are part of the energy performance requirements for renovated buildings, as described in Chapter 2.I.

**II.ii. Regulation of system performance, distinct from product or whole building performance**

Requirements for technical building systems can be found in the environmental regulation for heating and cooling systems as well as in the energy performance requirements for buildings. Minimum energy performance requirements in the Flemish Region are set for the following installations:

> heating systems with space heaters (gaseous and liquid fuels): minimum efficiency;
> heating systems with electrical heat pumps: minimum seasonal performance factor (SPF);
> electrical resistance heating: maximal power;
> electrical boilers and water heaters for domestic hot water (DHW): maximal power;
> stimulation of pipework insulation for heating/cooling systems and DHW

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(mandatory for forced circulation);
> cooling system with ice-water
distribution systems: minimum
efficiency;
> ventilation systems with mechanical
supply and extraction: minimum
efficiency of heat recovery;
> non-residential lighting systems:
maximal equivalent specific installed
power to prevent poor or oversized
dimensioning of the lighting system. The
use of modulating systems (e.g.,
dimming, daylight and presence
detection) is stimulated by a correction
factor on the installed power.

II.iii. Applicability to new,
replacement and upgraded
systems in existing buildings

The new Flemish energy performance
requirements for TBS are created with the
purpose of applying them to new,
replaced or upgraded systems in existing
buildings. The requirements apply to new
installations or installations which are
altered or expanded in existing buildings
with a building permit.

The requirements apply from 1 January
2015. Existing TBS which remain
unchanged during a refurbishment do not
need to comply with the requirements.
Works that do not require a building
permit do not need to comply with the
requirements either. However it is
expected that the HVAC contractors will
adopt the requirements as benchmarks for
these works. Requirements for
renovations carried out without a building
permit cannot be enforced. The Flemish
government chose to not lay down
requirements in cases where enforcement
is not possible in practice, or where the
extra administrative burden to prove
compliance would be too high.

The requirements apply to both large and
small modifications to installations in
residential, as well as non-residential
buildings. If the impact of the
modification is so small that it is not
technically feasible to meet the
requirements, there is a procedure for
requesting an exception.

II.iv. Applicability to new
buildings

The requirements for new buildings apply to
the building as a whole (minimal EP-level).
So, the evaluation of the energy
performance of TBS is part of the energy
performance calculation. Since the
performance of the installations is taken into
account in the EP-level, there is no need for
individual requirements. Individual
requirements for new buildings are therefore
considered an extra administrative burden
that in addition reduces freedom in design
without a proportionate benefit. For this
reason, the requirements for TBS do not
apply to new buildings.

II.v. Provisions for installation,
dimensioning, adjustment and
control

There are no regulations set for provisions
for the installation, dimensioning,
adjustment, and control of TBS. The use
of efficient TBS is stimulated during the
design process, as they are integrated
within the energy performance
calculations of new buildings, as well as in
the new regulations for TBS in existing
buildings: better systems will result in
better global energy performance. The
formulas to calculate the performance of
the installation take into account certain
measures with regard to installation,
dimensioning, adjustment, and control.
For example, the formula that calculates
the efficiency of the space heating system
(with a gaseous and liquid fuels heater)
takes the following factors into account:
> efficiency of the heater at partial load;
> design temperature of the water in the
emission system;
> location of the heater;
> regulation of the burner;
> regulation of the installation;
> insulation of the pipework;
> hydraulic regulation (only for
installations in existing buildings with
heating power over 400 kW).

II.vi. Encouragement of
intelligent metering

The energy performance regulations for
TBS contain requirements for energy
metering of large installations. Table 3
gives an overview of the requirements. The
presence of these metering systems is
obligatory but it has no impact on the
energy performance of the building and,
thus, on its EPC rating. The meters need to
comply with standards and they can
transmit data by using a form of electronic
communication. Smart metering of the
whole building is not yet mandatory.

<table>
<thead>
<tr>
<th>Type of installation</th>
<th>Power</th>
<th>Type of meter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heat-production</td>
<td>&gt; 70 kW</td>
<td>Fuel + meter</td>
</tr>
<tr>
<td>Heat-production</td>
<td>&gt; 400 kW</td>
<td>Calorimeter</td>
</tr>
<tr>
<td>Electrical heat pump</td>
<td>&gt; 10 kW</td>
<td>Meter for electrical consumption</td>
</tr>
<tr>
<td>Electrical heat pump</td>
<td>&gt; 100 kW</td>
<td>Meter for the amount of useful energy</td>
</tr>
<tr>
<td>Cooling (ice-water)</td>
<td>&gt; 10 kW</td>
<td>Meter for electrical consumption</td>
</tr>
<tr>
<td>Cooling (ice-water)</td>
<td>&gt; 100 kW</td>
<td>Meter for the amount of useful energy</td>
</tr>
</tbody>
</table>
II.vii. Encouragement of active energy-saving control (automation, control and monitoring)

Some control systems (if correctly applied) have a positive effect on the energy performance level of new buildings. Such an example is a balance control in a mechanical ventilation system with heat recovery and flow temperature compensation in function of the outside conditions. Also automatic modulation of the lighting installation, e.g., daylight control, may positively affect the performance level. When such systems are used, it is easier to comply with the energy performance requirements for TBS.

III. ENERGY PERFORMANCE CERTIFICATES (EPCs) REQUIREMENTS

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

Overview and administration system

The VEA is the responsible organisation for the implementation of the EPCs. In January 2006, the certification of new buildings started with the implementation of the energy performance requirements. More than 147,000 EPCs for new buildings have been issued in the Flemish Region since 2006.

For existing residential buildings (for sale), certification started on 1 November 2008. In case of the rental of existing houses, certification is compulsory as of January 2009. More than 700,000 certificates for existing residential buildings have been issued since then. Non-residential buildings, in case of sale or rental, do not yet require an EPC. The implementation of the energy certification scheme for the sale and rental of non-residential existing buildings is still under development and it is expected to start only by the end of 2016.

Only a QE can issue an EPC, and the QE has to use a specific certification software, provided by the Flemish government. All EPCs are stored in a (non-public) database, which is property of the VEA. QEs can only view their own files/EPCs.

The energy score on the EPC is based on a calculation (asset rating). The EPC includes standardised recommendations (depending on the QE’s input).

An EPC has to be available from the moment a building is put up for sale or rent. The buyer receives the EPC, and in case of rental, the tenant receives a copy of the EPC. In case of sale, the notary has to report the absence of an EPC to the VEA. The seller might have to pay a fine when an EPC is not available on time.

The EPC is valid for a period of 10 years. Currently, there is no obligation that in case of renovation, a new EPC should be issued.

How flats are certified in apartment buildings

An EPC is required for each housing unit in apartment buildings, as long as it has all the necessary (residential) facilities to function autonomously, i.e., a kitchen, a bathroom and a toilet. In case of collective facilities, e.g., student housing, one EPC for the entire building is sufficient.

Format and content of the EPC

A calculated (asset) energy index in kWh/m².year (primary energy) is used to describe the energy performance of both new and existing residential buildings. This index is shown on a continuous scale on the certificate (Figure 17).

The EPC includes standardised recommendations that are automatically generated and tailored to the building, depending on the input. Since January 2013, the EPC has been extended with more detailed advice (e.g., the size of a wall that is poorly insulated) and information on the input data.

Figure 17: Cover page of the EPC.

EPC activity levels

Up to December 2014, 147,021 EPCs were issued for new buildings (Figure 18). Up to November 2014, 740,475 valid EPCs were issued for existing residential buildings (both for sale and rent). A building can have more than one EPC, but only the most recent is valid. The number of certificates issued per month and per year is shown in Figure 19. More than half (54%) of the issued EPCs refer to single-family houses, 45% of the EPCs are issued for apartments and only a small fraction (< 1%) of the valid EPCs refer to collective residential buildings based on data at the end of 2013. For all types of houses, most EPCs are issued in the event of sale.

The average energy score in the Flemish Region is 398 kWh/m².year for existing residential buildings (primary energy). There is a difference between the types of houses: apartments have the best (lowest) energy score. Naturally, the energy score also depends on the age of the houses. Fifty-eight per cent (58%) of the existing residential building stock is built before 1970, and these buildings have a huge influence on the average. Twenty-nine per cent (29%) of all residential units are detached houses, and a further 19% are semi-detached houses. Aside from that, there is a slightly better energy score for rentals. The average energy use in kWh/m² per building type and age is shown in Figure 20.

Typical EPC costs

The determination of the price of the EPC is left to the free market. There is no minimum or maximum price imposed. The price depends strongly on the type and complexity of the house, the availability of the building plans or bills of used materials, the travel time for the QE, etc. Based on a small survey, the average price of an EPC for a large, detached house ranges from 150 € and up to 250 €.

Assessor corps

Only recognised QEs, called ‘Energy Experts Type A’, can issue EPCs for existing residential buildings. There are about 2,500 QEs for existing residential buildings. There are no predefined qualifications needed for QEs: a candidate QE should follow a recognised training programme and pass the centralised exam organised by the region. This exam is obligatory as of September 2012. The first centralised exam took place in February 2013. There are no diploma requirements to become a QE, and candidate QEs have to pay for the course (which is organised...
by recognised schools and institutions) and for their access to the exam (150 €). However, they do not need to pay for the use of the software or the database.

In 2013, in relation to the number of candidate QEs following the training course (609), rather few participants (278) took the centralised exam. The success rate was also low: only 43% of the participants succeeded in passing the exam.

The EPC for new buildings is part of the document in which the builder declares conformity or non-conformity of the as-built building with the energy performance requirements. Therefore, the accreditation of QEs for new buildings changed in January 2015. The new requirements include a diploma (e.g., architect or engineer, the former requirement), specific training (at least 95 hours) and a centralised exam. A mandatory scheme of permanent training for new and already qualified experts for new buildings is required from 2015 on. QEs recognised before the new January 2015 scheme keep their accreditation but they must also follow permanent training. There are about 1,200 QEs for new buildings.

**Compliance levels by sector**

Compliance with the availability of the certificate has stabilised. Ninety-three per cent (93%) of the buildings (for sale or rent) controlled in 2013 had a certificate (95% in 2012). The VEA performs sample tests on advertisements (i.e., checks whether or not an EPC is available and controls buildings on site). Notaries have to report the absence of an EPC. Citizens also have the opportunity to complain about the absence of an EPC. In 2013, there were 55 complaints (for 15 of them, the complaint was incorrect because an EPC was available) and 31 reports of notaries (6 incorrect). Figure 21 shows the number of controls and the compliance level by year (until 2013). These controls, reports or complaints do not reveal a significant difference between rental houses or houses for sale.

The seller or landlord risks a penalty in the range from 500 € up to 5,000 € if there is no certificate available. In 2013, 53 fines of 500 € were imposed (104 in 2012).

**Quality Assurance (QA) of EPCs**

In addition to the checks on new buildings (173 in 2013), the VEA executes a quality check on the work of a number of QEs, based on possible illogical input of data (desk controls) and on a targeted selection. Besides these desk controls, the VEA investigates a small number of EPCs on the spot (site visit) every year. In addition, the VEA also handles complaints regarding the quality. Controls on the spot are mostly based on complaints. Since the start of checks in 2010, the enforcement procedure has been systematically tightened:

- In 2010, only warning letters were sent to the QEs who made mistakes.
- In 2011, VEA implemented an enforcement procedure when two or more possible errors were identified.
- As of 2012, an enforcement procedure is initiated as soon as one single possible error is identified.

In 2013, 3 EPCs from a targeted selection of 302 QEs were checked by sampling (906 EPCs). Of those, 5 QEs were found to have correctly issued their EPCs, while all the others had to send evidence to back up the data they had inputted into the EPCs. After checking the evidence, 170 QEs were evaluated as OK, 125 experts had to pay a fine, and 2 were suspended. Experts risk a fine of between 500 € and 5,000 € if the control shows that the certificates were not correctly issued. Until now, only fines of 500 € were imposed. In 2013, there were 16 complaints (37 in 2012) and 10 QEs had to pay a fine. These high figures are based on a targeted control. Conclusions on the overall quality of all EPCs cannot be derived from this.

**III.ii. Progress and current status on public and large buildings visited by the public**

**Overview**

In the Flemish region, the certification of public buildings has been gradually introduced. Initially (since January 2009), only large (> 1,000 m²) public buildings needed to have an EPC on display. Since January 2013, also public buildings larger...
than 500 m² need to have an EPC on display. As of January 2015, small public buildings (> 250 m²) are also included. From 2009 until the end of December 2013, 7,631 certificates for public buildings were issued. These certificates are issued on the basis of an operational rating (measured energy consumption).

Public buildings are defined as being buildings of the federal, regional and local governments, schools, and health and welfare institutions.

Private buildings visited by the public are not included yet. In case of rental or sale, an EPC for non-residential buildings will be necessary.

**Format and content of the EPC**
The EPC for public buildings is based on real energy consumption. The EPC must be put in a place visible to the public. In this way, awareness is increased among both the visitors and the public organisations (Figure 22).

**Frequency of updating**
The EPC for public display is also valid for a period of 10 years. In case of a new user or a new building, the public organisation has 15 months after commissioning the building to obtain a revised EPC. As in the case of residential buildings, there is no obligation that in case of renovation, a new EPC should be issued.

**Activity levels**
From the 7,631 EPCs issued for public buildings by the end of December 2013, educational institutions represent the largest group (45%), followed by health institutions (15%), buildings for administrations (14%) and buildings for cultural events (13%). Buildings for sports activities, public services (e.g., railway stations, etc.) and police and court houses represent 13% of the EPCs for public buildings.

**Costs**
The price of the EPC is determined by the market. There is no minimum or maximum price imposed on the QE. The price depends strongly on the complexity of the building, the travel time for the QE, etc. Typical costs range between 500 € and 1,000 €.

**Assessor corps**
There are 1,299 registered QEs for public buildings and 886 internal experts. The internal experts are employees of the public organisation with two years of experience with energy efficiency. No exam is needed for internal experts.
Since September 2012, candidate QEs must, besides following a recognised training course, also pass a centralised exam. In 2013, in relation to the number of candidate QEs for public buildings following the training (49), rather few (29) took the exam. Ninety-three per cent (93%) of those passed the exam.

Quality Assurance (QA) of EPCs

Up to now, the VEA performed only a limited number of checks on the quality of EPCs for display in public buildings. EPCs with an unrealistic consumption or unrealistic usable floor areas were retrieved from the database. Supporting documents were requested and checked by the VEA for a number of EPCs. Up to now, no administrative fines were imposed. In 2013, no quality checks on the EPCs for public buildings were executed.

III.iii. Implementation of mandatory advertising requirement

Since January 2012, it is mandatory to publish the energy score and the address or the unique certificate reference number in all commercial advertisements. From 2012 until the end of December 2013, 5,224 controls have been executed regarding the advertising requirements. Of those, 735 advertisements (14%) were incorrect. In 2013, 83% of the controlled advertisements had the correct advertisement requirements (89% in 2012). Both private persons and broker agencies can receive a fine of between 500 € and 5,000 € for not publishing the required data regarding the EPCs. Since the start of 2012 until the end of December 2013, 68 fines were imposed (42 in 2012).

III.iv. Information campaigns

After the initial campaign in 2008, there were no major information campaigns concerning the EPC. A brochure listing the obligations related to the EPC is available on the website (Figure 23). Energy experts and other stakeholders are informed through a newsletter, the website, specific mailings, and other means. Additionally, public organisations are informed through newsletters, brochures, etc. (Figure 24).

Based on the results of the surveys, the VEA will try to communicate the benefits of EPCs in other information campaigns concerning rational energy use, zero-energy buildings, etc. Having an EPC is not the final aim, but an EPC can be a tool for inspiring energy saving in buildings.

A brochure listing all the subsidies and fiscal advantages for energy-saving investments (for residential buildings) is published every year (Figure 25). All brochures can be downloaded from the website[6].

III.v. Coverage of the national building stock

There are 2,626,744 buildings in the Flemish Region, of which 417,637 are non-residential buildings (including industrial and public buildings), and within these buildings, there are 3,069,975 residential units. At the end of 2014, 29% of the residential building units in the Flemish Region had an EPC (887,496 units out of a total stock of 3,069,975 residential units).

The public sector, as defined in the EPBD, is much larger than the stricter definition when applying the EED, Article 5 (only 150 buildings would be included in the strict EED definition). It is therefore not possible to estimate the coverage since there are yet no central data or statistics available regarding the number of public buildings subject to Article 12 of the EPBD.

III.vi. Other relevant plans

In 2013, the VEA started with the evaluation of the EPC regulation and therefore used input from different surveys:

> “RUE-enquête”: 1,004 Flemish households;
> 6 interviews with sector representatives of real estate agencies and notaries;
> interviews with real estate agents (103);
> online interviews with QEs (864).

The first draft of the evaluation report was published on the website of the VEA on 6 June 2014. Stakeholders were asked to give feedback on this report. The final report was send to the Flemish Minister of Energy in September 2014. Based on this report, changes on the procedures and the regulations will be made.

IV. INSPECTION REQUIREMENTS – HEATING AND AIR-CONDITIONING (AC) SYSTEMS

The Flemish Region has adopted the inspection option for heating and air-conditioning (AC) systems. The Department of Environment, Nature and Energy is in charge of the implementation of these requirements, which are independent of the EED implementation.

IV.i. Progress and current status on heating systems

Overview, technical method and administration system

In the Flemish region, central heating systems must be inspected by a recognised technician before they are used for the first time. Once in use, these systems must be inspected periodically, checking the proper operation as well as several safety aspects. Since May 2013, an audit of the entire heating system must be performed regularly, during which possible energy-saving methods are determined. The results of each inspection are documented in a report.

Maintenance

- Gaseous
  - Liquid
  - Solid

<table>
<thead>
<tr>
<th>Type of inspection</th>
<th>Fuel</th>
<th>Nominal power</th>
<th>When?</th>
<th>What?</th>
<th>By whom?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance</td>
<td>Gaseous</td>
<td>Liquid</td>
<td>≥ 20 kW</td>
<td>At least every two years</td>
<td>Systematic operation of the entire heating system</td>
</tr>
<tr>
<td></td>
<td>Gaseous</td>
<td>Liquid</td>
<td>&gt; 100 kW</td>
<td>At least every four years</td>
<td>Energy efficiency of entire heating installation is estimated</td>
</tr>
<tr>
<td></td>
<td>Gaseous</td>
<td>Liquid</td>
<td>20 kW</td>
<td>At least every five years</td>
<td>Performance and installation</td>
</tr>
<tr>
<td></td>
<td>Solid</td>
<td>All</td>
<td>All</td>
<td>At least every year</td>
<td>Inspection of several systems</td>
</tr>
</tbody>
</table>

There are only numbers performed heating audits for boilers with an output greater than 100 kW. There is yet no database available for inspections of heating systems with boilers with less than 100 kW, but a new online software is being developed. A detailed summary of inspections is given in Table 4.

Arrangements for assurance, registration and promotion of competent persons

All types of inspections must be performed by a recognised technician. Technicians must complete a specific initial training and attend in-service training at least every five years. An interactive map and a list of recognised technicians are available online.

Promotional activities

In the autumn of 2013, the government of the Flemish Region launched a campaign to promote the aforementioned inspections and published a campaign website, www.stookzuinig.be, offering information concerning central heating systems, an interactive map to locate a nearby recognised technician (Figure 26), as well as a web application to determine user responsibilities. Regularly, at the start of the heating season, municipalities are reminded of this legislation and are requested to locally publish this information.

Enforcement and penalties

The quality control of recognised technicians is run by several supervisors of the Department of Environment, Nature and Energy who check whether a recognised technician meets the requirements when performing inspections and drawing up inspection reports (see below). If the latter is not the case, the technician will be warned, fined or prosecuted and/or their recognition can be suspended or withdrawn. Non-recognised

Table 4: Summary of types of inspections on central heating systems powered by a boiler with gaseous, liquid or solid fuel.

<table>
<thead>
<tr>
<th>Type of inspection</th>
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</tbody>
</table>

* Abbreviations: RTG (recognised technician – gaseous fuel), RTL (recognised technician – liquid fuel), RTH (recognised technician – heating audit), SC (skilled craftsman).
technicians performing any of the
aforementioned mandatory inspections
that have been reported to the
government are prosecuted.

Municipal supervisors and supervisors of the
police zones may sanction the owner or user
of a central heating system when a
mandatory inspection has not been carried
out. The supervisors can carry out a random
selection of inspections or act when they
receive complaints. A list of possible
sanctions is included in the decree of 5 April
1995 concerning general provisions relating
to environmental policy (e.g., a fine
dependent on the kind of infraction).

Quality control of inspection reports
To implement the independent control
system, a statistically significant percentage
of the executed inspections are examined
annually by an accredited inspection body
appointed by the government. In 2013,
374 inspections were verified. As of 2014,
around 600 randomly selected recognised
technicians, as well as technicians against
whom complaints have been made, are
subjected to quality control annually.

Inspection activity figures
As of 2014, the number of recognised
technicians for the inspection of systems
using boilers with liquid or gaseous fuels
exceeds 5,000 and 8,000, respectively.
Currently, there are no figures of the
total amount of inspected installations.

IV.ii. Progress and current status
on AC systems
Overview, technical method and
administration system
AC systems with a cooling capacity above
12 kW need regular inspection by a
recognised expert. New AC systems should
be inspected within 12 months of
commissioning. The frequency of
inspection of AC systems in use is
dependent on the nominal cooling
capacity, as shown in Table 5.

Inspection is conducted with software to
evaluate energy efficiency and
dimensioning of AC systems, specifically
prepared for meeting EPBD requirements,
and supplied freely by the Flemish
government. The result of these
inspections is a report that includes
recommendations for the cost-effective
improvement of the energy performance
of the AC system. In 2015, the current
software spreadsheet will be replaced by
a more user-friendly online application.

Arrangements for assurance, registration
and promotion of competent persons
In order to become a recognised expert,
one has to meet certain requirements
regarding training qualifications, or
possess relevant experience of at least
three years, attend a specific training
course and pass a specific exam.
Additional training every five years is
required as well. The training courses
started in the autumn of 2014. Until
1 January 2015, individuals with minimum
training or experience (specified in the
Flemish legislation on recognised experts:
VLAREL) were temporarily accepted as
recognised experts[7].

Promotional activities
All information relevant to the inspection
of AC systems is supplied on the website
of the Flemish Department of
Environment, Nature and Energy[8].

Enforcement and penalties
Recognised experts must upon request
provide information on all inspections
conducted in the last three years to the
supervising government. The Flemish
government can suspend or withdraw the
recognition in specific cases. No penalties
have been levied yet.

Municipal supervisors and supervisors of
the police zones may sanction the owner
or user of an AC system when a mandatory
inspection has not been carried out. The
supervisors can carry out a random
selection of inspections, or act when they
receive complaints. A list of possible
sanctions is included in the decree of
5 April 1995 concerning general provisions
relating to environmental policy (e.g., a
fine that depends on the kind of
infraction).

Quality control of inspection reports
Once the new inspection software is
introduced (in 2015), all inspection
reports will be stored in a central
database. This database will be used for
quality control on a statistically significant
number of issued reports by an
independent accredited inspection body,
as stated in the VLAREL. Until the end of
2014, no inspection reports have been
controlled.

Inspection activity figures
The new software will be used to monitor
inspection activity as well. No inspection
activity figures are available yet.

3. A success story in EPBD implementation

The governmental decision on gradually tightening the energy performance requirements for new buildings towards 2021, and the communication about this, garnered a strong response from the building sector. A transition is taking place whereby NZEBs are gaining interest not just from innovators but also from a rapidly growing group of builders. On the supply side, more and more architects, EPB experts, construction companies, installers, etc. are levelling up their knowledge, expertise and services to the NZEB market segment. All these building professionals are visible through governmental and non-profit web portals. Surveys show that one in two future homeowners considers building a NZEB.

To stimulate NZEBs in the Flemish Region, focus is put on the frontrunners (early adopters) paving the way. The VEA developed a NZEB-label and provided this as communication material to frontrunners, who are engaged in promoting NZEBs and putting their development into practice. Since the start of February 2014, a large number (300) of companies and organisations have become involved.

Thanks to a successful campaign, NZEBs are becoming more and more mainstream; it is a prominent theme at housing and building fairs, the media converse regularly about it, NZEB buildings are considered stable investments, private companies are positioning themselves as ‘NZEB providers’ and are developing demonstration projects, and so forth.

Another key to success is aligning with support mechanisms (property tax reductions and subsidies). As shown in Figure 7, in 2011, subsidies for E60 and E40 contributed to the improvement of the E-levels of new residential buildings (see spikes at levels E60 and E40). Parallel to the tightening path, a parallel path is fixed until 2021 concerning the evolution (and phasing out) of the different support mechanisms. The EPB-software for new buildings was adapted and determines which NZEB requirements are fulfilled and which are not. When NZEB requirements are fulfilled, the label ‘Ik BEN hier’ (‘I’m NZEB here’) appears. This instrument might inspire energy experts and future homeowners to take the necessary measures to achieve the NZEB-level and receive the associated subsidy.

4. Conclusions, future plans

Directive 2010/31/EU was a strong catalyst to get EPBD implementation on a higher level.

Requirements for new buildings were sharpened and the path towards 2021 was developed. New requirements for TBS and for thorough renovations were introduced on 1 January 2015. The average energy performance of new buildings decreases every year, and a well-functioning enforcement strategy is one of the keys to this success. A close follow-up of cost-optimisation of the path leading up to 2021 can be actualised with biannual cost-optimal studies. The roll-out of the NZEB action plan delivered a successful introduction of the NZEB level. A lot of frontrunner companies support the NZEB message.

At the end of 2014, almost one quarter of existing residential buildings will have an EPC. Ninety-three per cent (93%) of existing buildings have an EPC when rented or sold. Eighty-six per cent (86%) of a sample of controlled advertisements in 2012 and 2013 contain the correct information on the EPC. The VEA continually strives to ameliorate the quality of the EPCs.

Tools and accreditation schemes on inspections have been improved in the past years to achieve a larger impact.
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More details on the IEE Programme can be found at ec.europa.eu/energy/intelligent

This individual report and the full 2016 book are available at www.epbd-ca.eu and www.buildup.eu