

Fourth Flemish energy efficiency plan

CONTENTS

1.	General framework of the fourth Flemish energy efficiency plan.....	5
1.1	Introduction.....	5
1.2	Flemish policy context and overview of the energy savings objectives and forecasts in the framework of the Energy Efficiency Directive.....	6
2.	Overview of the final energy savings.....	8
3.	Policy measures for the implementation of the EED	12
3.1	Horizontal measures	12
3.1.1	Obligation scheme for energy efficiency and alternative policy measures (Article 7)	12
3.1.2	Energy audits and energy management systems (Article 8)	18
3.1.3	Measurement and invoicing (Articles 9-11)	21
3.1.4	Consumer information and training programmes (Articles 12 and 17).....	25
3.1.5	Availability of qualification, accreditation and certification schemes (Article 16)	33
3.1.6	Energy services (Article 18)	39
3.1.7	Other horizontal measures to increase energy efficiency (Articles 19 and 20)	45
3.2	Energy efficiency measures in buildings.....	48
3.2.1	Approach to the requirements of the revised EPBD (Directive 2010/31/EU).....	48
3.2.2	Strategy in connection with the renovation of buildings (Article 4)	50
3.2.3	Additional measures with a view to the energy efficiency of buildings and appliances/equipment	50
3.3	Energy efficiency measures by government bodies (Articles 5 and 6).....	52
3.3.1	Central government buildings (Article 5)	52
3.3.2	Buildings of other government bodies (Article 5).....	56
3.3.3	Procurement policy of government bodies (Article 6)	60
3.4	Energy efficiency measures in industry	Error! Bookmark not defined.
3.5	Energy efficiency measures in transport.....	Error! Bookmark not defined.
3.6	Promotion of efficient heating and cooling (Article 14)	Error! Bookmark not defined.
3.6.1	Comprehensive review.....	Error! Bookmark not defined.
3.6.2	Installation costs for the user: cost-benefit analysis and results.	Error! Bookmark not defined.
3.6.3	Individual installations: exemptions and exemption decisions...	Error! Bookmark not defined.
3.7	Energy conversion, transmission (transport), distribution and demand response (Article 15).....	Error! Bookmark not defined.
3.7.1	Energy efficiency criteria for net fees and regulations....	Error! Bookmark not defined.

- 3.7.2 Facilitating and advancing the demand response Error! Bookmark not defined.**
- 3.7.3 Energy efficiency when setting up and operating networks..... Error! Bookmark not defined.**
- Annex A Annual report in the context of the Energy Efficiency Directive... Error! Bookmark not defined.**
- Annex B Roadmap for the renovation of buildings..... Error! Bookmark not defined.**

ABBREVIATIONS

NZE	=	Nearly zero energy
ESD	=	Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC
EED	=	Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC
EPC	=	Energy performance certificate; energy performance contract
ESCO	=	Energy Services Company (supplier of energy services)
ESD	=	Energy Services Directive (Directive 2006/32/EC)
(F)(N)EEAP	=	(Flemish)(National) energy efficiency action plan
HVAC	=	Heating, ventilation and air conditioning
IEE	=	Intelligent Energy Europe
IRR	=	Internal rate of return
SME	=	Small and medium-sized enterprise
NFEE	=	National Fund for Energy Efficiency
PV	=	Photovoltaic
EPBD	=	Energy performance of buildings Directive (Directive 2010/31/EU)
SHM	=	Sociale huisvestingsmaatschappij (Social housing company)
FEA	=	Flemish Energy Agency
VEB	=	Vlaams Energiebedrijf (Flemish Energy Company)
ETS	=	Emissions trading scheme
VITO	=	Vlaamse Instelling voor Technologisch Onderzoek (Flemish Institute for Technology Research)
VMSW	=	Vlaamse Maatschappij voor Sociaal Wonen (Flemish Agency for Social Housing)
VREG	=	Vlaamse Regulator van de Elektriciteits- en Gasmarkt (Flemish Regulator of the Electricity and Gas Market)
CHP	=	Combined heat and power production
BBRI	=	Belgian Building Research Institute
VLAIO	=	(Vlaams) Agentschap Innoveren en Ondernemen ((Flanders) Innovation & Entrepreneurship)

1. GENERAL FRAMEWORK OF THE FOURTH FLEMISH ENERGY EFFICIENCY PLAN

1.1 Introduction

The Energy Efficiency Directive (EED)¹ requires Member States to present an energy efficiency action plan to the European Commission every three years and provide a brief progress report each year, both by 30 April at the latest of the year in question.

The fourth Flemish energy efficiency action plan implements that requirement and forms part of the national action plan that will be submitted to the European Commission by 30 April 2017. Flemish input is integrated into the present document for the annual progress report, which will also be delivered to the European Commission by 30 April 2017.

The progress and (expected) changes to the policy measures of the third action plan (2014) are described, as are new measures that were taken or will be taken to implement the various articles of the Energy Efficiency Directive. The policy measures are implemented or carried out by various policy areas such as transport, agriculture, housing, government buildings, etc. The present plan also includes an estimate of the savings made at end-2015. New forecasts will be included of the savings to be made by the end of 2020. The total anticipated savings is compared with the target level of the Energy Services Directive (ESD)² to save an absolute amount of energy by the end of 2016 at the rate of 9% of the average final consumption in the non-ETS sectors over 2001-2005 (residual element of this Directive that was repealed prior to the other elements). Savings forecasts for 2020 were also included, in final and primary terms.

The structure followed for the present document is that of the template that was made available for this purpose by the European Commission.

¹ Directive 2012/27/EU of 25 October 2012 of the European Parliament and of the Council on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/EC.

² Directive 2006/32/EC of 5 April 2006 of the European Parliament and of the Council on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC.

1.2 Flemish policy context and overview of the energy savings objectives and forecasts in the framework of the Energy Efficiency Directive

The indicative target level of the ESD for 2016 is the same as in the previous energy efficiency action plans: 16 959 GWh final savings to be achieved in the non-ETS sectors.

Forecasts to 2016 have been drawn up for the savings from the policy measures in the non-ETS sectors to test against the final target level of the ESD. Savings forecasts were also calculated for 2020, final and primary.

The savings for the policy measures in the non-ETS sectors are further detailed in table 2.

There are no other Flemish target figures with respect to energy efficiency within the meaning of Annex IV, Part 2.1 of the EED.

The Flemish target figures for nearly zero energy (NZE) buildings under the EPBD (Article 9(1), Article 9(3) point b) are included in the table below. For existing buildings, the share that fulfils the long-term objective of the Renovation Pact has been determined on the basis of the total number of major energy renovations. For new buildings, the share that fulfils the energy performance and indoor climate requirements (EnergiePrestatie en Binnenklimaat or EPB) set by the Flemish Government for permit applications from 2021 has been determined on the basis of the total number of newly constructed buildings.

Table 1. Flemish target figures for nearly zero energy buildings

	<i>Existing buildings - target figure as a percentage of the total renovated buildings</i>	<i>New buildings - target figure as a percentage of all newly constructed buildings</i>
2015	10%	10%
2020	20%	75%

Other existing Flemish action plans in the framework of the energy and climate policy:

- With a view to limiting energy consumption in existing residences, the Energy renovation programme 2020 was developed by the Flemish Government from 2007. The Flemish Coalition Agreement of 13 July 2009 explicitly states that the Flemish Energy renovation programme 2020 will be continued and expanded to include customised measures. The objective of this programme is that every Flemish resident will have an energy-efficient home by 2020, with at least improved double glazing, an insulated roof and an energy-efficient heating system.
- On 29 April 2011, the Flemish Government approved the second Flemish Sustainable Development Strategy with a vision and long-term objectives to

be achieved by 2050.

- On 30 March 2012, the Flemish Government approved the air quality plan for NO₂.
- On 21 June 2012, the Flemish action plan for near zero energy buildings was notified to the Flemish Government. The national coordinated action plan was submitted to the European Commission on 28 September 2012. This action plan supports an increase in the number of near zero energy buildings, both in the newly constructed and existing building stock. The aim is that from 2021, all new buildings must be near zero energy (NZE). In the context of the government's leadership role, all government buildings will have to meet that requirement from 2019 (particularly new buildings in which government bodies are housed that own these buildings).
- On 28 June 2013, the Flemish Government definitively approved the (third) Flemish Climate Policy Plan 2013-2020. The plan consists of a general section and two sub-plans: the Flemish Mitigation Plan (FMP), to reduce greenhouse gas emissions (focus on non-ETS sectors), and the Flemish Adaptation Plan (FAP) to mitigate the impact of climate change in Flanders.
- On 17 July 2015, the Flemish Government laid the foundations and action points for the Renovation Pact. Thirty-four organisations have committed to actively and constructively cooperating to develop the Renovation Project. A strategic policy framework for the Renovation Pact was developed in working groups and a number of leverage actions were identified that will have a clear impact on the basic objective of the Renovation Pact, particularly that of substantially increasing the renovation rate of the Flemish housing stock. These leverage actions were developed in 2016 and 2017 into specific action points.
- On 29 January 2016, the Flemish Government approved the Flemish plan for government contracts for the period 2016-2020. The Flemish government is leading by example by focusing on innovative government contracts in its procurement policy and resolutely choosing solutions that have the least impact on the environment during their full life cycle and are, moreover, socially and ethically responsible.
- On 19 February 2016, the Flemish Government approved a draft memorandum entitled 'Stroomversnelling' ('Acceleration') that describes the process of reaching an Energy Vision and an Energy Pact. Various working groups were set up with a focus on priority themes to further shape the vision of the energy system and make concrete proposals for policy and action in the field. A project-based approach aims to bring together the required capacity and expertise from within the various governments and within the knowledge institutions and target groups. In addition, a citizen panel was assembled that serves as a pool from which participants can be drawn for participation initiatives.
- On 25 March 2016, the Flemish Government definitively approved the draft memorandum 'Vision 2050: a long-term strategy for Flanders'. Its long-term vision shows what Flanders must aim to become by 2050: a social, open, resilient and international Flanders that creates wealth and well-being in a

smart, innovative and sustainable way and where everyone counts. Vision 2050 sketches a long-term policy that responds to new opportunities and challenges and expedites the transitions that our society must make. To achieve this, the Flemish Government determined seven transition priorities. It wants to work on these over the coming years, across the boundaries of the policy domains and together with various actors from society. One of the seven transition priorities is 'ensuring an energy transition'.

- On 22 April 2016, the Flemish Government approved the draft memorandum that sketches the process for preparing a Flemish Climate Policy Plan 2021 - 2030 and a Flemish Climate Vision 2050. A Flemish Climate Policy Plan 2021 - 2030 is one of the building blocks of an integrated climate and energy plan.
- On 1 July 2016, the Flemish Government approved the energy efficiency action plan for the Flemish administration. As a starting point, all segments of the Flemish central government have adopted the following binding objective from 2017: primary energy consumption (buildings and technical infrastructure) will decrease by at least 2.09% per year and per entity, starting in 2017 to 2020.
- On 15 July 2016, the Flemish Government approved the internal mobility plan for the Flemish administration. Fuel consumption-related CO₂ emissions are to be reduced by at least 40 % in the period 2005-2030.

2. OVERVIEW OF THE FINAL ENERGY SAVINGS

1. For the objectives set out in Directive 2006/32/EU (in the first and second NEEAP), information is provided below about the energy savings achieved as well as a forecast of the savings in final energy consumption in 2016 as described in Directive 2006/32/EU (EED Article 27(1), Annex XIV, part 2.2.b), second paragraph).

Table 2. Overview of the final energy savings in 2015 (achieved), in 2016 and 2020 (forecast) in the non-ETS sectors, final and primary

Sector	Name of the energy saving measure	Energy savings in 2015	Expected energy savings in 2016	Expected energy savings in 2020
Buildings	Imposing of insulation standards and energy performance and indoor climate requirements (EPB)	2897 GWh final 3672 GWh primary	3298 GWh final 4076 GWh primary	4533 GWh final 5156 GWh primary

Manufacturing	Audit and benchmark covenant with energy-intensive non-ETS companies	2197 GWh final 3687 GWh primary	2378 GWh final 3983 GWh primary	2541 GWh final 4263 GWh primary
Energy sector	Imposing of efficient energy use/public service obligations on the electricity distribution network operators	9123 GWh final 11153 GWh primary	9735 GWh final 11823 GWh primary	12005 GWh final 14104 GWh primary
Energy sector	Stimulation of quality controlled heat and power production (CHP) via a system of heat and power certificates	590 GWh final 3292 GWh primary	590 GWh final 3292 GWh primary	590 GWh final 3292 GWh primary
Energy sector	Stimulation of photovoltaic solar panels via a reversing meter and a system of green power certificates, preceded by subsidies	2220 GWh final 5550 GWh primary	1986 GWh final 4964 GWh primary	2496 GWh final 6239 GWh primary
Mobility	Policy measures that control mobility demand and improve the environmental performance of transport	4098 GWh final 3294 GWh primary	4411 GWh final 3606 GWh primary	5669 GWh final 4875 GWh primary
Agriculture and horticulture	Subsidies for energy saving measures in greenhouse horticulture	1074 GWh final 1074 GWh primary	1045 GWh final 1045 GWh primary	1045 GWh final 1045 GWh primary

Total energy savings		22 199 GWh final 31 722 GWh primary	23 443 GWh final 32 789 GWh primary	28 879 GWh final 38 974 GWh primary
Target value of the ESD			16 959 GWh final	

In 2015, the savings achieved in the non-ETS sectors amounted to 22 199 GWh final, which is an increase of 34% compared to the savings realised in 2012 as reported in the 2014 action plan.

It can be seen from the new calculations that the final savings expected at the end of 2016 amount to 138% of the final target value. In the 2014 action plan, the projected savings in 2016 amounted to 162% of the objective.

At the end of 2016, the final savings were estimated to be 3973 GWh lower than in the 2014 action plan. The decrease is primarily due to the policy measures in transport (- 2147 GWh) and the efficient energy use/public service obligations of the electricity distribution network operators (-1670 GWh).

Efficient energy use/public service obligations of the network operators, in the form of action requirements, will provide most of the non-ETS savings to be made by the end of 2016 (9735 GWh or 41% of the total savings). Table 3 provides a breakdown of the final savings per action.

Table 3. Overview of the final energy savings in 2015 (achieved), in 2016 and 2020 (forecast) by means of the efficient energy use/public service obligations of the network operators

	Energy savings achieved in 2015 [GWh final]	Expected energy savings in 2016 [GWh final]	Expected energy savings in 2020 [GWh final]
Roof insulation premium	3177	3542	4888
Boiler replacement premium (*)	2798	2807	2843
Glass replacement premium	1037	1103	1439
Wall insulation premium	540	638	1066
Floor and basement insulation premium	68	84	147
	435	484	681

Solar water heater and heat pump premium (incl. a minimum share of renewable energy in new residences)	262	275	320
Non-residential energy-efficient lighting premium	601	588	414
Frequency converter premium (up to 2011)	125	125	125
Ventilation with heat recovery premium (up to 2011)			
Residential energy scans (implementing savings through energy saving bulbs/water-saving shower head) and discount coupons for energy saving refrigerators and washing machines for protected customers	80	89	82
Total	9123	9735	12 005

(*): from 2012, only for protected customers

- For the purposes of Directive 2006/32/EU, in the first and second NEEAP, a description is included below of the measurement and/or calculation methodology used to determine the final energy savings.

The savings from the policy in the transport sector are calculated top-down according to the recommended harmonised methodology of the EC ('Recommendations for the measurement and verification methods in the framework of Directive 2006/32/EU on energy end-use efficiency and energy services (ESD)').

The savings from all other energy saving measures (in the buildings, industry, energy, agriculture and horticulture sectors) are calculated bottom-up. Recommended harmonised calculation methods, lifespans and default values are used. If there are no harmonised methods or if the Flemish data are not available for application of the harmonised methods, own calculation methods are used and described in the Annex of the 2011 energy efficiency action plan.

Table 4. Overview of the calculation methods of the savings for the purposes of Directive 2006/32/EU (ESD)

Sector	Bottom-up (BU) or top-down (TD)	Calculation method
Buildings	BU	harmonised methodology: BU formula 2.3

Manufacturing	BU	own methodology: see 2011 action plan Annex
Energy sector	BU	- harmonised methodology: BU-formulas 2.2, 2.4, 2.7 - European default values - own methodology: see 2011 action plan Annex
Mobility	TD	harmonised methodology: TD indicators P8, P9, P12, P13, M6 and M7
Horticulture	BU	own methodology: see 2011 action plan Annex

The final savings from electricity-efficiency measures are translated to primary savings by using the conversion factor 2.5.

3. POLICY MEASURES FOR THE IMPLEMENTATION OF THE EED

3.1 Horizontal measures

3.1.1 Obligation scheme for energy efficiency and alternative policy measures (Article 7)

1. Information on the total amount of energy that must be saved during the obligation period in order to meet the target figure established in accordance with Article 7(1) and, if applicable, how the possibilities stated in Article 7(2) and (3) are used (EED Article 7, Annex XIV, part 2.2.a)).

The objective to be achieved during the obligation period is calculated based on the energy sales to end customers. Moreover, the choice was made to also exclude transport consumption from the calculation. In the notification to the European Commission of 10 December 2013, the target of 49.346 TWh was set on the basis of energy sales figures known at that time for the years 2010, 2011 and 2012.

Following a historical revision of the Flemish energy balance sheet, communicated to the Flemish Government on 14 February 2014, the objective is currently calculated as 47.750 TWh.

Table 5 below details the Flemish figures used to calculate energy sales from energy consumption for the sectors concerned (residential, tertiary, agriculture and industry).

Table 5. Calculation of the average energy sales from 2010-2012 as a basis for the objective of Article 7

Residential + tertiary + agriculture	2010	2011	2012	avg 2010-2012
TWh energy consumed (incl. PV)	107.000	91.028	97.083	98.370
<i>input self-production of electricity (excl. PV)</i>	<i>-4.861</i>	<i>-5.000</i>	<i>-5.750</i>	<i>-5.204</i>

	<i>heat</i>	-0.778	-0.806	-0.889	-0.824
	<i>biomass (excl. self-production of electricity)</i>	-4.528	-3.222	-4.000	-3.917
TWh energy sold		96.833	82.000	86.444	88.426
Manufacturing					
TWh energy consumed (energy, incl. PV)		111.056	107.472	104.833	107.787
	<i>own cokes and coke oven gas</i>	-9.444	-7.861	-7.333	-8.213
	<i>input self-production of electricity (excl. PV)</i>	-7.833	-7.583	-8.278	-7.898
	<i>recuperated energy (excl. input of self-prod. elec.)</i>	-22.250	-22.000	-19.222	-21.157
	<i>heat</i>	-5.389	-5.333	-5.361	-5.361
	<i>biomass (excl. input self-prod. elec.)</i>	-1.000	-0.944	-0.944	-0.963
TWh energy sold		65.139	63.750	63.694	64.194
TWh total energy sold (incl. PV)		161.972	145.750	150.139	152.620
Electricity production through PV		-0.489	-0.992	-1.617	-1.032
TWh total energy sold		161.484	144.758	148.522	151.588

The average final energy sales for the years 2010 to 2012 were therefore 151.588 TWh.

Application of the objective of 1.5% per year leads to an objective to be achieved of 63.667 TWh. By applying the options described in Article 7(2) of the Directive, this objective can be reduced by a maximum of 25%. In concrete terms, this means a minimum objective to be obtained of 47.750 TWh.

By applying only the reduced track (Article 7(2)(a)), the Flemish objective is reduced to 50.403 TWh.

Flanders chooses to make use of the exclusion of part of the ETS sector (at a rate of 7.980 TWh on a total of 37.898 TWh) from the calculation of the final energy sales combined with the reduced track, until the full 25% reduction of the objective is achieved. In other words, the aim is to achieve an objective of 47.750 TWh.

Table 6. Calculation of the objective of Article 7

Total final sales excluding transport (a)	151.588 TWh
Exclude part of the final sales from the ETS sector from the objective (b)	7.980 TWh
(a) – (b) final sales excluding transport and excluding part of the ETS sector	143.608 TWh
Apply reduced track to (a) – (b)	47.750 TWh

2. Information on a potential obligation scheme for energy efficiency under the meaning of

Article 7(1) (EED Article 7, Annex XIV, part 2.3.2).

No existing or planned obligation scheme for energy efficiency applies.

3. Alternative policy measures from the Flanders region in accordance with Article 7(9) and Article 20(6), *including* information on how the equivalence of this is guaranteed (EED Article 7, Annex XIV, part 2.3.2).

As regards the achievement of the objective of Article 7, the Flanders region has chosen not to introduce an obligation scheme with respect to suppliers or distribution network operators, but instead opted to notify the European Commission of a number of alternative measures on 10 December 2013:

- Energy policy agreement with the ETS companies;
- Energy policy agreement with the non-ETS companies;
- Several efficient energy use action requirements for the electricity distribution network operators with respect to existing buildings (both residential and non-residential):
 - premium for roof and attic floor insulation;
 - premium for wall insulation (exterior wall and cavity wall insulation);
 - premium for basement and floor insulation;
 - premium for high-efficiency glazing.

A new estimate was made of the energy savings forecasts for the above-mentioned measures as indicated in the annual report in Annex A. It is expected that the measures from 2014 to 2020 will yield total cumulative energy savings of 44.382 TWh. Compared with the objective of 47.750 TWh, this means that a gap is expected of 3.368 TWh. In order to bridge this gap, the distance-based road charging for heavy goods vehicles will be notified as a new measure. This measure is further detailed below in accordance with the criteria as determined in Art. 7(9) of the Directive. This measure went into force in the course of 2016 and is expected to yield cumulative energy savings of 3.358 TWh by 2020.

Measure	Distance-based road charging for heavy goods vehicles
Type of alternative measure (Art. 7(9) paragraph 2)	Category a) charges
Description of the measure	All owners of heavy vehicles with a maximum permissible total weight (MPTW) exceeding 3.5 tonnes must pay a distance-based charge for the use of motorways and certain regional and municipal roads. The distance-based charge is calculated using a device (On Board Unit, OBU) in the heavy vehicle. The OBU

	registers the kilometres driven via GPS technology.	
Parties concerned (Art. 7(10) point b)	Flanders region. The sector of the freight transport. Service providers of the registration system.	
Targeted sectors	Owners of heavy vehicles with a maximum permissible total weight (MPTW) exceeding 3.5 tonnes	
Expected energy savings (final) (Art. 7(10) point c)	2014 – 2017: 1.099 (2016: incomplete)	TWhcum 1 st period
	2018 – 2020 : 2.259	TWhcum 2 nd period
	2014 - 2020: 3.358	TWhcum total
Duration of the savings period and intermediary period (Art. 7(10) point a)		
Calculation method for energy savings (Art. 7(10) point c)	<p>According to the study 'Prospects for transport demand by 2030 in Belgium' from the Federal Planning Bureau (December 2015), the introduction of the km charge will result in an expected cumulative reduction in final transport use in Belgium from 2016-2020 of 4.939 TWh. The annual saving is 0.9% per year.</p> <p>If the distribution key is used of the number of tonne-kilometres driven in each Region, Flanders has a share of 68%, which is a cumulative saving of 3.358 TWh.</p>	
	<p>The Federal Planning Bureau study is based on the PLANET model.</p> <p>According to the study, the km charge represents an increase in costs of 5 to 6% in euro/km. Together with a decrease in use of 0.9%, this comes to an elasticity of 0.18, which is in line with the conclusions of the OECD study 'Greenhouse gas emissions and price elasticities of transport fuel demand in Belgium' (2012).</p>	
The energy savings are calculated in accordance with the method and principles	<p>Energy savings from the km charge for heavy vehicles come on top of Directive 2003/96/EU (minimum fuel tax levels) and Directive 2006/112/EU (tax on added value).</p> <p>Calculation of the effect is based on recent, official data</p>	

<p>in point 3 of Annex V (Art. 7(10) point f)</p>	<p>(Federal Planning Bureau study of December 2015). The representativeness of price elasticity in the study was verified by another related study.</p> <p>There are no additional energy savings due to accompanying instruments linked to the km charge.</p>
<p>Monitoring the savings (Art. 7(10) point h)</p>	<p>The savings can be estimated annually with the help of the PLANET model.</p>
<p>Annual energy savings publication (Art. 7(10) point j)</p>	<p>The energy savings from the alternative policy measures for which the Flemish region has opted for Article 7 will be published annually at the end of April on www.energiesparen.be .</p>

The annual report in Annex A includes the savings achieved through 2015 compared to the forecasts for 2020.

4. Methodological aspects in the meaning of EED Article 7, Annex V; Annex XIV, part 3.2; Annex V 2., under e.

A detailed sheet with a description of the calculation method is drawn up for each of the reported measures.

5. Published energy savings in the meaning of EED Article 7(6) (8) and (10), Annex XIV, part 2.2, under a).

Each year, the FEA publishes a report on its website which tracks the progress of compliance with Article 7: <http://www.energiesparen.be/EErichtlijn>.

6. Update of all major legislative measures implemented in 2015/2016 for the efficient energy use/public service obligation

The notified action requirements concern part of the ongoing action obligations of the electricity distribution network operators. The package of action requirements is more extensive. In 2016, new regulatory initiatives were taken for the entire package of efficient energy use/public service obligation action requirements.

Below is a description of the changes that were made in 2016 in the framework of the efficient energy use/public service obligations (and will enter into force from 2017).

As regards individual investments:

- For newly constructed residence/apartments, the premium for highly energy efficient new construction (E-level premium) will be abolished for building applications from 2017;
- For existing buildings, expansions and new building envelopes will also be eligible for insulation and glazing premiums from 2017;
- A new premium will be introduced for insulation of interior walls;
- A number of premiums will gradually be phased out: roof insulation, cavity wall insulation, glazing, solar water heater (from 2019);
- For a number of premiums, the substantive conditions will be tightened: roof insulation, external wall insulation, floor insulation;
- For some measures, a link with a quality system will be provided (in time): internal wall insulation, external wall insulation, solar water heater and heat pump;
- For heat pumps, a switch will be made to flat-rate premiums according to the type of heat pump. The support for geothermal heat pumps in particular will be greatly increased.

A shift will also be made towards support for residential buildings in which multiple investments (at least 3) occur in a 5-year period. In such cases, in addition to the individual premiums, total renewal bonuses will be awarded.

In addition, an effort will be made to ease the process by starting collective renovation projects (= at least 10 homes in the same neighbourhood that want to carry out the same investment) throughout the entire project, supervised by project managers.

And finally, the support for vulnerable target groups will be further expanded:

- A substantial increase in the premium for an individual condensing boiler for protected customers (from 800 euros to 1800 euros);
- For protected customers, 50% higher premiums for exterior wall, inner wall, floor insulation and total renovation bonuses, 20% higher premiums for solar water heaters and heat pumps. For glazing, the premium is set at 56 euros per m², for roof insulation at 10.5 (5.25 for do-it-yourself) euros per m² and for cavity wall insulation at 9 euros per m² (these will not be subject to a reduction timetable in the coming years);
- The social roof insulation projects for vulnerable tenants in the private rental market will be expanded to include social cavity wall projects and social glazing projects (see 3.1.6).

3.1.2 Energy audits and energy management systems (Article 8)

Overview of the measures that are planned or already being implemented to promote energy audits and energy management systems, including information on the number of energy audits already carried out, specifying those carried out in large companies and including the total number of large companies in the territory of the Member State and the number of companies to which EED Article 8(5) applies (EED Annex XIV, part 2.3.3.).

A. THE IMPORTANCE OF ENERGY AUDITS FOR HOUSEHOLDS

Article 8(3) of the EED states that households must also be made aware of the advantages of energy audits.

In accordance with EPBD, residences that are sold or rented must have an energy performance certificate (EPC - see also 3.1.4 and 3.1.5). The EPC ensures a basic awareness-raising among both owners and buyers as well as tenants, regarding the energy performance of the residence. In addition to an energy rating, the EPC mainly includes standard measures to improve the residence's energy performance.

Currently, a project is being developed to rework the content of the EPC based on user insights with the aim of upgrading the EPC to an EPC +. The standard recommendations in the current EPC are replaced in the EPC+ by a more customised package of measures for the specific residence. The package of measures will describe the works and the associated standard investment costs needed to renovate the property in accordance with the long-term target for 2050, which was laid down for existing residences under the Renovation Pact.

In parallel with the development of the EPC +, a more comprehensive renovation advice will be developed. The more comprehensive renovation advice is analogous to the EPC+, but will provide the homeowner with a customised master plan for his concrete renovation project. An alignment with the information on the EPC+ is necessary. This advice will also be able to take account of expert engineering and physics advice. The renovation advice must allow the homeowner to decide to immediately carry out the renovation fully or in phases. The renovation advice must include a substantiated estimate of investment costs, as well as an assessment framework to assess whether a renovation is preferable to renewal.

According to the current schedule, the EPC + and the renovation advice will be available from 1 January 2019.

The network operators will also be subject to a public service obligation on the basis of which they must offer a free household energy scan at the request of specific vulnerable target groups (see also 3.1.6).

In the Flemish Region, it is also mandatory to carry out a heating audit for heating appliance with an energy capacity of 20 to 100 kW. This audit must be carried out during the first maintenance after the device has been in operation for 5 years and every five years thereafter by either a liquid fuel technician or a gaseous fuel technician. The heating audit for heating appliances with an energy capacity exceeding 100 kW must be conducted every two years (liquid fuels) or four years (gaseous fuels) by a heating audit technician. These 3 accreditations are granted for a period of 5 years, after which a further training must be completed in order to extend the accreditation.

B. REQUIRED ENERGY AUDITS (LARGE ENTERPRISES) AND STIMULUS PROGRAMMES (SMES)

Energy Planning decision

The introduction of the environmental permit (February 2017) imposes energy efficiency requirements on equipment with a total annual primary energy consumption of at least 0.1 PJ. This is done through the Energy Planning decision, which was integrated into the Energy Decision in 2010. An important factor in this decision is the distinction between (the procedure and treatment of) the energy plans and energy studies:

- An energy study must be attached to the environmental permit application if the application concerns new equipment with an annual energy consumption of at least 0.1 PJ or changes to equipment with an annual energy consumption of at least 0.1 PJ if that change entails an annual primary additional consumption of at least 10 TJ. The energy study must demonstrate that the equipment in question will be operated in an energy efficient manner. The FEA assesses the energy studies submitted within the licensing procedure.
- When applying for renewal of the license, an existing device with an annual energy consumption of at least 0.1 PJ must add an energy plan. The FEA assess these plans in the framework of the licensing procedure. Economically cost-effective energy saving measures included in the energy plan (and defined here as measures with an IRR of more than 15%) must be implemented within 3 years.

Within the framework of VLAREM II, section 4.9.1, since 1 July 2005 (existing) equipment with an annual energy consumption of more than 0.5 PJ must be in possession of a energy plan that has been cleared as compatible (independent of the environmental permit procedure) since 1 July 2005. The FEA is tasked with clearing these energy plans as compatible. Economically cost-effective energy saving measures included in the energy plan must be implemented within 3 years. These plans must be updated every 4 years.

Energy policy agreements with energy-intensive companies

Energy-intensive companies with an annual primary energy consumption of at least 0.1 PJ are encouraged to reduce their energy consumption by entering into an energy policy agreement.

On 4 April 2014, the Flemish Government definitively approved the energy policy agreements for the anchoring of and for ongoing energy efficiency in the Flemish energy-intensive industry (ETS and non-ETS companies). These energy efficiency agreements are valid for the period 2015-2020. Companies that enter into an energy policy agreement commit to drawing up an energy plan and to making all cost-effective investments included therein. Furthermore, they undertake to conduct a CHP potential study, check the potential for heating and cooling networks and introduce a power management system (see also 3.4.1 and 3.6.1, point 4).

These energy policy agreements (EPAs) are also part of the alternative policy agreements under point 3.1.1.

Energy audit for large companies

The EED requires the Member States to ensure that all enterprises that are not SMEs undergo an energy audit carried out in an independent and cost-effective manner by qualified and/or accredited experts or implemented and supervised by independent authorities under national legislation by 5 December 2015 and at least every four years from the date of the previous energy audit. The Flemish Government made an amendment to the environmental permit regulation that provides for a conversion of these provisions: see sections 4.9.2. And 4.9.3. of VLAREM II. Large companies that already draw up an energy plan in the context of the Energy Planning decision or the energy policy agreements for the energy-intensive industry, are exempt from the obligation to draw up an energy audit. Large companies that have a European Energy Standard EN 16001 or an international standard for energy management systems ISO 50001, or a valid EPC for public buildings are also exempt from the obligation to draw up an energy audit. The data arising from an energy plan or energy audit form are entered into a web application. The results of the energy audit from the EN 16001 or ISO 50001 procedures are also entered into the web application. The data arising from an energy plan drawn up under one of the energy policy agreements and data from a valid EPC for public buildings should not be entered into the web application. The web application includes the user profiles of the buildings and processes, as well as the upgrade proposals with an estimate of energy savings and costs. By arranging the upgrade proposals into categories in the web application in advance, statistical analyses can be performed afterwards, such as which proposals are the most common, what is the estimated energy savings and realisation costs. This way, any support (e.g. through premiums, etc.) can be budgeted. The web application has been online since July 2015. The FEA exercises supervision of the energy audits and auditors through the management

of the web application.

Energy scans for SMEs

In the period 2013-2015, five energy agencies were commissioned by the Flemish Agency for Innovation and Entrepreneurship (VLAIO) to conduct 400 energy scans at SMEs. The total primary energy use of the scanned companies amounted to 5.11 PJ. A total of 1,949 quantified recommendations (savings calculations) were carried out. Expressed in euros, this concerns a total annual recommended energy savings valued at 11.3 million euros. The necessary investments to achieve these savings amount to a total of approximately 54.3 million euros. A subsequent survey indicated that about half of the proposed measures were implemented, accounting for a primary energy savings of 0.37 PJ per year.

Support by the network operators

Each electricity distribution network operator grants a premium for the execution of an investment in an existing non-residential building whose energy savings were demonstrated by an energy study or audit. The premium is granted per saved kWh of primary energy. This premium is in line with efficient energy use/public service obligations imposed by the Flemish Government on the electricity distribution network operators.

Quality assurance of the service providers

The energy studies and energy plans made for companies in the context of energy policy agreements and environmental permit regulations (energy planning) are evaluated by the Verification Agency. This is an independent and neutral organisation appointed by the Flemish Government to monitor the correct implementation of the energy policy agreements, to provide advice and report on this. It is the only authority that assesses individual cases, namely the acceptance of the energy expert, the energy plan and the reporting. The Verification Agency works according to strict guidelines and with a certified quality care system.

The VLAIO has developed an audit method by means of a public tender aimed at better aligning the recognition of service providers with the needs of the SME portfolio. The screening of the service provider is conducted by an independent audit agency. If the service provider is found to be qualitatively good, it receives recognition as 'the SME portfolio service provider'. If the service provider specifically requests recognition for the energy sphere of the strategic advisory pillar, it will be checked whether the individual service provider has the necessary knowledge and experience in that particular sphere.

3.1.3 Measurement and invoicing (Articles 9-11)

Information on the established or planned measures for measurement and invoicing (EED Article 9, Article 10, Article 11, Annex XIV, part 2.2.).

Current situation concerning roll-out of smart meters

Since the adoption of the amending decree of 14 March 2014, the Energy Decree has incorporated a statutory legal basis for the roll-out of digital (smart) meters. The Energy Council states in Article 4.1.22/2 that the Flemish Government will determine the situations in which the network operator and the manager of a closed distribution network must place a smart meter. Furthermore, if a smart meter is placed, the network operator and the manager of a closed distribution network must ensure that the customer is adequately informed and advised of his rights and duties and the full potential of the meter, including regarding the use of the smart meter data and the ability for the customer to check their energy consumption. It is subsequently stated that the Flemish Government will determine what conditions these smart meters must meet and which parties for which purposes can access what data from smart meters. The parties who have access to the data from these smart meters will have to ensure that data protection is guaranteed and compliance with privacy laws and, more particularly, the European Data Protection Regulation (GDPR).

The Flemish Government approved a draft memorandum on the roll-out of digital meters in the Flemish Region on 3 February 2017. It sets out the broader framework and the guidelines in terms of the meter's functionalities, which roles should be included, how to handle the data from the digital meters and how to roll-out will proceed. In the next phase, the Energy Decree and Decision will be brought into line with this draft memorandum.

Following a first technological test in 2011, large-scale pilot projects have been running on new smart electricity and natural gas meters since October 2012. In total, 28,410 smart electricity meters and 16,384 smart gas meters were placed at different locations in Flanders, spread across rural and urban areas, both in individual homes and in apartment buildings. The pilot project was also accompanied by a specific study of the efficient energy use effects of the smart meters. Participants in the pilot projects have the opportunity to follow their consumption via a website or by letter.

Established measures in the area of measurement and invoicing of electricity and gas consumption

The technical regulations for the distribution of electricity and natural gas already include the obligation to provide separate measurement/tallying per access point on the distribution network (Article V.1.2.1 of the technical regulations for the distribution of electricity and Article V.1.2.1 of the technical regulations for the distribution of natural gas). These provisions have applied to new buildings since 1 July 2002.

The measurement codes of the technical regulations for the distribution of

electricity and natural gas stipulate that this tallying must be done at least annually, alternately based on a physical meter reading by the network operator one year and the following year on the customer's own meter reading (using a meter card sent to the customer) and/or in the absence of this by the network operator's estimate.

Article 3.2.18 of the Energy Decision of 19 November 2010 stipulates that the supplier must provide a settlement invoice to household customers at least annually. That article also includes a requirement that the supplier provides accurate consumption information based on actual consumption either at least twice a year or if the customer has opted for electronic billing or at his request at least four times a year. The supplier must make the information available in a clear and easily understandable way via a communication channel that is suitable for the customer and may not charge extra for this. Article 3.2.18 further states that this requirement can be met with a customer self-read system, which informs the supplier of the meter data that have been read. In addition, the same article states that when sending and changing agreements, and in the invoices received by customers, or on individual customer websites, customers are clearly and comprehensibly informed about the contact information of independent consumer advice centres, the VREG and the Flemish Energy Agency, including their internet addresses, where customers can obtain advice on the available energy efficiency measures, benchmark profiles of their energy consumption and technical details of energy consuming devices to help reduce the usage of those devices.

Articles 6.4.23. and 6.4.25. of the Energy Decision of 19 November 2010 include the requirement that the supplier informs the customer of the settlement of his consumption over the last 3 years.

Article V.3.10.2 of the technical regulations on the distribution of electricity and natural gas also provides for the possibility of requesting detailed consumption data from the distribution network operator.

Measures related to metering and billing of heating, cooling and hot water supply of a building through a district heating network or a central source serving different buildings

On 26 February 2014, the Flemish Parliament adopted a decree which states:

“Art. 7.8.1. §1. Where heating and cooling or hot water are supplied to a building from a district heating network or from a central source servicing multiple buildings, a heat or hot water meter shall be installed at the heating exchanger or point of delivery. The Flemish Government may determine conditions and further rules regarding the heating, cooling or hot water supply of a building by a district heating network or by a central source servicing different buildings.

§2. The Flemish Government can determine the conditions that must be met

by the district heating or central source operator in order to operate such a network or source.

§3. The manager of a district heating network or a central source serving different buildings or consumers ensures that by 31 December 2016 at the latest, individual consumption meters are installed to measure the heat or cooling consumption or hot water consumption for each unit in apartment buildings and multifunctional buildings with a central heating/cooling source or with delivery from its district heating network or its central source.

The Flemish Government may determine exceptions for those cases where it is not technically feasible or not cost-effective to install such a meter. The Flemish Government determines the conditions these meters must meet. The parties who, through this decree and its implementation decisions, have access to the data from these meters ensure that data security is guaranteed at all times and privacy laws are complied with.

The Flemish Government may lay down further rules regarding the transparent and accurate calculation of individual consumption and for the distribution of the costs of thermal or hot water consumption for:

1° hot water for domestic needs;

2° heat from the building's installation for the heating of the common areas;

3° the purpose of heating apartments.”

In the implementation of these decree provisions, the Flemish Government gave its final approval on 16 December 2016 to a decision that stipulates, among other things, which exceptions are possible and what technical requirements must be met by the heat meters.

Specific situation concerning social housing

About 23,000 social apartments, distributed over 350 residential blocks, are collectively heated. In some locations there is one collective boiler for multiple buildings; some are combined with a CHP.

Recent newly constructed or renovated projects with collective heating are equipped with an efficient cost management system. However, a lot of older buildings still use evaporation meters or are settled on a flat rate basis. This may change in the coming months given the recent decision of the Flemish Government concerning individual heat measurements, mainly as regards the older systems.

Depending on the conditions of application and the requirements for new measurement systems, their introduction may have significant technical and financial consequences for the social housing associations involved. The

economic feasibility must therefore be thoroughly evaluated.

3.1.4 Consumer information and training programmes (Articles 12 and 17).

Information on measures established or planned to promote and facilitate the efficient use of energy by SMEs and domestic customers (*EED Articles 12 and 17, Annex XIV, Part 2.2.*).

General

The general policy on stimulating the efficient use of energy and environmentally friendly energy production, is translated to the level of citizens. Indeed, citizens will only take significant action on their own initiative when it becomes clear how they will personally benefit when making investment decisions regarding energy savings and the use of renewable energy. The local level and intermediary organisations can also be excellently placed in this regard because they are close to the citizen to offer customised information.

The FEA has developed a number of tools that can provide citizens with customised advice on a number of energy saving investments, such as roof insulation, wall insulation, replacement of single glazing, replacement of old central heating boiler, installing a solar water heater or photovoltaic solar panels (the so-called energy profit calculators - see www.energiesparen.be/energiewinst). These not only take into account the umbrella premiums at Flemish level, but also with any municipal or provincial premiums. There is very regular contact between the FEA and local governments to keep all energy saving premiums up to date. These instruments are also actively promoted by many local governments on their websites. Many contractors also use the energy profit calculators to advise their customers. Another tool is the 'test your EPC'. This tool allows citizens to compare the EPC of a particular house (2, 3 or 4 gables) or apartment with the average EPC figure in a particular municipality, province or in relation to Flanders. This enables citizens to verify whether the EPC is (much) higher or (much) lower compared to the market average. Furthermore, the FEA regularly releases new publications on energy premiums, the EPC and the energy performance regulations for new construction (EPB regulations). For new construction, the focus lies on NZE (or Nearly Zero Energy), while renovating is the focus of NZEovating or Better Renovation. As a standard, these brochures or folders are distributed via the local authorities. The local authorities (town halls, libraries) have information kiosks for distribution of these publications. A majority of the FEA publications are directly distributed via local authorities. These authorities can also order additional copies free of charge. An important communication channel from the Flemish Government to local authorities is Dito. The Dito newsletter is regularly distributed via the 'Services for General Government Policy' department (Diensten voor het Algemeen Regeringsbeleid or DAR). This newsletter often announces new information campaigns or brochures. Local authorities also obtain standard texts and images through this channel in order to

easily distribute this information through local communication channels. All FEA information campaigns are announced through Dito. The FEA also supports many initiatives where citizens can get information about energy saving investments, such as the events 'My house my architect', the renovation day and the open house days of ecobuilders. Indeed, making energy saving investments tangible is still the most effective way to motivate citizens. Various communication tools are regularly announced through social media (Facebook and Twitter).

Energy consultant projects

Since 2010, the Minister of Energy has been able to issue calls for subsidies for the granting of energy consultant projects in non-commercial institutions under a regulated subsidy framework. Key objectives in the calls are to increase the support for the efficient use of energy through campaigns and education as well as setting up concrete actions that contribute to the realization of long-term objectives in the area of housing renovation and the reduction of energy use. Based on the first two calls, energy consultants projects were carried out during the periods 2011-2013 and 2014-2016 for the target groups (agriculture) companies, construction professionals (contractors and architects) and households (including vulnerable families). In October 2016, a new call was launched for the 2017-2019 period for the same target groups based on a budget of 1.6 million euros. Based on the evaluation by the FEA and within the available budget, the Minister granted a subsidy to seven organisations for 3 years for 1 FTE energy consultant on 20 December 2016, three with a focus on construction professionals and four aimed at the families target group.

Information about cost-effective and easily realised changes in energy consumption

- Website www.energiesparen.be. A lot of information on energy efficiency is available through the Flemish Energy Agency website (approximately 1.5 million visitors a year), including via the energy profit calculators, the premium search module and the FAQ module. In addition, specific organisations are used to ensure the information provision and request processing proceed as smoothly as possible. These include Organisatie voor Duurzame Energie (ODE) Vlaanderen (Flanders Organisation for Sustainable Energy), Cogen Flanders (European Association for the Promotion of Cogeneration), Groenlicht Vlaanderen (Green Light Flanders), Biogas-E and Quest. It is the Flemish Government's ambition that the website remains the reference site in the area of energy savings in Flanders.
- Energy profit calculators. Six energy profit calculators are provided on the website www.energiesparen.be/energiewinst; roof insulation, subsequent insulation of cavity walls, replacement of an old boiler, replacement of single glazing, solar water heater and photovoltaic solar panels. The calculators are easily accessible to the general public and provide a quick overview of the most important ways to save energy.
- Brochures. The target groups are informed through a general range of

brochures on energy efficiency (for example, premiums and financial instruments, EPC, EPB, etc.). All information campaigns feature the website www.energiesparen.be and the Flemish Government's free telephone number 1700. In addition, tips on energy saving are distributed continually not only through the website and the media but in brochures. For companies, the FEA and the VLAIO jointly developed a brochure on energy efficient lighting for SMEs.

- Large-scale campaigns such as the FEA campaign on NZEovating or Better Renovation, which started in the autumn of 2016, sensitise citizens to make more thorough energy renovations that use the right focus, are better thought-out and focus on the long-term goal of 2050 (see www.energiesparen.be/ikbenoveer). In 2017, the campaign will be expanded (TV and radio commercials, supplements in newspapers) whereby a number of well-known Flemish figures will act as coaches for the various target groups.
- On 20 March 2017, the sun card was launched on www.energiesparen.be. Using this tool, every Flemish citizen can check for his or her individual roof whether solar energy (solar water heater or photovoltaic solar panels) would be an attractive option and how much solar production would be possible.
- The website www.klimaattips.be. This website focuses on suggestions for a broad array of themes on what each Flemish citizen can do to help work towards a healthier climate. Most of the proposed actions/tips and tricks concern energy efficiency, thereby addressing both aspects that require investment and behavioral aspects (good use). In this process, reference is continually made for each (sub) topic to relevant sites and brochures (which can be consulted via the Internet) with more in-depth information, including the above sites and brochures.
- Action Plan for increased Energy Efficiency among SMEs. In the context of the Rapid Acceleration process and the Flemish energy transition to achieve the Flemish climate and energy objectives, the research agency 3E was commissioned by the Flemish government to conduct a study investigating how SMEs can be stimulated to invest in energy efficiency.

This study will serve as a support for drawing up an action plan to increase energy efficiency among SMEs in 2017. In this action plan, a concrete long-term strategy will be formulated to improve energy efficiency among SMEs. In this study, an analysis was made of Flemish SMEs (number of companies by sector, subdivided by number of employees) and their energy consumption in order to assess the savings potential among SMEs. An assessment was then made of the current policy and current projects related to stimulating energy efficiency among SMEs. A brief explanation of how SMEs abroad have been encouraged to increase energy efficiency was also included. These analyses served as a basis for a number of recommendations and action proposals, some of which were specifically worked out as part of this study. Building on this study, a number of actions are now being further studied and/or worked out by the FEA:

- **Mini-EPAs for SMEs:** sectoral voluntary agreements whereby a facilitator tests a list of energy saving measures on behalf of the sector organisation concerned and, if appropriate, implements them in SMEs in the sector concerned. For this purpose, the Flemish Government will launch pilot projects with interested sector organizations by granting project subsidies (at the start of 2017 FEVIA, AGORIA and Horeca Vlaanderen (catering sector) showed interest in this).
- **Benchmark tool for SMEs:** via a project subsidy, the Neutral Syndicate for the Self-Employed (Neutraal Syndicaat van Zelfstandigen or NSZ) was offered the option of setting up a benchmark tool based on 10,000 consumer data from SMEs. This has been available since the summer of 2016 on <http://kmo-energiewijzer.be/>.

Communication and information measures to facilitate consumer engagement during the period of roll-out of digital meters

Parallel with the changes to the Energy Decree and Decision, an information campaign will be provided that informs citizens about the digital meter. In concrete terms, the campaign will explain why the meters will be replaced, which consumer groups will be involved, what the functionalities are and how the data read out will be used (see 3.1.3.).

Information provided to banks about opportunities to participate in financing the measures to improve energy efficiency

At the end of 2012, the Flemish Government approved the proposal to conclude an energy policy agreement with banks. Financial institutions that enter into an energy policy agreement with the Flemish government undertake to offer beneficial loan terms to builders of energy efficient homes. In return, banks are assigned a label and are listed in the government communication on energy efficient construction and renovation. In 2013, Belfius and Triodos Bank signed this energy policy agreement with the Flemish government to make energy efficiency a priority. They have since offered an advantageous NZE credit for nearly zero energy newly constructed residences.

At the Flemish Climate and Energy Summit of 1 December 2016, ING, BNP Paribas Fortis and BPost Bank committed to offering cheap energy renovation loans of under 2 per cent interest in 2017. And in the context of its Batibouw campaign 2017, AXA Bank will charge no administrative fees when concluding renovation loans. By offering inexpensive energy loans, the banking sector is helping to create an energy efficient future. They are not only giving citizens the opportunity to invest in renewable energy in their homes, but to carry out energy saving

renovations.

Exemplary projects

Since 2012, the Flemish Government has been implementing its NZE front runner strategy for nearly zero energy buildings. The projects that fit within the implementation of this strategy focus on citizens, government authorities and construction professionals, and were set up in close cooperation with building federations, sector organisations, professional associations, universities, Flemish government services and local governments. See also 3.2.2 point 2.

Since 2015, the FEA has intensified its long-term renovation strategy for residences by developing and implementing a Renewal Pact in close consultation with 34 organisations in the construction sphere.

By establishing and publishing the long-term rendition target for existing buildings and the EPB requirements for new construction until 2021, with both residential and non-residential functions, the Flemish Government created a transparent, stable and motivating climate for private initiatives. By putting an NZE brand for new construction and an 'I NZEovate' brand for existing construction on the market, the construction sector, citizens and local Flemish Government authorities have a tool to mark their leading role. The introduction of labels on the market stimulates the construction and renovation of energy efficient buildings, as evidenced by the increase in the number of NZE residences (33% for the 2015 application year, further monitoring is done through the energy performance database), the surveys conducted by the FEA, media attention and construction fairs for renovation advice and NZE construction.

Since 2015, construction professionals can register as an NZE front runner on the FEA website through an engagement statement. This has been the case for I NZEovate front runners since October 2016. Citizens can obtain the lists via the FEA website.

Subsequent actions and projects focus specifically on providing information to users and increasing their level of responsibility (Article 12):

- Publication of the tightening process for energy performance requirements up to the NZE definition of new construction.
- Publication of the two possible paths to the long-term renovation objective 2050 for existing buildings: energy performance indicator (E-level E60 or energy rating of 100 kW/m²/year) on the one hand and U_{max} requirements measurement package + installation requirements on the other.
- In 2016, the FEA completed phase 2 of developing the long-term renovation strategy with the creation of a business model for neighbourhood renovation according to the Osterwalder method. Given that the administrative and organisational burden represents a barrier for citizens

considering undertaking renovations, making the business model less complicated is key. Thanks to the one-stop-shop principle, the citizen no longer has to worry about organisation, contracting, preparation, coordination and planning of the site (if the property remains occupied during work), the subsequent premium application, etc. Consultation with stakeholders reveals that each target group wants to apply its own approach and that bringing together and convincing the target group is a very intensive process. Different profiles that can act as a lever in community action were identified. Easing the burden should facilitate renovation operations. In 2017, the FEA is considering how the business model can be completed and which demonstration projects will be eligible. Demonstration projects will be integrated with the development of the BE-REEL! proposal for the European LIFE call.

- The FEA questions citizens on the information they deem necessary to renovate their homes to the long-term objective. The results will lead to the reworking of the energy performance certificates for existing buildings (see also 3.1.2 A). The objective is to inform citizens about the renovation plan to be followed to the long-term objective: recommended steps of the phased renovation, order of implementation, points of attention for each step (lock-in prevention), energy performance improvement achieved, calculation of the associated costs and savings, etc.
- The FEA published ‘a practical guide for your NZE home’ and the ‘I NZEovate’ manual, which sets out all necessary and useful information about such matters as regulations, building techniques, lock-in prevention and financial support measures for the (potential) builder. The construction guide and the manual can be downloaded free of charge, ordered or picked up at a construction fair.
- On the website www.BEN-architect.be, which was developed on behalf the FEA by the NAV, the largest architectural association of Flanders, citizens can follow the implementation of exemplary projects of both new construction and renovation projects, look up NZE projects (for inspiration) and receive contact details for NZE construction professionals. The construction professional can consult the website for the NZE courses organised by all training institutions. In addition to this website, manufacturers and professional associations for contractors and architects have also set up NZE websites. The private market is helping raise awareness among citizens via its own awareness-raising channels.
- In 2016, the FEA had a game developed for young people age 8 to 11 on saving energy. The game, ‘Energiewijs’ (energy wise), playfully provides information, awareness and education about energy saving and energy efficiency for what will in future be an important consumer group. Primary schools were involved in the project on a large scale.
- The provincial Sustainable Building support centres give advice and guidance to builders and their construction team in the construction or renovation of their homes. Each year, they provide more than a thousand extensive opinions, hundreds of short recommendations and help more than a thousand people who come to the counter with questions. As a permanent stakeholder, they are involved in the FEA’s strategic consultation. Together with local governments, the provincial support

centres set up projects on renovation advice and renovation guidance.

The following campaigns and projects are specifically aimed at providing information and education to all involved market participants (Art. 17):

- The Flemish government charted the experiences and needs of both the builders and the construction sector in implementing energy efficient renovations. This study was aligned with the European project Cohereno, which aims to strengthen cooperation among the building partners (Collaboration for Housing NZEB Renovation on www.cohereno.eu). The needs of the builders mainly consist of a need to limit concerns, obtain financial resources, reliable information, finding the right professional help and good communication and coordination with the construction partners. There is also a demand for more demonstration projects. The needs of construction professionals mainly consist of information about energy efficient renovation: making advantages visible, taking necessary actions, long-term vision on financial support for phased implementation and, based on the building's energy performance, exemplary projects. In 2016, the government responded to most of these needs by establishing a long-term goal, introducing the total renovation premium, developing new business models and issuing the 'I NZEovate manual'. Learning networks are under construction (including Knowledge Platform for Residential Renovation Testing Grounds in Annex B).

These reports were published by the FEA and are available to the public.

- Qualicheck is a European project that was carried out thanks to the support of the Flemish Government. The focus is on proposing interesting and relevant methods that create support for initiatives that increase the reliability of energy performance certificates for residential buildings and the quality of work. The main tasks of the consortium, for which the BBRI is project leader, consists of:
 1. The evaluation of the situation in practice and of the critical situations;
 2. Collecting, structuring and documenting possible solutions to achieve improvements, both in terms of reliability and availability of the data used in the calculations as well as the quality of the works;
 3. Realizing the scope and commitment, so that the results of the project trigger action and are used in practice.

The Qualicheck project therefore meets the need for “*compliance*” and thus creates close ties with other European projects that are related to this theme, such as the *Concerted Actions* and *Build Up Skills*. The *Concerted Actions* have shown that Flanders has a good compliance framework compared to other EU Member States. In 2016, an interim report was forwarded with the performances achieved by the various working groups

within Qualicheck.

- The FEA conducted a survey of contractors in 2016 to check their training needs with a view to ensuring they will be able to ensure nearly zero energy construction by 2021. The main conclusions of the survey are that contractors obtain information and training via manufacturers and federations. There is a need for more practice-oriented trainings. Only one of the three site leaders is prepared to complete a training on NZE construction. The study was published and presented to the construction sector and educational institutions.
- The Fund for Vocational Training in the Construction Industry (Fonds voor Vakopleiding in de Bouw or FVB) develops training materials for public and private training institutions (including digital). The FVB gathers all training options for contractors via <https://www.buildingyourlearning.be>, a site that is integrated with websites of colleges, education (KlasCement) and the academic centre for construction (Wetenschappelijk Centrum or WTCB). See also 3.1.5 Build Up Skills. Upon request by the FEA, NZE trainings are included in the www.BEN-architect.be website. The Bouwunie, a professional association of contractors, organises the trainings and accreditation of energy-conscious contractors (see 3.1.5 Energy Conscious Contractor).
- In the context of developing the long-term renovation strategy, the FEA, together with its stakeholders, is working on a business model for the renovation of collective residential buildings. In particular, it concerns the development of a methodology and associated tools for the trustee (building manager) to provide guidance to the association of co-owners (vereniging van mede-eigenaars or VME) during a renovation process. The calculation of the various steps, the associated costs and energy savings can be illustrated by a calculation tool. Through a publicly accessible dashboard, all necessary and useful information is available (regulatory framework, info points, offering, financial incentives, etc.) for both the trustee, the owner, the tenant, and even the local government. The calculation tool was further developed in-house by Pixii (formerly the non-profit Passive House Platform), and is offered with a training and, in time, with a quality certification. The implementation of demonstration projects in cooperation with several city councils (including the city of Ghent) is planned for 2017.

For industry, transportation and government buildings, see the relevant chapters in this action plan.

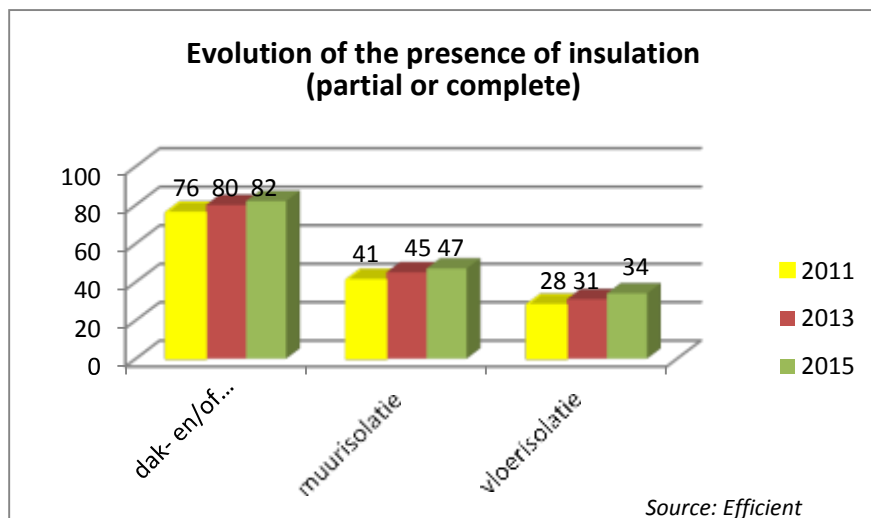
Support surveys

In 2015, the FEA carried out the ninth efficient energy use survey. This survey of 1000 Flemish households, conducted by TNS Dimarso, shows that 94% of Flemish citizens consider energy saving to be important or very important. And 66% of Flemish say they are economical or very economical in their use of energy. As regards electricity applications, LED lighting in particular continues to gain ground (present in 47% of homes versus 31% in 2013 and 22% in 2011). When purchasing devices, 81% of Flemish families claim to always or usually pay

attention to electricity consumption. Of homes with a natural gas boiler, 75% are equipped with a high efficiency or condensation boiler. For those using fuel oil: 41%. Approximately 1 in 5 homes overheat during the summer, but the share of energy-guzzling air conditioners (6%) and the interest in installing them within 5 years (3%) remains low. Of the homes surveyed, 82% have roof or attic insulation, 34% have floor insulation and 47% wall insulation; 10.5% still have single glazed windows.

The graph below shows the evolution of insulation based on the last 3 studies. The graph clearly shows that the situation is only very gradually improving. Roof insulation is installed in only around 1% of existing homes each year. The same percentage applies annually to wall insulation. For floor insulation, the annual percentage is approximately 1.5%.

Figure 1: Evolution of insulation



Translation of image	
Source:	Translation:
dak- em/of...	roof and/or...
muurisolatie	wall insulation
vloerisolatie	floor insulation

With regard to future plans for the next 5 years, investments in roof insulation and energy efficient heating boilers are popular, followed by high efficiency glazing, wall insulation, PV panels, floor insulation and a solar water heater.

3.1.5 Availability of qualification, accreditation and certification schemes (Article 16)

Information on existing or planned accreditation or certification schemes or equivalent qualification schemes (including, where appropriate, training programmes) for providers of energy services, energy audits, energy managers and installers of energy-related building elements as defined in Article 2(9) of Directive 2010/31/EU (*EED Article 16*,

Qualification system for building energy experts

The European Directive states that the energy performance certificates must be drawn up by independent and/or qualified experts.

In the Flemish Region, various qualification systems were developed for creation of the energy performance certificate according to the type of building. The certificate for existing residential buildings can only be drawn up by a qualified energy expert type A. To be qualified, a VEA-recognised energy expert type A course must be completed and an exam passed.

The certificate for public buildings can be drawn up by an energy expert type C or an internal energy expert. As is the case for type A, qualification as an energy expert type C for public buildings requires that a recognised energy expert type C course be completed and an exam passed. An internal energy expert for public buildings is an employee of the public organisation who has at least two years of experience in energy management within the organisation.

The certificate for new buildings is part of the EPB declaration (the as-built certificate to be submitted six months after the commissioning of a new building) and can only be prepared by a certified EPB reporter. In order to be certified, the individual must have a particular degree, must complete a reporter course certified by the FEA and pass an exam.

The energy experts are either self-employed in their main or secondary occupation or employees of a legal person. If it is established that the energy expert is incompetent, the certification can be withdrawn.

For the professions of energy expert type A and EPB reporters, professional qualification files were drawn up in consultation with the professional organisations, independent contractors, training institutes, the Agency for Higher Education, Adult Education, Qualification & Study Grants and the FEA. These professional qualification files are classified by an independent body and certified by the Flemish Government. They form the basis for the content of the courses.

The introduction of a mandatory permanent education for energy experts (from 2017) and EPB reporters (since 2015) ensures that educational institutions have reformed and enhanced the offering of courses for the professionals. Courses for permanent education must be certified by the FEA, which benefits the quality of the courses and the instructors. The number of hours of permanent education to be completed is determined annually according to the changes in regulations, calculation method and certification software.

Certification as a liquid fuel, gaseous fuel and heating audit technician

Technicians responsible for the maintenance and control of central heating systems must have the necessary certification and accreditation. There are three possible types of accreditation:

- accreditation as a 'liquid fuel technician'
- accreditation as a 'gaseous fuel technician'
- accreditation as a 'heating audit technician'.

Qualification scheme for cavity wall insulation

In the Flemish Region, the premium for post-insulation of cavity walls has been linked to a declaration of conformity (verklaring van overeenkomstigheid or VVO) since 2012. This is a document that records construction site-specific information about the work performed and which the installer uses to declare that the work was performed in accordance with the regulations that refer to Special Technical Specifications (STS)³. In the case of post-insulation of cavity walls, reference is made to STS 71-1. On the other hand, the manufacturer must submit a declaration indicating that the products used comply with any relevant regulations.

Qualification scheme for post-insulation of external walls via the inside or outside

From 2017, a quality system will be introduced for the post-insulation of external walls via the inside, linked with a new premium scheme. The works must be performed by a certified contractor with a certificate of competence (or apprentice) or the work must be supervised by an architect including checking on the execution of the work. From 2019, this quality system will be expanded to an STS comparable to the post-insulation of cavity walls. An STS will also be introduced for the post-insulation of external walls via the outside from 2019, coupled with an insulation premium.

Qualification scheme for installers of small-scale renewable energy systems - personal certificate

The European renewable energy Directive (2009/28/EC) requires the European Member States to implement a certification scheme for installers of small-scale hot water boilers and heating boilers using biomass, solar photovoltaics and thermal systems using solar energy, shallow geothermal systems and heat pumps.

The three regions developed a joint training programme for installers, linked to a certification scheme, in consultation with the knowledge and training centers and sector associations.

³http://economie.fgov.be/nl/ondernemingen/specifieke_domeinen/kwaliteit_bouw/Goedkeuring_voorschriften/#.UfkGKm3-aRE

The certification scheme for renewable energy installers provides a certificate of competence at the personal level, not at the level of the company. A certificate of competence is awarded on the basis of following an approved course, passing an exam, admission to the profession and relevant professional experience. If the conditions for certification are not met, the certificate will not be issued, not renewed or revoked. To open up the market for school leavers, a 'certificate of competence as an apprentice' can be obtained for installers who do not have sufficient relevant professional experience. This will be converted into a certificate of competence if sufficient relevant experience is acquired. To extend the 5-year validity period, installers must complete further training. The certificate of competence is recognised throughout Belgium. This system has been operational since March 2014 and training and examination bodies can apply for recognition from the FEA. From mid 2017, a certified contractor must be employed for solar water heaters or heat pumps in order to claim a Flemish energy premium granted through network operators.

Qualification schemes for companies

Quest quality label

The non-profit Quest was established by both knowledge centres and sector federations and, with the financial support of the Flemish Government, has developed a quality system for renewable energy applications by means of quality references for both installation companies and products. This Quest quality system is currently operational for the recognition of heat pumps and companies that install photovoltaic systems, solar water heaters and heat pumps. Enterprises receive a quality label based on a neutral and independent control procedure.

Construction Quality label

Construction Quality is an initiative of the Construction Confederation Federation, its three Regional Construction Federations, the Belgian Construction Certification Association (BCCA), the Belgian Construction Quality Society (BCQS) and the Federal Insurance. Construction Quality organises, develops and ensures the promotion of a voluntary labeling system that meets the appropriate quality and competency criteria according to a coherent and impartial reference framework. The labeling of specialised activities is provided under CQSkill for the installation of small-scale renewable energy systems, among other things. The procedure is organised by BCCA, as an accredited and independent operator, with the expert support of Quest as a recognised technical institution.

Energy Conscious Contractor

The Bouwunie sector federation offers contractors the opportunity to obtain the Energy Conscious Contractor label. With this label, Bouwunie wants to offer companies that take a conscious approach to sustainable and energy-conscious construction the opportunity to even more clearly distinguish themselves from other construction companies. This label is awarded on the basis of completing

training modules and passing a test, training workers and building an energy efficient construction project.

Qualification scheme for energy experts in the context of the SME portfolio

SMEs are not subject to the obligation imposed on large companies to regularly conduct an energy audit. However, the Flemish government has developed programmes to encourage SMEs to conduct energy audits and to implement the recommendations of those audits, including the involvement of the SME portfolio. An individual is recognised as a service provider in the field of energy if he is certified by an audit firm. The service provider must be recognised in the field designated in the submitted subsidy application. Ministerial decisions of 14 February 2013 and 21 June 2013 determine the implementation conditions regarding the appointment and operation of the audit firms.

Qualification scheme for energy experts in the context of energy policy agreements with energy-intensive companies

The energy expert, both internal and external, who will draw up the energy plan under the energy policy agreements, must be accepted according to an established procedure as described in Annex 2 of the EPA texts. The Verification Agency accepts the energy experts based on a documented evaluation of the conditions set out in Article 2 for the external energy experts and/or Article 3 for the internal energy experts. This acceptance procedure applies as a qualification scheme within the energy policy agreements.

Qualification scheme for energy experts in the context of the Energy Planning decision (EPD)

Energy plans and energy studies under the EPD must be drawn up by energy experts accepted by the FEA. In the assessment of the energy expert candidate, the FEA will be assisted by the independent Verification Agency (VBBV). The energy expert candidate will be assessed on the following 2 points:

- he/she may not be among the company staff of the establishment for which the energy study/plan is being drawn up;
- he/she must have a thorough technical and commercial knowledge of the facility to be studied. This means that the energy expert candidate must have sufficient experience and expertise with the installations to be studied. He/she must be able to convince the Verification Agency of his/her ability to draw up such a plan or study.

The FEA includes an application form on its website that operators who are having an energy plan or study draw up can use for acceptance of an energy expert.

The Flemish Institute for Technological Research (Vlaamse Instelling voor Technologisch Onderzoek or VITO) presents a list of potential energy experts on

its website. This list of potential energy experts is of course not exhaustive and is regularly supplemented. Being included on this list does not constitute a guarantee that the relevant energy expert will be accepted by the competent authority under the applicable regulations. Conversely, the government can also accept energy experts that are not included on this list. Companies, consultants, etc. that wish to be included on this list can apply to VITO.

Build Up Skills Belgium

For the European IEE project Build Up Skills, the Build Up Skills Belgium project was submitted and approved by the Belgian Association for Professional Training in the Construction Industry (FVB-ffc Constructiv), the Belgian Building Research Institute (BBRI) and the Flemish and the Walloon Region. Several bottlenecks were inventoried that impede an increase in skills among the technical staff in the workplace. In response to these challenges, an action plan was developed for nine different themes, whereby seven were technological and two cross-sectoral:

- post-insulation of walls;
- ventilation;
- PV and solar thermal installations;
- sun blinds;
- insulation of roofs;
- replacement of woodwork;
- heat pumps;
- draft prevention;
- interaction among professions.

The results were grouped into a general roadmap with five key aspects in the area of energy efficiency (EE) and renewable energy (RE):

- Key aspect 1: tools for quality management and control;
- Key aspect 2: knowledge dissemination and raising awareness;
- Key aspect 3: reorientation courses;
- Key aspect 4: contribution of the manufacturers;
- Key aspect 5: redefinition of professional competency profiles.

The project proposal for further elaboration of the results of the study was not accepted, but the key aspects were further elaborated by the project partners. In 2015, the Association for Professional Training, in cooperation with the construction sector, implemented the necessary reorientation of construction training and the redefinition of the professional competence profiles* from the construction sector. All professional competence profiles within the construction sector were reworked by adding the competencies needed to carry out construction activities linked to energy efficiency measures. The FEA has followed up on the developments. The FVB connects its work to the European project BROAD, which discusses with the construction sector, social partners and educational institutions the link between the greening of the construction industry, training opportunities and related social dialogue. A final national

meeting was held on 30 May 2016.

***An educational institution that offers a course that does not cover all the professional competencies in a profile cannot issue a diploma or certificate.**

3.1.6 *Energy services (Article 18)*

1. Measures that have been established or planned to promote energy services. See also hyperlinks to the list of available energy service providers and their qualifications (*EED Annex XIV, part 2.3.8*).

The expansion of the premium schemes for energy saving investments has given a significant impetus to the energy saving investment market, as evidenced by the evolution of premiums paid by network operators for the period 2008-2015.

Table 7. Total number of network operator premiums paid (residential + non-residential, excluding discount vouchers, scans and social roof insulation projects)

	2008	2009	2010	2008	2012	2013	2014	2015
Total number of network operator premiums paid (residential + non-residential, excluding discount vouchers, scans and social roof insulation projects):	155,011	214,383	213,663	242,688	216,260	160,139	111,556	135,833
Roof insulation	19,842	52,984	59,297	70,648	72,482	53,967	41,580	54,609
Wall insulation	4,151	7,347	9,352	13,441	14,696	21,382	20,157	26,231
Floor/basement insulation	477	924	1,226	1,407	4,435	7,695	6,248	7,611
Replacement of single glazing	41,361	55,438	56,848	59,463	55,695	49,271	29,878	33,580
Replacement of existing system with condensing boiler	35,547	45,223	48,846	55,605	39,130	1,449	865	959
Solar water heater	3,295	3,620	3,455	3,544	4,932	18,101	6,308	5,985
Heat pump	527	666	379	473	1,135	1,195	1,116	1,580
E-level premium (residential only)	236	1,648	3,911	5,001	4,457	5,604	4,009	3,617
Other services	49,575	46,533	30,349	33,106	19,298	1,475	1,395	1,661

The awarding of a number of premiums was linked to quality requirements, including cavity wall insulation (see 3.1.5 and post-insulation of external walls via the inside from 2017 as well as installers for solar water heaters and heat pumps from mid-2017). List of cavity wall insulation contractors who comply with the requirements:

<http://www2.vlaanderen.be/economie/energiesparen/reg/installateurs-spouwmuurisolatie.pdf>

List of contractors with a certificate of competence (or apprentice) post-insulation via the inside:
<http://www.energiesparen.be/sites/default/files/atoms/files/aannemers%20binnenisolatie.pdf>

Lists of Energy Experts type A (authorised to draw up an EPC for existing residential buildings) and type C (authorised to draw up an EPC for public buildings) and EPB reporter (for new construction):
www.energiesparen.be

The list of energy experts that can create energy audits for companies is published by VITA on:
http://www.emis.vito.be/adresboek?field_organisation_products_tid%5B%5D=586

The energy consultants in the construction sector have developed tools to easily find contractors able to carry out energy saving measures and to search for exemplary projects:
www.buildyourhome.be
www.vinduwaannemer.be

List of recognised certified technicians for gaseous fuels:
http://www.lne.be/themas/erkenningen/bestand/erkende_technici_stooktoestellen_gasvormige_brandstof.pdf

List of recognised certified technicians for liquid fuels:
http://www.lne.be/themas/erkenningen/bestand/erkende_technici_stooktoestellen_vloeibare_brandstof.pdf

List of recognised certified technicians for heating audits:
http://www.lne.be/themas/erkenningen/bestand/erkende_technici_verwarmingsaudit.pdf

List of renewable energy installers with a certificate of competence:
<https://rescert.be/nl/lists>

Since 2007, vulnerable families have been eligible for a free household energy scan which provides energy saving tips on behaviour and possible investment. In addition, a few small energy saving measures are implemented and any issues related to energy supply or invoicing are addressed. This service is primarily conducted by the Energy Savers, social economy actors.

List of Energy Savers:
www.energiesnoeiers.net

Table 8. Evolution in number of energy scans

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	TOTAL
number of energy scans	2,157	22,524	25,930	28,899	37,216	23,193	23,735	25,899	21,557	17,477	228,587

Protected customers (beneficiaries of social maximum energy prices) receive a bonus on the basic premiums and total renovation bonuses.

A scheme is in place for private rental homes inhabited by vulnerable families that combines high financial intervention with integral guidance of tenant and landlord through project promoters. From 2017, this measure is being expanded to cavity wall insulation and low-emission glass.

List of project promoters of social roof insulation projects:

http://www.energiesparen.be/sociale_energiepremies. This list will be expanded from 2017 to include the project promoters for cavity wall insulation and low-emission glass.

2. Qualitative overview of the energy services market with a description of the current situation and a forecast of future market developments (*EED Article 18(1) under e*)).

Energy services for companies

One way that energy efficient investments could be realised quickly at SMEs is the use of Energy Service Companies (ESCOs). This saves the company time as it does not need to search for savings opportunities and the best technology to achieve these opportunities. Initially, the company is not affected because the ESCO is paid with the return on energy saving. Ultimately, it takes ownership of the installations (depending on the contract between the company and the ESCO) and saves on its energy bill. Currently, ESCOs have a very difficult time gaining access to the SMEs, which is hindering the further development of this market segment. For smaller companies in particular, the lack of legal clarity is probably too great.

In 2013, the Agency for Entrepreneurship developed a specific ESCO initiative to further stimulate both the supply side and demand side of the ESCO market. This initiative will focus on the following five elements:

- **Organisation of a stakeholder platform aimed at taking inventory of the bottlenecks on the ESCO market, and ideas about possible solutions.**
- **Study and modify existing legislation applicable to ESCOs and support measures for their activities.**
- **Call for the performance of a number of pilot projects (3 to 5) focusing on the development of workable ESCO-SME models.**
- **Benchmarking with foreign countries.**
- **Formulating recommendations to stimulate the ESCO market in Flanders.**

The outcome of pilot projects will be awaited to determine whether a new support measure tailored to ESCOs will be developed (see also point 4 of Annex B).

The 'ESCOs for SMEs' programme is part of the Flemish action plan for nearly zero energy (NZE) buildings in which the Flemish government, in consultation with the stakeholders involved, has developed actions for the transition to energy efficient buildings with low CO₂ emissions. In addition to requirements for new construction, the NZE action plan also includes actions for the energy renovation of existing buildings and processes. To reinforce this ambition, the VLAIO was identified to facilitate ESCO operation at SMEs. Four consortia inform and recruit SMEs and ESCOs in their field of work to ultimately facilitate a number of concrete contracts between ESCOs and SMEs. A steering group of industry, financial, and energy sector experts provides substantive support for the consortia, which thus contribute to the policy recommendations in support of ESCO-SME cooperation. The projects are proceeding in various stages. First, the participating SMEs are monitored and possible savings measures are identified. Based on this, the total energy saving potential is inventoried and a concrete action plan is drawn up. If there is sufficient potential, an effort is made to set up an ESCO contract that respects the rights of both parties: the ESCO and SME.

Energy efficiency fund PMV

The proposal consists of setting up a fund within the Flanders Participation Company (Participatiemaatschappij Vlaanderen or PMV) and providing a budget of 20 million euros. This fund, with the working name "Energy Efficiency Fund (EEF)", will invest via public-private partnerships in energy efficiency at companies ("ESCO" model). Energy efficiency is the main objective, but overall projects that combine energy efficiency with local renewable energy production (wind, sun, green heat) and energy management (flexibility, demand-response) are also considered.

In concrete terms, EEF will invest in projects, ESCOs or ESCO funds which, in addition to each euro EEF invests in a project, ESCO or ESCO fund, will bring at least one euro, of the same level of seniority or subordinated, in private resources. The management of these projects, ESCOs or ESCO funds is conducted by private managers. In this way, PMV activates the risk capital available for this type of investment in Flanders.

The following investment criteria will be used as a guideline:

- Predetermined return of at least 5 to 6% IRR on the EEF investment;
- At least one euro of private resources in addition to each EEF euro, in the same level of seniority or subordinate;
- Particular attention to governance in the project company, ESCO or ESCO fund.

If the EEF finds that certain markets or niches are not approached, there is always the possibility of establishing a new project company (ESCO or ESCO fund) that will approach this specific target group. Indeed, the ultimate goal must be to maximise the opportunities in energy efficiency in order to achieve the Flemish climate targets.

Energy services for local authorities

Because many local governments are looking for guidance to implement energy saving or energy-generating measures in their patrimony, since 2010 the Flemish umbrella electricity distribution network operators Eandis and Infrac have been providing a service that facilitates these processes. This service is in line with the mandatory support provided for in Article 6.4.1/7 of the Energy Decision of 19 November 2010, which stipulates that each distribution network operator, at the request of a local authority, will assist in the planning and implementation of the policy in terms of efficient energy use of these local authorities. This extra service is not a regulated activity and therefore has no effect on the distribution network fees. Staff costs are covered by an allowance, offset in the tender and the invoice to the local authority. It is a major advantage for local authorities that a global approach to various buildings and systems is facilitated in a cost-effective way, in collaboration with a known partner. Moreover, working with large-scale framework contracts means lower prices. Energy services in buildings may involve the building envelope, HVAC, lighting, maintenance of heating and lighting, renewable energy as well as works that meet the above-mentioned measures (e.g. demolition, maintenance). In addition, similar services are offered for public lighting and the increasing the sustainability of the fleet.

In addition to the usual energy services offered to local authorities, Eandis has also launched a pilot project related to energy performance contracts. The energy performance contracts provide an overall savings guarantee, not for each measure. A bonus/malus system is used with respect to the predetermined baseline. Measurement and verification are an integral part of the offering. Financing is optional. Eandis acts as an intermediary (via a mandate or management transfer by the local authority or a group of local authorities ('pooling')), and looks for an energy performance contractor (who implements the measures and provides the savings guarantee) for each tender.

Energy services for public buildings

On 7 July 2006, the decree concerning the catching-up of school infrastructure was approved. This decree determines the key elements of the investment programme for (new) school infrastructure via alternative financing. In 2009, the private investment company DBFM (Design, Build, Finance, Maintenance) Scholen van Morgen ('Schools of Tomorrow') nv was selected with the aim of more quickly achieving an investment volume of approximately 1 billion euros. In doing so, the private company will carry out selected construction/renovation projects of the governing bodies to then make them available to the governing bodies for

30 years in exchange for a performance-related availability payment. After this period, the building is transferred to the school management at no additional cost. The programme is comprised of the design, construction, financing and 30-year maintenance of 182 school construction projects (new construction and renovation). Each School of Tomorrow is a unique project based on local needs and vision, and fulfils all modern requirements as regards sustainability, comfort and flexibility. At the start of 2017, 24 school construction projects were in the design phase, 48 projects in the construction phase and 110 Schools of Tomorrow were in use.

In February 2012, the Flemish Government set up the private law external independent agency Vlaams Energiebedrijf (Flemish Energy Company or VEB). The mission of the VEB is to ease the burden of the public sector as well as to make it more sustainable and efficient in the area of energy. This will firstly be accomplished through the centralised and more efficient purchase of energy. Secondly, by centralising and making use of energy data. And finally, by supervising public services to ensure they use energy more efficiently. The VEB wants to help the entities of the Flemish government to reduce their energy consumption and to purchase 100% green energy in the future through the 'energy efficiency/energy supplies/energy production' services and investments to meet these objectives:

- For energy efficiency, the VEB provides advice and support to the government based on direct measurements, scans, accurate specifications and project follow-up. As a commissioning centre, the VEB provides energy performance contracts and ESR neutral funding by third parties. Three pilot projects have been launched.
- For investments in green energy production and for investment in energy innovation and marketing of these innovations, a number of files have been submitted to the Board of Directors.
- The energy supply service, on the other hand, acts as a purchasing agency, which means that the VEB ensures that from 1 January 2015, the affiliated entities of the Flemish Government no longer need an individual tender procedure and yet they comply with the government contract legislation. Furthermore, VEB customers receive favourable prices with a transparent cost-effective compensation. Through a portal, the entities can obtain customised information on budget estimate and approval modalities.
- For the implementation of energy efficiency measures from the Flemish action plan for energy efficiency for the Flemish Government, participating entities may apply for funds from the Climate Fund. The VEB will use objective criteria to distribute these resources. At the same time, all public services for energy services can seek funding from the VEB and the facility company (Het Facilitair Bedrijf or HFB) of the Flemish Government. Both service providers will collaborate to provide all entities with the services at the lowest price. The action plan includes a follow-up and consultation by means of a steering group and an interdepartmental working group.

Energy services for vulnerable families

On 4 March 2016, the Flemish Government approved the Energy Poverty Program, which was established following a participatory process involving a wide range of stakeholders. In addition to optimising an option that is already regarded as effective whereby people who cannot afford their energy bills are protected against debt accumulation (payment plans, prepayment meters) and possible shutoffs, this programme emphasises structural energy poverty prevention by expanding target-oriented measures to making homes more energy efficient.

For rented homes occupied by vulnerable tenants, the government imposes a public service obligation on the network operator for the planning and implementation of roof insulation. For this purpose, the network operator uses project promoters (mainly from the social economy) that provide guidance to both the landlord and the tenant in the preparation and execution of the works. A high premium (20 euros instead of 6 euros per m²) provides an additional incentive. From 1 January 2017, this approach will be extended to cavity wall insulation (12 euros per m²) and the placement of high-efficiency glass (85 euros per m²).

The network operators will also be subject to a public service obligation on the basis of which they must offer a free household energy scan at the request of specific vulnerable target groups. In this way, the energy consumption in the home is mapped out, searched and possibly switched to a less expensive energy supplier, small energy saving interventions are performed for free and families get behavioural tips, information on premiums and investment guidance. For the implementation of the energy scans, network operators conclude agreements with more than 30 scan companies, usually so-called energy savers (organisations from the social economy). Over 20,000 energy scans are carried out annually.

For protected customers (right to social fee for energy), premiums for energy saving projects are 50% higher, with an additional bonus for roof insulation and high-efficiency glass from 1 January 2017. For this group, in addition to a 150 euro discount voucher for the purchase of energy efficient household appliances, there is also a premium for a condensation boiler, which increases from 800 to 1800 euros from 1 January 2017.

A network of Energy Houses allocates energy loans financed with public funds for energy saving investments. Over 9,000 loans were granted since the beginning of 2015. Vulnerable families receive a 0% interest rate and intensive supervision during the process.

3.1.7 Other horizontal measures to increase energy efficiency (Articles 19 and 20)

1. Other energy efficiency measures that have been taken or planned in order to implement Article 19. List of measures taken to remove regulatory and other obstacles to increasing energy efficiency (e.g. separate incentives in apartment buildings, public tenders and

annual budgeting and accounting by government bodies) (EED Annex XIV, section 2.3.9.).

Energy performance requirements in the Flemish Housing Code from 2015

With the Decree of 29 April 2011, the principle of minimum energetic performance in the Flemish Housing Code was added to the list of basic safety, health and housing quality requirements that each home in Flanders must meet. The implementation decision of the Flemish Government opted for a phased introduction of the roof insulation standard. From 2015 to 2020, the sanctioning (based on a system of penalty points for breaches of standards) for insufficient roof insulation will be gradually sharpened so that from 2020 the absence of sufficient roof insulation alone will suffice for a house to be declared unsuitable. As a minimum standard, an R-value roof insulation of 0.75 m²K/W applies. This corresponds to a layer of specific insulating material of 3 to 4 cm. In cases where it is established that a home has insufficient roof insulation, the owner is systematically made aware that he should opt to have roof insulation installed that immediately complies with the current standard for obtaining a premium from the network operator (from 2017 an R-value of at least 4.5 m²K/W).

On 15 July 2016, the Flemish Government decided to add a ban on single glazing alongside the roof insulation standard to the standard framework of the Flemish Housing Code. From 2020, phased penalty points will be given for the presence of single glazing in living areas (= living space, kitchens and bedrooms) or bathrooms, which means that the stated presence of single glazing from 2023 will be, in itself, sufficient to declare a home unsuitable. As with the roof insulation standard, residents will also be made aware that when single glazing is replaced they must immediately opt to comply with the current standards to obtain a premium.

Specific measures in the social housing sector

In the social housing sector, following a patrimony survey conducted by the VMSW in 2010 and updated on a biennial basis, an action plan for energy improvement of the social (rental) housing stock was also made. The action plan is adjusted based on a biennial update of the data. See also: 3.2.2.

Both Infrac, in collaboration with the non-profit Stebo, and Eandis, organised pilot projects with social roof insulation projects using a collective approach, mainly with social housing associations but also in the private rental market, through supportive guidance and adjusted subsidisation. This type of social roof insulation project has been officially included as a public service obligation of the network operators since 2012 and receives more compensation than the “normal” cases without a project supervisor.

The Flemish Energy Fund

The Flemish government has set up the Energy Fund. This fund is mainly funded by the Flemish energy tax and administrative fines in the context of non-compliance with the energy performance regulations.

From 2016, 10.5 million euros is allocated annually, on the basis of which aid can be requested for investment projects in residual heat valorisation. In 2016, 11 projects for residual heat utilisation were supported. Through a call, support is given to both residual heat utilisation within a company or organisation and projects where the residual heat is used in another location. The majority of approved projects use a heating network. The source of residual heat is often residual heat recovery from waste disposal (8 out of the 11 projects). In the remaining projects, the residual heat comes from a process within a company and residual heat from waste water.

The Flemish Climate Fund

The Flemish Government established the Climate Fund in 2012. The income from the Climate Fund mainly concerns the proceeds from the auction of emission allowances. The decree provides four possible expenditures:

1. Co-financing of Flemish reduction measures;
2. International climate support for developing countries;
3. Remedying indirect carbon leakage;
4. Use of flexible mechanisms.

In 2013, when it approved the Flemish Climate Policy Plan the Flemish Government decided on allocation of the first tranche of revenue amounting to 36.4 million euros. Of this total, 20 million is reserved for internal measures. Based on an evaluation (on the criteria for cost efficiency, additionality and sustainability), the Flemish Climate Fund selected 14 priority Flemish reduction measures in various policy areas for co-financing. In the area of energy efficiency, it was about a thorough renovation premium for social housing companies (in the amount of 7.9 million euros) for improvements to the building envelope and energy systems and co-financing for the combination premium for wall insulation and glazing amounting to 3.7 million euros.

The allocation of these funds was reported in the progress report of the Climate Policy Plan, see Chapter 6 in: <https://www.lne.be/sites/default/files/atoms/files/VR%202016%201504%20MED.%20VORA2015%20-%20%20bijlage.pdf>

In 2016, the Flemish Government decided to spend a second tranche from the Flemish Climate Fund for internal reduction measures in the period 2016-2019 as follows: 262 million euros for buildings (80 million euros for social housing, 54 million euros for school buildings, 59 million euros for government buildings,

23 million euros for the welfare sector, 13 million euros for cultural homes, 25 million euros for neighbourhood renovation and support for energy-autonomous municipalities, 8 million euros for agricultural facilities), 25.2 million euros for mobility (3.2 million euros for environmentally friendly cars and the Flemish Government's charging infrastructure, 22 million euros for the greening of the De Lijn buses) and 12 million euros for local authorities to support the local climate policy.

3.2 Energy efficiency measures in buildings

3.2.1 [Approach to the requirements of the revised EPBD \(Directive 2010/31/EU\)](#)

1. Calculation of the cost-optimal levels of minimum energy performance requirements (EPBD Article 5(2)).

On 20 September 2012, Belgium submitted an action plan for nearly zero energy buildings to the European Commission. The NZE action plan can be viewed on:

- As regards Flanders:

http://www2.vlaanderen.be/economie/energiesparen/epb/BEN/Actieplan_BE_N_versie_juni2012.pdf

The progress and results achieved from the various NZE actions are included in the NZE monitoring report and can be freely viewed at:

http://www2.vlaanderen.be/economie/energiesparen/epb/BEN/Vlaams_actieplan/Monitoringrapport-BEN-actieplan_20150924.pdf.

- As regards Belgium:

http://ec.europa.eu/energy/efficiency/buildings/implementation_en.htm
[tm](http://ec.europa.eu/energy/efficiency/buildings/implementation_en.htm)

On 31 May 2013, the Flemish Region provided via ENOVER the studies with the calculation of the cost-optimal levels of minimum energy performance requirements to the European Commission. The studies can be viewed at:

<http://www.energiesparen.be/epb/prof/evaluatie2013>

or at:

http://ec.europa.eu/energy/efficiency/buildings/implementation_en.htm

In 2015, in the context of the bi-annual evaluation of the energy performance legislation, two studies were again conducted into the cost optimum. In addition to the study for residential buildings, a study was conducted for all types of non-residential buildings (energy performance standard or energieprestatienorm (EPN)). The studies can be viewed at <http://www.energiesparen.be/bouwen-en-verbouwen/epb-voor-professionelen/epb-regelgeving/epb-evaluatie>

In 2017, a review of the cost optimum for EPN buildings will be completed to once again evaluate the regulations. Additionally, for residential buildings, a feasibility study will be carried out for the NZE level on an extensive set of geometries.

2. In accordance with the requirements of Article 10(2) of the EPBD, a list of measures and tools to support the EPBD objectives (*EPBD Article 10(2)*).

On 20 September 2012, Belgium submitted an action plan to the European Commission for nearly zero energy buildings that incorporates the relevant measures and instruments. Since 2012, the action plan is being implemented as illustrated under 3.1.4 'exemplary projects', 3.2.1, point 1, and 3.2.2.

3. Alternative measures for heating and air conditioning systems (*EPBD Article 14(4) and Article 15(4)*).

This does not apply within the EED, as a choice was not made for alternative measures were in 2011 but instead for an inspection requirement.

4. The scheme *applied* in 2015/2016

That stated below is also appropriate in the context of annual reporting according to EED Annex XIV, part 1, point b).

Based on the EPB evaluation 2015 and intensive consultation with the construction sector, at the start of 2017 the Flemish Government established a tighter process for EPB requirements for non-residential buildings for the subsequent years (2018-2021). The tighter process for residential buildings, which was already laid down in 2013, has been perpetuated.

For the permit applications in 2017 for newly constructed residences, an energy performance requirement of E50 is required. The above study shows that all E levels between E20 and E50 are approximately equal if the cost of construction and energy costs or savings on the energy bill are considered jointly. In this zone, the total costs are very similar. At lower E levels, costs start to rise sharply. In the 2012 study, this zone was still between E40 and E50. The cost-optimal E-level has thus evolved somewhat in recent years. It was therefore decided to maintain the predetermined E30 level as the near zero energy objective to be achieved in 2021. Between now and 2021, the compulsory E level will be tightened in phases. This gives the construction industry a clear perspective, a gradual adaptation to the new standards can be made and builders who wish to build with a view to the future know the direction in which new construction in Flanders will evolve. In concrete terms, a new step will be taken in 2018 to E40 and in 2020 to E35. This approach is bearing fruit. An analysis of the applications in the energy performance database shows that over 30% of applications submitted for the years 2014 and 2015 are at the E30 NZE level, although their requirement is still

E60.

In order to ensure that the standards remain feasible and affordable, a feasibility study will be conducted in 2017 of an extensive set of geometries. Those who act ahead of the standards will also enjoy a considerable discount on the property tax in the future.

For permit applications in 2017 for non-residential (EPN) buildings, an introductory level applies as an energy performance requirement, except for offices and schools where a global requirement previously applied. Because of the new EPN method, cost-optimal levels had to be determined for all types of EPN functions. Due to the difference with the EPU method, this was also needed for offices and schools, and the existing tightening process could not necessarily be maintained. The cost-optimal levels from the above-mentioned study were included in the regulations as an energy performance requirement as early as 2017 for permit applications from 2018.

It was decided not to tighten further by 2021 and to set current cost-optimal levels as NZE levels. By 2021, only the requirement for offices will be further tightened to E50 because for public offices, a requirement of maximum E50 has been required since 2016.

The cost optimum study will be repeated in 2017. If the results of this study show that the cost-optimal E-level shifts for a particular function, the requirement for 2021 can still be tightened.

3.2.2 *Strategy in connection with the renovation of buildings (Article 4)*

The Flemish strategy for the renovation of buildings, both residential and non-residential, is described in detail in Annex B.

3.2.3 *Additional measures with a view to the energy efficiency of buildings and appliances/equipment*

Further details on additional measures for the energy efficiency of residential and non-residential buildings, as well as promoting the use of energy efficient appliances and equipment in buildings *EED Article 24(2), Annex XIV, part 2.2, under a)*.

Coupon for energy efficient devices from network operators

Since 2008, network operators have issued vouchers of 150 euros to protected customers. These coupons can be exchanged in regular trading for an energy efficient washing machine or refrigerator. From the date of the introduction up to

2015, more than 14,000 discount coupons were exchanged.

System requirements

A policy preparatory study was carried out for the introduction of the system requirements in Flanders. The study was completed in May 2012. On 29 November 2013, the regulatory framework was definitively approved by the Flemish Government. Among other things, this Flemish Government decision states that renovations and functional changes with an application for planning permission or notification are subject to system requirements from 1/1/2015. The system requirements have been substantively elaborated in an annex that has been added to the Energy Decision. This attachment contains minimum requirements for newly installed systems or renewed systems in the case of renovations and functional changes.

There are requirements in the area of:

- Heating.
- Sanitary hot water.
- Cooling.
- Ventilation systems.
- Lighting.

For further details on the requirements, please refer to:

<http://www2.vlaanderen.be/economie/energiesparen/epb/doc/Bijlage%20SYS%20XII%2020151218.pdf>

Maintenance of heating appliances/heating audit

Under the heating appliances decision of 8 December 2006, it is mandatory in the Flemish Region to regularly carry out maintenance on the heating system, including ensuring the safety of the system and promoting energy efficiency. Maintenance must be performed annually for liquid and solid fuels and biennially for gaseous fuels. On the other hand, it is mandatory to carry out inspection of new systems and a heating audit to calculate the energy efficiency and overall efficiency of the entire heating appliance. This heating audit must be carried out every five years for systems between 20 and 100 kW, every 2 years for larger liquid fuel systems and every 4 years for larger gaseous fuels systems.

Since 1 June 2013, the minimum combustion efficiency of a central heating appliance using liquid fuel was increased to at least 90% (previous options were 85% or 88%, depending on the year of construction) and from 2018, the combustion efficiency of a central unit using gaseous fuel must be at least 88% or 90% depending on the type of device (previous options were 82% 84%, 85% or 86% respectively, depending on the year of construction). Together with stricter emission requirements, this makes a very important contribution to the replacement of older appliances with new energy efficient central heating systems in the Flemish Region. On the other hand, there has been extensive

communication via the Ecodesign Regulation (since September 2015) about the efficiency requirements of new central heating boilers that can be sold and the new labeling of the heating boilers. Since then, the sale of non-condensing heating boilers has come to a near standstill (less than 5% of sales).

From 2017, there will be a relaunch of the heating audit tool for home systems with a new online computing tool linked to a central database that will track all data.

More information on the periodic maintenance:

www.veiligverwarmen.be

<https://www.lne.be/stooktoestel-in-gebruik-periodiek-onderhoud>

More information on the periodic heating audit:

<https://www.lne.be/verwarmingstoestel-in-gebruik-periodieke-verwarmingsaudit>

More information on the Ecodesign Regulation:

<http://www.energiesparen.be/verwarming/ecodesignenergielabel>

3.3 Energy efficiency measures by government bodies (Articles 5 and 6)

3.3.1 *Central government buildings (Article 5)*

1. Information about the published inventory of the central government's heated and/or cooled buildings (EED Article 5(5)).

The Flemish Government decided on 13 December 2013 that Flanders would opt for the alternative approach to comply with the requirements of Article 5 of the EED. The notification to the European Commission of 23 December 2013 showed that with the alternative approach, Flanders could achieve at least equivalent savings compared to the standard approach. The European Commission did not comment on this notification. The full notification is available at:

http://ec.europa.eu/energy/efficiency/eed/doc/article5/2013_be_article5_en.pdf

Defining the scope of application

The scope of the Directive concerns central government buildings. The central government is defined in the Directive as 'all government institutions whose jurisdiction extends throughout the entire territory of the Member State'. In view of their exclusive powers and the fact that they are not covered by the federal government's hierarchical supervision, the regions and municipalities are considered to be central authorities in Belgium. For the purpose of defining the scope of application, the Flemish government (Flemish Region and the Flemish Community) chose to use the scope for its property policy, as well as the scope of

the 'European System of Accounts (ESA)'. For this purpose, it uses data on public accounts as collected under Regulation 479/2009/EC.

The demarcation of the Flemish Government according to the ESA application area, is based on legal and financial criteria from EUROSTAT. Each year, the National Bank of Belgium (NBB) applies these criteria to the Belgian administrations and, among other things, draws up a list of entities considered part of the Flemish state government. It concerns both buildings located in the Flemish Region and in other regions (mainly the Brussels Capital Region). The entities included in this list can change slightly from year to year. The ESA area of application is specifically formed by those entities which are counted as 'Flemish Community' and which were given ESA code S.1312, except for the services of the Flemish Parliament and the university and college associations (as they were not part of the executive power). Also not included in the reporting: the subsidiaries that themselves fall within this scope but whose parent entity is not covered by the ESA scope.

The Flemish Property Database provides an overview of the Flemish Government property, both buildings and plots. All government bodies that fall within the scope of the property policy, which coincide with the scope of Article 5 of the Energy Efficiency Directive, report on their property through this database.

From this database, the Flemish Government has selected the following buildings:

- Buildings owned by bodies that are included in the scope.
- Buildings currently being effectively used by bodies that fall within the scope of application.
- Buildings with a useful floor area of at least 250 m² as well as the buildings for which no surface data is available at this time.
- Buildings that are heated and/or cooled.

Meanwhile, the following buildings are excluded:

- Buildings with a protected status.
- Buildings owned by the Flemish government, which are listed on the inventory of the architectural heritage. These latter buildings do not have an officially protected status but were excluded because they also possessed heritage value. Deviations are also provided for these buildings in the energy performance regulations.
- Religious buildings.
- Buildings that can be primarily considered non-heated and/or cooled. This particularly concerns buildings for public infrastructure and agricultural buildings.
- Buildings with an E-level below E60 or buildings with an EPC figure lower than 75% of the reference range. It is assumed that these buildings already meet the current energy efficiency requirements.

The remaining buildings that fall within the scope of application have an

administrative, cultural, sporting, scientific or community function.

In total, there are currently 150 buildings with an estimated total useful floor area of almost 900,000 m². This floor area is also useful as annual reporting within the meaning of EED Article 7, Annex XIV, part 1, under c).

Inventory

On 13 December 2013, the Flemish Government decided that all entities falling within the scope of application should submit the missing data for drawing up an inventory as described in Article 5 (5) by 30 September each year. Even though the Flemish government has opted for the alternative approach to the transposition of Article 5, it considers that it is appropriate to demonstrate equivalence between the alternative approach and the standard approach by means of an inventory.

Article 12.3.1. of the Energy Decree stipulates that the Flemish Government shall ensure that a publicly available inventory is drawn up for the buildings in question that are owned and used by the Flemish Government and that the inventor contains at least the following information:

- the floor area in m²;
- the energy performance of each building;
- other useful energy data.

The inventory lists will be made public in accordance with Article 12.3.1 of the Energy Decree.

2. Further details on the calculation regarding the renovation requirement (*EED Article 5, (1) through (4)*).

The objective is determined by reference to the consumption and surface data of buildings falling within the scope of the Directive, as determined by Articles 5 (1) to 5 (4). Because the alternative approach has been opted for, the target is not calculated as 3% of the total useful floor area of these buildings. However, it must be demonstrated that equivalent savings will be achieved.

The savings to be achieved were recalculated. This is because of the major progress of data in the Property Database for the buildings that fall within the scope. In particular, surface area data are more accurate and more complete in 2016 compared to 2013.

For the buildings owned and used by the Flemish Government, and located on its territory, an energy saving of 14 kWh/m² is applied in accordance with the requirements and calculations of REPG Cost Optimum Methodology (and already delivered to the European Commission).

For the buildings owned and used by the Flemish government but located in the

territory of the Brussels Capital Region, energy savings of 14 kWh/m² is also applied in accordance with the requirements and calculations of the Brussels Capital Region.

Table 9. Annual energy savings to be realised for the period 2014-2020

	2014	2015	2016	2017	2018	2019	2020
Total surface to be renovated (m ²)	535,396	519,334	503,754	488,642	473,982	459,763	445,970
Total surface to be renovated per year (3%) (m ²)	16,062	15,580	15,113	14,659	14,219	13,793	13,379
Saving/m ² (kWh/m ²)	14	14	14	14	14	14	14
Saving (MWh)	225	443	655	860	1059	1252	1439

The total energy savings to be achieved over the 2014-2020 period according to the standard approach amounts to 5.932 GWh.

- Information on the alternative approach to achieving savings equivalent to the renovation obligation as permitted by Article 5(6).

Equivalence is demonstrated by the standard approach, in particular renovating 3% of the usable floor area annually and the associated energy savings compared to the energy savings that will be realised under the alternative approach.

To calculate the objective for 2014-2020 according to the alternative approach, data is made available through EPC regulations, namely:

- Types of reference buildings according to the EPC for public buildings.
- Energy consumption reference values for each type of reference building for renovation based on the EPC for public buildings.
- Energy consumption reference values for each type of reference building after specific energy efficiency measures were applied.

Based on the available data of the EPCs for public buildings, the buildings of the inventory are categorised into reference buildings that correspond to the categories within the application area for the EPC for public buildings. Based on the data in the public buildings EPC data base, an average energy consumption/m² before renovation was derived for each type of reference building. Based on this average energy consumption, a total energy consumption of all buildings is then calculated before renovation. For the buildings with no available surface area, the calculation used the average surface area per type of reference building, which was also derived from the EPC database.

To calculate the energy consumption after implementing measures, an average energy consumption after renovation was determined for each reference building. For this, it was assumed that all buildings were located at least in the centre of the yellow zone of the EPC's colour bar after measures were implemented. These buildings use on average 10% less energy than the reference building for a particular category. This approach allows energy consumption to be calculated after the renovation of all buildings.

In this way, a savings of about 28 GWh can be realised.

As announced on 23 December 2013 at the European Commission, the alternative approach allows a greater energy savings to be achieved than with the standard approach.

The summary of measures included in the notification (mainly on EPC) is also useful as an annual report containing the list of alternative measures (EED Article 7, Annex XIV, part 1, under d)).

See also section 3.3.3 for flanking measures such as:

- The Flemish policy on sustainable government contracts;
- The manual of sustainability considerations in government contracts;
- The behaviour action plan in the context of the Flemish government's energy efficiency action plan;
- The manual for office buildings;
- The tool for sustainable school buildings;
- The mobility action plan (service vehicles).

3.3.2 *Buildings of other government bodies (Article 5)*

1. In accordance with Article 5(7), below is information on measures taken/planned that demonstrate the exemplary role of government bodies that do not form part of the central government (*optional info see Annex XIV, part 2.2., first paragraph*).

Municipal authorities: Covenant of Mayors

Many cities and municipalities, provinces and regions in Flanders draw up energy and climate plans aimed at reducing their dependence on fossil fuels and their contribution to greenhouse gas emissions. The way local authorities approach the formulation, implementation and follow-up of these plans can vary widely. In recent years, there has been a trend among with local authorities of making use of the framework and guidelines of the European Covenant of Mayors and its Sustainable Energy Action Plans (or SEAPs). By signing the Covenant of Mayors, a local government engages in achieving the European climate and energy objectives in its territory. The experience of cities that have already joined the Covenant of Mayors teaches us that a wide consultation and information process is often set up with citizens and key actors. On the one hand, to create a level of support, and on the other certainly also to use that to inspire action. Possible actions from the local policy level in the context of the Covenant of Mayors are:

- Communicate and raise awareness (to create actions that raise awareness among the public and entrepreneurs of the social importance of energy saving and investment in environmentally friendly energy production).
- Promoting and facilitating (promoting energy measures through a policy of stimulation - easing the burden of citizens and entrepreneurs).
- Controlling and maintaining (realisation of policies also assumes the necessary control and monitoring of its effectiveness).
- Extending the exemplary role of the local government as an active driver and innovator.
- Offering a platform where projects are explained, in order to work in an inspirational way.
- Bringing stakeholders together.

The study entitled ‘Support for the Covenant of Mayors’ carried out by VITO on behalf of the Flemish government (Department of Environment, Nature and Energy or LNE [Leefmilieu, Natuur en Energie]) was intended to support the cities and municipalities in Flanders in the formulation of a “Baseline Inventory” (BEI) and the “Sustainable Energy Action Plan” (SEAP) as defined under the Covenant of Mayors. On the one hand, the study resulted in a zero measurement for each municipality with all the centrally available data being filled in, and on the other hand in a simulation where 10 different measures can be simulated at the municipal level. The tool contains all the data and calculations needed to create a CO₂ zero measurement for the territory and to do so according to the minimum reporting requirements of the Covenant of Mayors. The results of the calculations are reflected in the SEAP template. The above-mentioned calculation sheets are already filled in with data and require only limited user input. Municipal inventories are available free of charge and can be downloaded by all Flemish cities and municipalities on the local statistics website of the Flemish Government’s research unit, <http://www.burgemeestersconvenant.be>. Currently, the inventories for 2011, 2012, 2013 and 2014 are available.

According to the latest available data concerning the Covenant of Mayors on the

EU portal, <http://www.burgemeestersconvenant.eu>, 237 municipalities and cities in Flanders have signed the Covenant of Mayors. Thirteen Flemish municipalities signed at the beginning of 2017. This means that 76% of all cities have signed the Covenant. A check of the EU portal reveals that 191 action plans have now been submitted to Flanders and the action plans have been monitored for 38 Flemish municipalities. A total of 227 municipalities and cities have set targets for 2020, 5 cities and municipalities have also submitted a CO₂ target for 2030 and 9 municipalities have integrated adaptation into their action plan.

Management of exemplary role through public service obligations

See the description under 3.1.6., point 2 for the actions in support of the local energy policy under the efficient energy use/public service obligations.

Management of exemplary role using other tools

Refer to the manual 'Valuation of office buildings - moving towards sustainable housing for the Flemish Government' (see further under 3.3.3.). Although the manual was originally intended primarily for internal use by the Flemish Government, the manual has also become a reference document for the other authorities and the construction sector.

For the school institutions that do not fall under the Flemish Government, reference is made to the sustainable school building tool (see point 3.3.3.).

On behalf of the FEA, in 2015-2016 the provincial support centres organised working visits to NZE government buildings in each Flemish province. Local authorities were the project's target group. During the working visits, local authorities were informed about the regulations, the benefits of NZE building, the options in choice of materials and systems, the construction problems and the available financial systems. Every working visit had a policy, regulatory and technical speaker. A mayor or alderman talked based on their own experiences as organiser, financier and sometimes user. A construction professional analysed the more technical side and the support centre gave more insight into the regulations. In 2016, NZE advice was issued in conjunction with this *roadshow* of good examples. Local governments were able to consult their province's support centre free of charge for the design, tendering or execution of their NZE project for an entire year.

In the final report, the support centres combine the obstacles and opportunities for the policy. The main barriers are the uncertainty about the budgetary impact and the lack of sufficient support in the government. Financial incentives, early involvement of an energy advisor in the construction team (at the design stage), providing communication that clarifies the governmental NZE requirements for public non-residential buildings, structural knowledge sharing or customised advice and the development of a cost simulator are important opportunities. The project shows that local governments can create support thanks to the energy

advisor and that they are helped by specific advice and guidance in shaping and quantifying their project. Thanks to the assignment, the FEA also has a better view of the number of NZE projects that local authorities plan to implement. The report was published on the FEA website.

2. List of government bodies that have drawn up an energy efficiency action plan (alone or as part of broader climate or environmental plans) (*EED Annex XIV, part 2.3.1.*).

Flemish Government

On 1 July 2016, the Flemish Government approved the energy efficiency action plan for the Flemish administration. As a starting point, it was assumed that all segments of the central Flemish government will adopt the following binding objective from 2017: primary energy consumption (buildings and technical infrastructure) will decrease by at least 2.09% annually and per entity starting in 2017 to 2020. For a proper follow-up of the realisation of the target of 2.09% annually, a reference consumption and a reference volume will be drawn up per entity. The resources allocated to the largest consumers each year to cover energy costs (= energy budget) will be reduced by 2.09%. The resulting budget margin will be used for concrete investment projects in the entities covered by the savings target. From 2017, the principle of reducing the energy budget by 2.09% is applied to all entities with an annual energy cost of at least 200,000 euros (Agentschap Wegen en Verkeer (Agency for Roads and Traffic), Facilitair Bedrijf (Facility Company), Vlaams Radio- en Televisieomroep (Flemish Radio and Television Broadcasting), De Lijn transport company (excluding traction), Waterwegen en Zeewezen (Waterways and Maritime Affairs), Vlaamse Dienst voor Arbeidsbemiddeling (Flemish employment agency), Sport Vlaanderen (Sport Flanders), Vlaams Milieumaatschappij (Flemish Environmental Association), Vlaams Instelling voor Technologisch Onderzoek (Flemish Institute for Technological Research), Shipping, Instituut voor Landbouw- en Visserijonderzoek (Institute for Agriculture and Fisheries Research), Jongerenwelzijn (Youth Welfare), Plantentuin Meise (national botanical garden in Meise), Kind en Gezin (National Child Welfare Agency), Maritieme Dienstverlening Kust (Maritime Services and Coast Agency), Agentschap voor Natuur en Bos (Nature and Forest Agency)). From 2018, the principle of reducing the energy budget by 2.09% will be extended to entities with an annual energy cost of at least 100,000 euros. The following will be added to the list: Vlaams Maatschappij voor Sociaal Wonen (Flemish Agency for Social Housing), Instituut voor Natuur- en Bosonderzoek (Institute for Nature and Forest Research), Vlaams Landmaatschappij (Flemish Land Agency). From 2018, the Flemish Government will also apply an indicative annual energy efficiency target of 2.09% in respect of the entities subsidised by the Flemish government in the care sector and the school groups.

On 15 July 2016, the Flemish Government approved the Facility Company's building portfolio action plan. The Facility Company will focus strongly on the energy upgrade of existing buildings, both in technical and architectural terms, to

make efficient use of internal heat gains, reduce heat losses and thus reduce energy consumption. In the case of new buildings, the aim is to achieve near zero energy (NZE) buildings with a good level of user comfort. Thanks to the exemplary function of the Flemish government, the Facility Company aims to achieve higher energy efficiency in all its major projects compared to the current energy performance regulation. In order to implement its action plan, the Facility Company will invest around 61.5 million euros in energy master plans, single works and small works in the period 2016-2019. In order to be able to implement this action plan, the Flemish Government awarded 44.5 million euros from the Climate Fund.

All information concerning this was gathered together on:

<http://www.vlaamseklimaatop.be/klimaatdoelstelling-vlaamse-overheid-2030>.

Provincial authorities

Province of Antwerp:

<http://www.provincieantwerpen.be/aanbod/dlm/duurzame-organisatie/klimaatneutrale-provincie0/klimaatplan.html>

Province of Limburg:

<http://www.limburgklimaatneutraal.be/>

Province of East Flanders

http://www.oost-vlaanderen.be/public/wonen_milieu/energie/index.cfm

Province of Flemish Brabant

<http://www.vlaamsbrabant.be/wonen-milieu/milieu-en-natuur/vlaams-brabant-klimaatneutraal/klimaatplan/index.jsp>

Province of West Flanders

https://www.west-vlaanderen.be/kwaliteit/Leefomgeving/klimaat/Documents/Nota_klimaattoelstellingen_eigen_organisatie_Gk_10122015_.pdf

3.3.3 Procurement policy of government bodies (Article 6)

Information on the measures taken to ensure that the central government only purchases high energy efficiency performance products, services and buildings (*optional info see EED Article 6(1)*), as well as on the measures that are taken or planned to encourage other government bodies to do the same (*optional info see EED Article 6(3)*).

In the pursuit of sustainability, the Flemish government wants to set a good example.

Flemish policy on sustainable government contracts

In the period 2009 to 2015, the policy on sustainable government contracts was

worked into action plans for sustainable government contracts. Each action plan includes a comprehensive amount of information on the sub-themes of sustainable government contracts and describes a large number of targeted actions that contribute to the maintenance of Flemish government contracts. The objective is to achieve 100% sustainable government procurement by 2020. Energy efficiency is also part of sustainability.

A few key aspects of these action plans:

- Focus on framework agreements and commissions centres.
- Use of life-cycle cost in government contracts.
- Sustainable innovative tendering.
- Sustainable government contracts to leverage sustainable materials management.
- Sustainability in public-private partnerships.
- Sustainability criteria and objectives per product group - always paying attention to energy efficiency of products and services.
- Central point of contact for sustainable government contracts for communication, awareness-raising and supervision of entities in integrating sustainability criteria in government contracts.
- Monitoring of sustainable government contracts.

The Flemish government contracts action plan, approved by the Flemish Government on 29 January 2016, has driven forward a strategic and coordinated government contracts policy within the Flemish government and in the expansion for Flanders.

This plan provides for the expansion necessary to achieve the predetermined objective of 100% sustainable government contracts by 2020. With this ambitious and innovative plan, the Flemish government also engages in an innovative circular economy and wants to support the marketing of innovation and growth opportunities, especially SMEs.

The point of departure is the effective and efficient deployment of the government contracts tool to contribute to the realisation of Flemish government policy objectives such as stimulating innovation, continuation of the transition to the circular economy, ensuring an energy transition, reducing human rights violations in the production chain, reducing environmental pressures, improving access of SMEs to government contracts, etc.

This plan establishes a high level of overarching strategic objectives for public procurement in the period 2016-2020 (including efforts concerning sustainable and innovative government contracts). In the period 2016-2020, the entities of the Flemish government will set up and report on concrete initiatives each year.

In 2016, the Flemish Government also approved a new four-year agreement between the Flemish Region and the non-profit Association of Flemish Cities and Municipalities (Vereniging van Vlaamse Steden en Gemeenten or VVSG) on the

structural support of a support centre for sustainable local government contracts. The support centre for local authorities is the key consultation and advisory partner with respect to sustainable government contracts and must ensure the widest possible application of sustainable government contracts with local governments by means of various actions and an integrated approach.

The Behavioural Action Plan in the context of the energy efficiency action plan for the Flemish Government

The Behavioural Action Plan was approved by the Flemish Government on 25 November 2016. With this action plan, the Flemish Government wants to support the energy efficiency and mobility action plans while putting the pioneering function in place that will be included in behavioural change efforts. In other words, the main dynamic will be the energy efficiency and mobility action plans and, in addition, a determination will be made of the best possible way for civil servants to adjust their behaviour. Evaluation and learning are key here: which approach works best, which actions are most scalable, etc.

The Department of Chancellery and Government will create a series of tools, organise sessions and, in time, include a module on behavioural change in the AgO training offering. The department will also support entities that want to set up concrete projects on this theme. On the one hand, there is a framework contract in which behaviour-related research can be ordered. And on the other hand, the Department of Chancellery and Government has established contacts with universities that can carry out such research.

The manual for office buildings

At the beginning of 2011, the second edition of the manual 'Valuation of office buildings - moving towards a sustainable housing for the Flemish government' was published. The Agency for Facility Management (AFM) applies this when selecting large office buildings. It is a part of any construction, renovation or rent specifications and is decisive in the award of contracts. The manual is regularly evaluated. The results of an assessment against various domestic and foreign buildings that stand out in terms of sustainability have now been included in the publication.

For three performance groups (liveability and well-being; environment and sustainability; energy) an office building can earn a score of 0 to 4. The individual score per performance group results in a final score that is translated into a number of stars: from 0 for office buildings that only meet the minimum requirements, up to 4 for office buildings that integrate highly innovative, sustainable technologies.

Tool for sustainable school buildings

The Agency for School Infrastructure (AGION) and the GO! education institution of

the Flemish Community are committed to realising quality, sustainable and functional school buildings.

To this end, the tool for sustainable education was developed. This tool provides the building team with the necessary support to measure the sustainability aspects of a school. In addition, the project can be tested to see whether it meets the minimum requirements. The sustainability meter is useful for both new construction and renovation projects. The school of the future is thus more efficient in dealing with energy, water, raw materials, space and financial resources.

Service vehicles

On 15 July 2016, the Flemish Government approved the Mobility action plan. A reduction of at least 40% of CO₂ emissions due to fuel consumption is the objective for the period 2005-2030. Initially (2016-2020), the Flemish Government is aiming for an overall 40% reduction of CO₂ emissions from the fuel consumption of the service vehicles. It wants to make the environmental impact of its transportation needs sustainable in three areas:

- Stimulating sustainable mobility behaviour (mainly energy efficient driving and choosing a more sustainable means of transport).
- Avoiding travel (driving fewer kilometres, meeting in the digital workplace or planning meetings differently, etc.).
- Greening the vehicle fleet (when driving cannot be avoided, using a less polluting car, reducing vehicle fleet by removing old polluting cars and choosing systematically for smaller vehicles that consume less).

In this context, the explicit intention is not only to focus on technology-driven measures but also on a change of behaviour among entities and end users. The action plan is also clearly leading the transition towards electrification and further reduction of diesel use in the Flemish Government fleet.

The three strategic objectives are translated into the action plan to operational objectives that each entity must meet.

- Each entity with its own fleet will achieve a minimum Ecoscore of 67 and a weighted Ecoscore of 68 by 2020.
- Each entity will reduce fossil fuel consumption by at least 40% by 2030 compared to 2005.
- Each entity will set up a profile and a transport needs plan.
- Each entity will set up a replacement plan. Based on this, each entity will work out the strategic objectives in terms of smaller, fewer and more environmentally friendly vehicles.

For implementation of this action plan, the Flemish Government was awarded 3.2 million euros from the Climate Fund.

3.4 Energy efficiency measures in industry

Further information on energy efficiency measures in industry (*EED Article 24(2), Annex XIV, part 2.2.*)

See chapters 3.1.2, 3.2.2 and 3.1.6 for:

- **Decision on Energy Planning;**
- **Energy policy agreement with the energy-intensive industry;**
- **Energy audit for large companies;**
- **Action plan for increased Energy Efficiency among SMEs;**
- **Energy audits, qualification and energy services;**
- **Information.**

In Flanders, 99% of the industrial companies are SMEs. Because the highest SME energy consumers are in these industrial sectors and a small savings in a high-energy consuming company is an immediate guarantee of significant savings in absolute terms, particular attention will be paid to industry in the action plan for more energy efficient SMEs.

The total joint energy consumption of all these Flemish industrial SMEs is 48.3 PJ (which corresponds to 13% of total industrial energy consumption). A further breakdown of this energy consumption to small and medium-sized industrial enterprises shows that the medium-sized enterprises account for the largest share of this energy consumption (63.5%), while they only represent 3.5% of the number of industrial SMEs. The remaining 96.5% of industrial SMEs, the small businesses, represent only 36% of this energy consumption. By focusing efforts on the limited number of medium-sized enterprises (approximately 930 companies), the administrative burden will be lower than by covering all industrial SMEs (approximately 26,600 companies). The sectors with the largest number of medium-sized enterprises are the food, chemical and metal industries. In developing actions, extra attention will be paid to these sectors.

For SMEs, investing in energy efficiency is often less interesting than investing in their core business. One of the main reasons for this is that energy saving investments have a lower return than investments in the core business. This problem mainly occurs when the payback period of the energy saving investment is very long. However, energy saving investments with a short payback period are rarely implemented by SMEs. The main reasons for this are a lack of knowledge about energy investments, a lack of time and the low share of energy costs in total operating costs. In order to encourage SMEs to carry out energy saving investments, close attention must be paid to unburdening the SMEs when actions are developed. In this case, unburdening means that the energy audit, the analysis of profitable investments, the application and comparison of offers, the facilitation of financing, the follow-up of the installation and the follow-up of energy savings must be carried out for the SME by a specialist as far as possible. This serves to eliminate the main current obstacles. In order to succeed in this unburdening, it is important that it be offered in the context of an existing trust relationship. Examples are the sector federations, managers of industrial sites, etc.

Concrete actions currently being undertaken by the Flemish government:

- **Mini-EPAs for SMEs:** sectoral voluntary agreements whereby a facilitator tests a list of energy saving measures on behalf of the sector organisation concerned and, if appropriate, implements them at SMEs in the relevant sector. For this purpose, the FEA will draw up pilot projects with interested sector organisations via project subsidies (in 2016, FEVIA, AGORIA and Horeca Vlaanderen (catering sector) have shown interest in this).
- **Benchmark tool for SMEs:** via a project subsidy, the Neutral Syndicate for the Self-Employed (Neutraal Syndicaat van Zelfstandigen or NSZ) was offered the option of setting up a benchmark tool based on 10,000 consumer data from SMEs. This has been available since the summer of 2016 on <http://kmo-energiewijzer.be/>.

New Cluster Policy

With its new cluster policy, the Flemish Government wants to open up untapped economic potential and increase the competitiveness of our Flemish companies through active and sustainable cooperation between different actors. The cluster policy focuses on collaborations of Flemish innovation-conscious companies with growth ambitions and an international perspective open to cooperation with other companies and knowledge centres.

The Flemish cluster policy distinguishes two types of clusters: the spearhead clusters and the innovative corporate networks. The focus of this policy lies in a limited number of large-scale and ambitious spearhead clusters. For these spearhead clusters, they are developing and implementing an ambitious long-term strategy and competitiveness program for a strategic domain for Flanders, in a partnership between companies, knowledge institutions and government (triple helix). The long-term strategy is based on a significant market potential for the companies, while within the competitiveness programme there should also be sufficient attention to achieving short-term demonstrable results. Innovative corporate networks are smaller-scale initiatives aimed at setting a dynamic in motion within a group of companies. Thanks to an intensive cooperation between companies, a concrete action plan will be implemented with demonstrable economic added value for the participating companies. Joint initiatives in emerging domains also fit within this cluster type.

The Agency for Innovation and Entrepreneurship (Agentschap Innoveren en Ondernemen or VLAIO) facilitates this new cluster policy. An initial call for innovative corporate networks was launched at the end of 2015. Meanwhile, 13 corporate networks were selected and they receive support for a period of three years. Three of these networks are explicitly related to the topic of energy. In

addition, within five different domains, project proposals were submitted for recognition as spearhead clusters, including one for the theme of energy. On 15 December 2016, the Flemish Government gave the green light to the latter, enabling it to start.

Within the Flemish Energy Cluster, companies in the energy, construction and ICT sectors will work together on system innovations in 3 market segments: 'energy efficiency', 'sustainable cities and communities' and 'smart homes'. The intention is that within 5 years' time, 90 partners will work on 24 projects in 5 innovation zones. An 'innovation zone' is a programme that combines various complementary activities and projects in a specific energy domain. These five innovation zones are: *Energy Ports*, *Microgrids*, *Multi-energy solutions in neighbourhoods*, *Energy cloud platforms* and *Intelligent renovations*. Breakthroughs are being undertaken in each innovation zone and in time, at least one market breakthrough must be made per zone.

Industrial areas

The Flemish Government's decision of 24 May 2013 to subsidise industrial sites requires that industrial sites whose (re)construction is subsidised are CO₂-neutral in terms of electricity consumption. Because fewer sites are subsidised where new lots actually come on the market and which will have to meet this requirement (because more resources will be used for redevelopment of outdated industrial sites), developers who request subsidies for industrial property management must also enforce CO₂ neutrality. The first step here (and whereby a manual is available) is encouraging companies to practice energy efficiency.

In the past, industrial area management projects were launched in many industrial areas through calls for projects by either corporate associations or intermediary project promoters such as POMs, municipal associations or VOKA. Some industrial areas practice energy efficiency. From the projects, a lot of knowledge has been gained about collective purchasing, construction of heating networks, energy exchange, etc. In 2016, a new call was launched on industrial area management whereby 22 projects were selected. Many projects focus on energy efficiency. Moreover, the 5 Provincial Development Companies set up a knowledge network on industrial area management. This knowledge network will also devote attention to energy efficiency.

Ecology support

With the decision of the Flemish Government of 17 December 2010 to grant aid to companies for ecology investment in the Flemish Region and the Flemish Government's decision of 16 November 2012 to grant support to companies for strategic ecology investments in the Flemish Region, the Flemish Government encourages the companies to invest in technology to promote energy efficiency by means of the ecology premium plus and the strategic ecology support. With this ecology support, the Flemish Government wishes to encourage companies to organise their production process energy-efficiently, thereby taking on part of the

additional investment costs associated with such an investment.

a) **Ecology premium plus**

Only investments listed on the exhaustive technology list are eligible. These are the highest performing technologies in the market, which makes it possible to achieve the greatest improvements in energy saving and environmental efficiency. This list is regularly updated. The amount of the ecology premium is determined by the size of the company, the performance of the technology, the type of investment and a possible subsidy bonus. The support offered by the ecology premium plus amounts to up to 35% (including the highest subsidy bonus) of the essential investment components and up to 1 million euros per 3 years per company.

b) **Strategic ecology support**

There are technologies that are difficult to standardise because of their exceptional and unique character and are not eligible to be included in the exhaustive ecological premium list. Strategic ecology support falls into this category. The conditions are that investment projects must amount to at least 3 million euros and must be of strategic importance. In other words, ecology investments provide a global energy solution with closed energy and material cycles, fit into the global vision of the company with respect to sustainable energy use and pursue generic energy policy goals. The support offered via the ecology support amounts to up to 40% of the essential investment components and up to 1 million euros per 3 years per company.

Network operator premiums

Rational energy use in industry is stimulated through public service obligations for electricity distribution network operators, which have a number of action commitments to encourage their end customers to save energy.

Electricity distribution network operators also grant SMEs a premium if an energy study or energy audit that has been carried out shows that an investment in a commercial building without residential function provides significant energy savings compared to the existing situation and this investment is actually implemented. The premium amounts to 0.035 euro per saved kWh of primary energy with a maximum of 25,000 euros per year if the payback period of the investment is longer than 2 years. The 2016 business survey conducted by Ipsos revealed that approximately 44% of companies are familiar with the premiums of network operators. Of these companies, 33% are familiar with the specific premium for post-audit support.

Increased investment deduction for energy saving investments by companies

Article 69 of the Income Tax Code (Wetboek Inkomstenbelastingen or W.I.B.)

allows companies to reduce their taxable profit by an increased investment deduction for energy saving investments. The deduction is made from the profit of the taxable period during which the assets were acquired or established. For the energy saving investments carried out during the taxable period linked to the 2017 tax year (income from 2016), there is an increased deduction of 13.5%. The percentage of the increased investment deduction and the categories of eligible investments are determined by the federal government. Each region, for Flanders the FEA, provides the certificate to be attached to the tax return for the energy saving investments carried out in the region. The number of applications processed for increased investment deductions for energy saving investments has grown sharply in recent years. In 2016, the FEA processed approximately 1100 application files for a certificate of increased investment deduction. The 2016 business survey conducted by Ipsos among 1000 energy managers from companies with 5 to 200 employees has shown that these support measures are very well-known to companies (58%). 17% of companies surveyed in 2016 have already taken advantage of this support measure.

Promoting CHP and heating networks and stimulating the use of residual heat (see also 3.6.1.)

- a) **Controlled heat and power production certificates and guaranteeing a stable investment climate for CHP, see 3.6.1.:** Each year, electricity suppliers are required to submit CHP certificates for an increasing percentage of their deliveries. A CHP certificate is provided for the primary energy savings achieved in a qualitative CHP system relative to the situation in which the same amount of electricity and heat is generated separately. This support measure can be applied cumulatively with other support mechanisms, in particular green electricity certificates and the increased investment deductions.
- b) **Support scheme for the use of residual heat, see 3.6.1.**
- c) **Ecology support for the use of residual heat and heating networks for companies, see above.**
- d) **The Flemish Government's decision of 24 May 2013 to subsidise industrial sites (see above) provides grants for the construction or expansion of a heating network at bottleneck sites or outdated industrial areas.**
- e) **By mid-2015, companies participating in the energy policy agreements (see also 3.1.2) with the energy-intensive industry conducted studies of the potential for qualitative CHP and heating and cooling networks. The results of these studies served as input for the comprehensive assessment (EED Article 14 (1) and (3)).**
- f) **A heating chart with an analysis of available residual heat and interesting areas for heating networks is available online at geopunt.be (extended**

assessment, in accordance with Article 14(1) and (3) of the EED).

- g) **Mandatory implementation of a cost-benefit analysis for major energy projects (see also 3.6.1).**

3.5 Energy efficiency measures in transport

Overview of policies aimed at improving the energy efficiency of passenger and freight transport and promoting a modal shift to more sustainable transport modes (EED Article 24 (2), Annex XIV, Part 2.2.).

The Flemish Government approved a new Mobility Plan in principle in late 2013. The public research was completed at the beginning of 2014. The draft Mobility Plan Flanders is currently being adjusted, taking into account the new policy priorities for basic accessibility and combi-mobility, the forthcoming Flanders Space policy plan and the new European climate objectives. Various measures are also included in the Air Quality Plan and the Flemish Climate Policy Plan. At the end of 2015, the Flemish Government approved an action plan for Clean Power for Transport, which was delivered to the European Commission as part of the Belgian policy framework in November 2016.

The following policies are aimed at reducing energy consumption and emissions in the transport sector:

- management of the growth of the number of road transport kilometres;
- a change in the environmental characteristics of the means of transport;
- stimulating an energy efficient driving behaviour.

Energy consumption and CO₂ emissions from the transport sector are determined by the shares of the various modes of transport, the energy efficiency of the means of transport, the energy carriers involved and the volume of transport (travel and transport behaviour).

A greening of the vehicle fleet comes about through European regulations: for new passenger vehicles sold in the EU, every manufacturer must meet an average CO₂ emissions level of 130 g/km by 2015 and 95 g/km by 2020. New vans must comply with an average of 175 g/km by 2017 and 147 g/km by 2020. Given that the standards are based on the quantity of vehicles sold, meeting the European objectives therefore depends on the Flemish (mobility) policy for the various target groups (individuals, companies, government fleet, public transport) with respect to the greening of the various transport parks.

In accordance with the European White Paper on transport, the long-term aim is to achieve a low-carbon vehicle fleet. A low-carbon vehicle fleet requires further-reaching technological measures such as the switch to electric vehicles, but also a far-reaching greening of the heavy vehicle fleet.

The European Directive on Clean Power for Transport is also aimed at a greening

of the vehicle fleet.

A. Management of the growth of the number of road vehicle transport kilometres;

Measure A.1. Towards a guiding pricing for road vehicle transport kilometres

On 21 January 2011, the three regions concluded a political agreement on the reform of traffic taxation. This agreement governs the introduction of the distance-based charge for heavy vehicles. The agreement also provides for a coordinated reform of traffic taxes, which will eventually be calculated on the basis of the environmental characteristics of the loaded vehicle. The project was given the umbrella name Viapass (www.viapass.be). This joint website of the three regions contains all relevant information. The Viapass project was implemented on 1 April 2016 with the introduction of the distance-based charge for heavy vehicles. Viapass is the coordinating inter regional entity for the distance-based charge for heavy vehicles.

An examination is currently underway to determine whether and under what conditions it would be possible to introduce a differentiated distance-based charge or an alternative system for passenger transport, which enables a better system of charging user costs and external costs of transport to users.

Measure A.2 Additional measures for managing the growth of the number of road kilometres driven by car (personal mobility)

In order to stimulate a reduction in car use, the Flemish Government is investing heavily in quality alternatives for cars and is focused on a good interlinking of the various mobility networks.

With the basic accessibility concept, the Flemish Government is able to achieve important social functions based on a demand-driven system and prioritising the best use of resources. Through the best use of resources, Flanders must succeed in setting up a more efficient transport system. A system tasked with increasing accessibility in a better and more efficient way, which is therefore able to convince a larger (potential) target group to make the move to collective transport.

Basic accessibility is not limited to revamping the public transport network, but also focuses on the development of hubs where the different transport systems meet, so that transfers take place smoothly and logically. We therefore ensure that (public) transport hubs are easily and safely accessible to pedestrians and cyclists, with particular attention to accessibility for those with reduced mobility. We equip these hubs and P+Rs with sufficient and safe bicycle storage areas, ample parking spaces with attention devoted to charging for electric bikes, mopeds and cars. Shared bicycles and cars can improve pre- and post-transport. This customised transport is also part of the mobility network.

We pursue an ambitious cycling policy: we increase the budget for bicycle investments and contribute to the further development of bicycle facilities. The priorities are included in the Flemish bicycle policy plan and the bicycle investment programme.

Based on the priorities list in the framework of the Flemish rail strategy (2013), the Flemish Government communicates with the federal government about their rail strategy and their investment plan for passenger transport.

An important theme concerns commuting, an area where we want to achieve a significant decline in car use. The Flemish Government is aiming to develop bicycle highways and through the Commuting Fund (Pendelfonds) it supports company projects focused on making commuting sustainable.

Teleworking is encouraged in cooperation with the social partners. The Flemish Government takes an exemplary role here by offering its own employees the opportunity to work at home or at a satellite office.

The Flemish Government is working together with 80 organisations to accelerate the implementation of shared mobility under the “shared mobility” green deal. Companies, governments and citizens are encouraged and supported to organise their mobility more sustainably by making use of offers from car sharing organisations, bicycle sharing systems and carpool services. To this end, maximum use is made of electric car sharing and electric bicycle sharing.

Measure A.3 Additional measures to manage the growth of the number of heavy vehicle road kilometres (freight mobility)

The Flemish Government wants to build a strong logistics sector. The companies were assisted by logistic consultants in the search for sustainable alternatives to contribute to energy saving and emissions and cost reduction. The necessary support tools were developed, such as a roadmap and best practices on green logistics, a simulation model for optimising the time of road freight flows, etc. The Flemish Government has also recognised the Flanders Institute for Logistics as a spearhead cluster. As part of that role they will, among other things, manage Flanders Synchromodal (working name) - a promotional and project agency dedicated to a modal shift towards inland shipping and rail transport. In order to increase the share of inland shipping in the modal shift, support measures were provided for pallet transport, among other things.

Inland shipping is seen as the alternative to road transport. To this end, substantial investments were made in the removal of missing links, maintenance of the infrastructure, dredging, etc. In addition, water-related industrial areas and quay walls were provided.

With regard to investment in rail freight transport, the Flemish Government wants to enter into a constructive dialogue with the federal government on its rail

strategy and investment plan for freight transport based on the priorities contained in the Flemish rail strategy (2013).

B. Improving the environmental performance of the means of transport

Measure B.1 The use of steering fiscal instruments

The buying behaviour is directed towards low CO₂ vehicles. The car registration tax car registration tax (belasting op inverkeerstelling or BIV) was reformed from March 1, 2012: when determining the taxable basis, the environmental characteristics of the vehicle are taken into account: CO₂ emissions, emissions of particulate matter, fuel type and euro standard.

From January 2016, the calculation of annual traffic taxes will also be based on environmental features, including CO₂ emissions from the car. Electric vehicles and vehicles powered by hydrogen are exempt. Natural gas vehicles and plug-in hybrid vehicles with a CO₂ emissions of up to 50 g/km are exempted until 2020.

Measure B.2 Communication

Information and awareness-raising are very important in order to encourage consumers and companies to choose an energy efficient and environmentally friendly car. In a low-threshold manner, objective information is given on the energy efficiency and environmental characteristics of cars (see, among other things www.ecoscore.be). In implementation of the Clean Power for Transport Action Plan, communication also focuses on the potential and market of so-called new vehicle technologies (hybrid, plug-in hybrid, electric and fuel cell (hydrogen) vehicles, but also (compressed) Natural gas powered cars). This information is detailed on a new website www.milieuvriendelijkevoertuigen.be.

Measure B.3 Stimulate the use of alternative energy carriers and technologies

The draft Flemish action plan for renewable energy 2020 assumes that the Flemish Government will draw up a biofuel plan to support the production and distribution of the latest generation of biofuels in Flanders. For this purpose, a policy preparation study will be carried out.

The 'Clean power for transport' (CPT) action plan contains the Flemish objectives and measures for vehicles fuelled by electricity, natural gas and hydrogen.

The focus of the action plan includes the following:

- Financial incentives: a purchase premium was introduced and the road tax for these vehicles was set at 0.
- The information provision was increased (www.milieuvriendelijkevoertuigen.be)
- Within Flanders, consultation structures for CPT were established.

- The Flemish Government has approved an action plan for its own fleet.
- A coordinated network of 7400 charging points will be built by 2020 to ensure the power supply of electric cars. A project budget has been created to support concrete actions in the field. The main theme for 2016 was the electrification of niche and business fleets.
- The Flemish Government is investing in the expansion of additional shore-side power infrastructure.⁴ In addition, investments of private companies in shore-side power facilities have been financially supported for several years through the Flemish ecology premium. The expansion of a network for shore-side power facilities for inland vessels is ongoing. The platform of inland shipping services is taking a prominent role in this effort (www.binnenvaartservices.be/walstroom/). This is a partnership between the Flemish government, the seaports and interest groups. Inland shipping entrepreneurs will find an overview map of the shore-side power infrastructure in Flanders on this website. With a view to uniformity, a central management system (CEBES) was developed for shore-side power in Flanders. This system combines the local management systems of the ports and waterway managers. The end user (in this case, the inland shipper) has access to all shore-side power cabinets via the CEBES.

Natural gas also offers potential, especially for freight transport for which there are no electric vehicles available, as well as for maritime and inland shipping.

Companies are encouraged to purchase heavy goods vehicles powered by compressed natural gas (CNG) and liquefied natural gas (LNG). Both technologies are subsidised through the Flemish ecology premium. The conversion to a natural gas engine is also subsidised. In consultation with the sector, support rates will also be raised.

The permit for the installation of natural gas stations became more attractive and simpler. Sectoral provisions for natural gas stations were included in VLAREM legislation, which meant that the mandatory safety provisions were known in advance. Consequently, the obligation to prepare a safety study is suspended. A BAT study of small-scale distribution of LNG will be carried out by the VITO and from this study, the sectoral terms will be drawn up at a later date.

For maritime and inland shipping, studies resulted in 40 recommendations regarding the use of LNG, whose feasibility is being further investigated.

Measure B.4 Exemplary role of the Flemish Government

The ambition level of the circular for acquisition of service vehicles is systematically tightened and the Flemish Government is therefore taking a leading role. In terms of energy efficiency, this concerns the reduction of fuel

⁴ The shore-side power concept indicates that a ship uses a connection to the electricity network ashore for its power supply on board. For example, the ship does not have to run its diesel engines in ports. For more information, visit www.binnenvaartservices.be/walstroom.

consumption of its own fleet. Fuel efficiency in the purchase of tyres is also part of this. In 2016, a new “Mobility” action plan was approved, which aims to reduce CO₂ emissions by 40% in 2030 compared with 2005.

Specific attention is paid to the introduction of electric vehicles in the fleet of the Flemish Government. An examination is being made of how rapid charge facilities can be provided in or near the major administrative buildings, for both service vehicles and private vehicles.

Measure B.5 Green public transport and green taxis

As stipulated in the policy document ‘an accelerated shift towards sustainable Flemish public transport’ submitted to the members of the Flemish Government (July 2016), De Lijn will more quickly move towards a greener bus fleet.

The purchasing policy is clearly and definitely aimed at sustainability. From 2019, only buses with alternative propulsion systems (hybrid, electric, hydrogen, etc.) will be purchased. The ambitious goal is to solely operate green buses in urban environments by 2025 (hybrid and electric battery buses), and only use electric buses in the city centres.

By basing the investment policy on sustainability, we provide a structural and crucial contribution to the sustainability revolution in Flanders and increase the attractiveness of modern, sustainable, responsible, progressive public transport.

In 2017, preparations will be made so that a start-up project can be realised at several locations in the urban environment with electric battery buses for daily operation.

These projects should be the impetus for the expansion of bus lines using electric buses.

The selection phase will start in April 2017. The specifications are expected to be completed in April. Following the selection of candidates, the tender can start. The first buses can be put into service in the course of 2019.

De Lijn owns approximately half of the buses in operation, while the other half is owned by operators. In awarding the operating contracts, account will be taken of the environmental friendliness of the operator’s bus fleet.

In areas with a high transport potential, efforts are being made to maximise (expand) tram connections.

In Flanders, local authorities are authorised to issue taxi permits, in which the conditions for operating a taxi service can be determined by the city council within the parameters determined by the Flemish Government. Under the new taxi regulations that have been announced, we will continue to provide for the

possibility that local authorities can set specific conditions for the operation of taxis operating from taxi stands. These may relate to emissions and/or the technology of the vehicles used.

Measure B.6 The greening of the logistics sector

Unlike passenger vehicles and vans, there are no European CO₂ standards for heavy use vehicles. Logistic consultants were used to encourage the use of economical vehicles through awareness raising and other tools.

The savings potential of the use of long and heavy vehicles (LHV) and improved aerodynamics is being studied. Research indicates that a 12.5% reduction can be achieved in energy and CO₂ emissions per tonne/km among long and heavy vehicles of 60 tonnes and above. A pilot project was launched to assess the feasibility and the potential of using such heavy vehicles and further examine improved aerodynamics, whereby road safety remains ensured. This pilot project, which led to a clear decline in CO₂ emissions, has since been extended to June 2018.

Due to the relatively long life of a marine engine, the engines of the vessel fleet will only be renewed very gradually. After research and consultation with the sector, it was examined whether the financing was possible for the development of a premium system for emission-reducing technologies for inland shipping. To this end, two support measures were introduced into the market in October 2016:

- Support for reconversion of small ships (< CEMT 4)
- Support for the installation of after-treatment techniques on board medium and large ships suitable for ships (≥ CEMT class IV).

C. Energy efficient driving behaviour

Energy efficient driving has the potential to reduce fuel consumption for passenger vehicles and light commercial vehicles by 3% and by 1.5% for heavy vehicles and buses by 2020.

Measure C. 1. Reform of driver training and examinations

During driver training, prospective drivers are already required to learn about energy efficient driving. Indeed, once they have adopted a certain driving style, it is much more difficult to change. Therefore, attention will be devoted to this both during the training and during the examination. During the training, the instructors will pay attention to eco-driving. For all candidates, i.e. those who are taking driving lessons and those who choose to learn on their own with supervision, the supporting material currently being developed in the context of the reform of driver training will devote attention to eco-driving and the choice of the right vehicle for a particular trip. Ecological driving will be included in both the theory and practical examinations.

Meanwhile, the Flemish government is expanding its training offer to De Lijn driving instructors and examiners to include a course on energy efficient driving. At the end of 2010, the eco-driving training for instructors and drivers was introduced at the De Lijn bus company. At the end of 2016, a new eco-driving module was launched as a follow-up. This module pays even more attention to, among other things, the driving style meter (present in approximately 90% of buses), and also uses the D-cam that captures camera images as well as measuring the G-forces. Consequently, during the training there is a greater focus on the driver's viewing technique and thus a more comfortable driving style for the traveller. Within traffic education projects funded by the Flemish Government, including on the initiative of or developed by the Flemish Foundation for Traffic Knowledge (Vlaamse Stichting Verkeerskunde or VSV), due attention will be paid to the principles of energy efficient driving.

In accordance with the European Directive 2003/59/EC, most professional drivers are required to obtain a certificate of professional competence and to attend 35 hours of mandatory refresher training every 5 years. The minimum requirements for the basic training and refresher training are related, among other things, to the development of defensive driving behaviour in combination with efficient fuel consumption. Nowadays, most recognised training centres in our country offer courses on efficient fuel consumption or eco-driving.

Measure C.2 Enforcement policy for permitted speeds

At speeds above 100 km/h, a car consumes far more fuel and also expels many more harmful substances.

Speed control checks will ensure that the permitted speeds are also enforced. In addition to existing mobile units and unmanned cameras, section speed enforcement will be further developed on the highway network. Number plate recognition, including section speed enforcement, will be used on the underlying road network. Section speed enforcement ensures a more homogeneous traffic flow and a calmer road scape.

The options for providing an impulse to the implementation of intelligent speed adaptation systems are being examined, taking into account the resolution of the Flemish Parliament and the European policy context in this regard.

Measure C.3 Improved flow

Accelerating and braking leads to a higher energy use. A modified road design is aimed at making it easier for motorists to drive at a steady speed.

Dynamic traffic signs are already in use around Antwerp and Ghent to improve road safety and flow. They indicate, among other things, the maximum speed at a given time. Dynamic road signs will also be used on the rest of the main road

network to improve traffic flow. Another measure concerns the optimisation of the traffic light scheme in urban areas.

3.6 Promotion of efficient heating and cooling (Article 14)

3.6.1 Comprehensive review

1. Further information on the process, the participants and the methodology used to make this comprehensive assessment, including a brief description of how the cost-benefit analysis at country level has been conducted in accordance with part 1 of Annex IX (*EED Article 14(1) and (3)*), *Annex IX.1, Annex XIV, part 2.3.4*).

The extensive assessment of Article 14(1) of the potential for the development of quality CHP and efficient district heating and cooling was carried out as a study for Flemish territory. This study contains both the global cost-benefit analysis and the heat map.

The methodology used is fully aligned with the general principles of Annex IX of the Directive and for the heat map, the requirements of Annex VIII of the Directive.

The cost-benefit analysis is carried out per region, in other words, the comprehensive assessment for Belgium consists of a collection of regional plans. The full study for the Flemish Region, the methodology and the resulting maps are publicly available on www.geopunt.be. The maps include in a detailed grid both the residual heat supply and the heat demand. Based on this data, different scenarios have been calculated that result in maps indicating, per grid, whether heating networks or combined heat and power are more or less profitable. For heating networks, account is taken of the possible heat sources and customers in a wide area.

The competent agency responsible for the implementation of the global cost-benefit analysis in Flanders was the FEA.

This assessment will be updated every five years and includes:

- A description of current and future (10 years) demand and supply.
 - A map displaying heat and cooling demand supply points (including planned and potential supply points fuelled by power plants, waste incineration plants, CHP plants and heating networks).
 - The potential of CHP and recovery of residual heat and energy efficiency of heating networks.
 - A strategy and tools for achieving the desired potential.
 - An estimate of the possible energy savings.
2. In the 2014 National Energy Efficiency Action Plans (NEEAP): The established potential for:

- i. high-efficiency combined heat and power (*EED Article 14(1) and (3)*);
- ii. efficient district heating and cooling (*EED Article 14(1) and (3)*);
- iii. other efficient heating and cooling systems (optional, *EED Article 14(2) and (3)*).

An estimate of the potential was reported to the European Commission in the context of the comprehensive assessment of Article 14(1) of the Directive (with a 31 December 2015 deadline).

3. Description of measures, strategies and policies, including programmes and plans at regional and local level to develop the potential of high-efficiency combined heat and power and efficient district heating and cooling and other efficient heating and cooling systems as well as promoting the use of heating and cooling from waste heat and from renewable energy sources, including measures to develop the heating markets (*EED Article 14(2) and (4), Annex VIII 1, under g)*).

A. Stimulation of combined heat and power in a stable investment climate

In order to realise the potential for qualitative combined heat and power, Flanders has introduced a support mechanism for quality CHP, the so-called combined heat and power certificate system. Each year, electricity suppliers are required to submit CHP certificates for a predetermined percentage of their deliveries. A CHP certificate is provided for primary energy savings achieved in a quality CHP system relative to the situation in which the same amount of electricity and heat is generated separately. This support measure can be applied cumulatively with other support mechanisms, in particular green electricity certificates (for CHPs that use renewable energy sources) and the increased investment deductions.

For buildings larger than 1000 m², a mandatory feasibility study for CHP must be carried out (MB 11/01/2008 laying down detailed rules for introducing the feasibility study for alternative energy systems).

B. Stimulation of heating networks

- a) By mid-2015, companies participating in the energy policy agreements with the energy-intensive industry conducted studies of the potential for qualitative CHP and heating and cooling networks in accordance with their commitments. The results of these studies also served as input for the comprehensive assessment for the Flemish Region. See 3.4.1.
- b) Mandatory feasibility study for buildings larger than 1000 m² concerning connection to the heating network in areas surrounding the heating network: This obligation is imposed by the ministerial decision of 11 January 2008, laying down detailed rules regarding the implementation of the feasibility study for alternative energy systems.

- c) Energy performance regulations. Within the energy performance regulations, the FEA has worked out a calculation method to make a better calculation of the heating systems.
- d) Subsidy for the construction or expansion of a heating network or bottleneck sites or outdated industrial areas via the Flemish Government's decision of 24 May 2013 on subsidising industrial sites. See 3.4.1.

C. Stimulating the use of residual heat

A residual heat support scheme was introduced in 2013 for systems using residual heat that meets an economically demonstrable demand, located in the Flemish Region, for which no green electricity certificates or combined heat and power certificates can be awarded. The aid is granted in the form of an investment subsidy (up to 1 million euros per investment project) and is allocated through a call system with an annual call. Since the first call, support has been granted to 21 projects using residual heat and 17 projects using heating networks for a total aid amount of 6.3 million euros.

D. Other measures for CHP and heating networks

For the ecology support, an increased investment deduction and efficient energy use premiums, see 3.4.1.

3.6.2 Installation costs for the user: cost-benefit analysis and results

Summary of competent authorities and parties concerned and explanation of the process and methodology for the cost-benefit analysis at installation level, including the companies that provide district heating and relevant parties concerned (EED Annex IX, part 1). Brief overview of the number of cost-benefit analyses drawn up, with some further details.

The authorised authorities are the LNE department and the FEA.

The cost-benefit analysis methodology was established by the Minister of Energy. The FEA will also issue advice to the LNE department concerning the permit applications and the cost-benefit analyses carried out in this context.

One cost-benefit analysis was submitted within the limited scope of application (installations with thermal input power of more than 20 MW), whereby it was suggested not to choose the reference technology (separate generation) but CHP or residual heat for a chemical company and surrounding (future) companies.

3.6.3 Individual installations: exemptions and exemption decisions

Further information on exemptions from the KBA obligation pursuant to Article 14(6) and on the ad hoc exemptions pursuant to Article 14(8), (EED Article 14(6) and (8)).

Belgium does not provide any exemptions from the cost-benefit analysis under Article 14(6). This position was communicated to the European Commission on 3 December 2013.

3.7 Energy conversion, transmission (transport), distribution and demand response (Article 15)

3.7.1 Energy efficiency criteria for net fees and regulations

1. Scheduled or established measures to ensure that rate incentives affecting the overall efficiency (including energy efficiency) of production, transmission, distribution and delivery of electricity, or which may hamper the market participation of demand response in connection with balancing and secondary services can be eliminated (*EED Article 15(4), Annex XIV, part 2.2, first sentence*).

By a decree of 27 November 2015, the legislator laid down a series of guidelines in the Energy Decree to which the VREG must comply in drawing up the rate methodology (and the approval of tariffs). Guideline 19 (Article 4.1.32, §1, 19°) stipulates the following, among other things:

“19° the rates do not contain incentives that affect overall efficiency, including energy efficiency, of the production, distribution and supply of electricity or which may hamper the market participation of the demand response in connection with balancing and secondary services. [...]”

On 24 August 2016, the VREG established the rate methodology for distribution of electricity and natural gas during the regulatory period 2017-2020 in compliance with the guidelines laid down by the Energy Decree.

In Flanders, however, measures are being taken today to control the price of the energy of a distribution network user if it has a small-scale production plant with a reversing counter, which means payment is only made for the net energy used. The distribution rates are corrected for the ‘prosumers’. This situation hampers energy efficiency because the prosumer will not or cannot participate in demand response or time-of-use offers by suppliers. Its cheaply produced and injected current always compensates for its purchase of more expensive power at a later date. The smart meter allows participation in demand response because real-time measurements are possible, but do not yet stimulate self-sufficiency among prosumers.

2. Planned or established measures to encourage network operators to improve efficiency through infrastructure design and management (*EED Article 15(4), Annex XIV, part 2.2, first sentence*).

Article 3.1.4 /1, 4° of the Energy Decree states that energy efficiency is one of the

objectives that the VREG should promote in the development of the networks. In concrete terms, this will be done through the approval of the investment plans of the network operators.

In accordance with Article 4.1.19 of the Energy Decree, each year distribution network operators must submit an investment plan for their networks to the VREG, listing the most important investments and their timing.

On 26 February 2014, the Flemish Parliament adopted a decree incorporating an article offering a decree that provides a basis to impose an obligation in the technical regulations on the network operator to provide information to the Flemish energy regulator VREG on the assessment of the network operator concerning the potential for energy efficiency of their gas and electricity infrastructure.

The study conducted by Synergrid to further specify Article 15.2. of the Energy Efficiency Directive 2012/27/EU has not led to additional insights and/or projects to proactively reduce the energy losses of distribution networks or to adjust the investment in existing infrastructure. The current investment policy already takes maximum account of both the aspect of the energy losses in the electricity networks and the efficiency of the investments, taking into account the failures of the existing assets and the performance expected of these networks in terms of safety and lack of availability. However, some improvements can be made in the exploitation of the networks.

The VREG has asked network operators to provide an annual follow-up report on investments and exploitation measures that improve energy efficiency even when they were already scheduled or started prior to the study.

3. Planned or established measures that are meant to ensure that rates allow suppliers to improve consumer participation in system efficiency, including demand response (*EED Article 15(4), Annex XIV part 2.2, first sentence*).

The VREG is examining the possibilities for introducing a new rate structure for the network-related distribution costs. This is the so-called capacity rate. In doing so, both efficient use of energy and efficient network use are taken into account to enable a better match of supply and demand.

For the development of the demand response, it was decided in a first phase to focus on the development of a framework for facilitating participation in demand response from network users with quarter hourly measurement data. Given that no smart meters have been rolled out in households to date, this means that this relates mainly to industrial and commercial customers in the medium and high-voltage distribution network. In this target group, the potential for demand response capacity, as well as the short-term business case, is the greatest for

flexibility (including demand response). Hence, a number of initiatives (see answer to question 3.7.2) are ongoing to advance and facilitate this.

With the emergence of a number of new companies (such as several independent aggregators) and innovations from existing suppliers, as well as the efforts of network operators (such as transmission and distribution network operators) and other market parties, there are already a large number of network users in this target group on the distribution network. These users participate in flexibility products for balancing and supply security. The current challenge is to extend this to other forms of flexibility, as well as making these products and markets available to households subject to quarter hourly measurement as their numbers increase due to the potential roll-out of the smart meter.

4. Support for the development of demand response services through network rates (optional info see EED Annex XI, point 3.).

The VREG is examining the possibilities for introducing a new rate structure for the network-related distribution costs. This is the so-called capacity rate. In doing so, both efficient use of energy and efficient network use are taken into account to enable a better match of supply and demand. We also refer to the answer to the previous question and paragraph 3.7.2.

3.7.2 Facilitating and advancing the demand response

Information on the measures identified or planned to enable and develop demand response, including measures related to rates in order to support dynamic pricing (EED Annex XI 3., Annex XIV, part 2.3.6., EED Article 15(4), Article 15(8)).

On 26 February 2014, the Flemish Parliament adopted a decree incorporating an Article 3.1.4/1 that explicitly provides the VREG with the objective of stimulating the participation of demand side resources in the supply on the Flemish electricity and gas market.

Furthermore, this decree provides for the following Article:

“Article 4.1.18/1. In close cooperation with energy service providers, including aggregators and customers, network operators establish technical specifications with respect to access to and participation of demand side management in the balancing and other support services markets on the distribution network. These technical specifications are based on the technical requirements of these markets and the possibilities that demand side management offers.”

The country’s different governments have asked the Belgian energy regulators

(CREG, VREG, CWaPE and Brugel) to report on possible measures that can be taken at the various levels of authority with the aim of deploying demand management for the support of system equilibrium as well as to strengthen supply security. This report, which was published on 20 February 2014, is available on <http://www.vreg.be/rapp-2014-01>.

In addition, in 2015 the VREG investigated which adaptations are required by the Flemish regulatory framework to facilitate flexibility (in which demand response is included) on the electricity distribution network and the local transport network in Flanders (<http://www.vreg.be/nl/document/adv-2016-01>). Among other things, this advice covers:

- Definitions, clarification of the different roles, such as that of the network operator, the rights and obligations of new roles such as the Flexibility Service Provider as the basis for further development in a contractual context
- Necessary adjustments to the market function processes
- Impact of flexibility on operational safety and how this should be handled
- A framework for flexibility on request of the DNB (Support Services), etc.

The implementation of this advice in the regulations, as well as the further development of various components, such as those related to decentralised production units, data management under flexible circumstances, etc., will be continued in 2017.

3.7.3 Energy efficiency when setting up and operating networks

Information on the evaluation of the energy efficiency potential of the gas and electricity infrastructure, in particular regarding transmission and distribution, load management and interoperability, as well as the connection to energy generating installations, including access possibilities for micro energy generators. Description of the concrete measures and investments established to use the energy efficiency potential of the gas and electricity infrastructure (EED Article 15(2), Annex XIV, part 2.3.5.).

At Flemish level, the technical regulations for the distribution of electricity in the “Content and planning horizon” Planning Code under Article II.1.1.1 §3 provide for the following:

“The electricity distribution network operators provide information to the VREG on the assessment they conduct of the energy efficiency potential of their electricity infrastructure, in particular regarding electricity distribution, load management of the electricity distribution network and interoperability, as well as the connection of energy generating installations, including access the possibilities for micro energy generators.”

Studies were carried out by Belgian network operators to supplement Article 15.2.

of Energy Efficiency Directive 2012/27/EU. However, these studies have not led to additional insights and/or projects to proactively reduce the energy losses of distribution networks or to adjust the investments in existing infrastructure. The current investment policy already takes maximum account of both the aspect of the energy losses in the electricity networks and the efficiency of the investments, taking into account the failures of the existing assets and the performance expected of these networks in terms of safety and lack of availability. However, some improvements can be made in the exploitation of the networks.

For example, the Flemish distribution network managers have examined a number of measures to improve energy efficiency in the exploitation of distribution networks:

Investment measures:

- At a low voltage, the three-wire networks (3X230V) were converted to four-wire networks (3X230/400V) in the event of replacement.
- At medium voltage, the optimal cable section is rolled out. The choice is determined by:
 - 40% by load (low load)
 - 30% by the voltage drop (10 & 11 KV)
 - 30% by the cables for the losses (150 mm²)
- When purchasing new distribution transformers for new electricity cabinets or for replacing existing transformers, network operators choose an energy efficient transformer that must comply with the imposed regulation (EU) No. 548/2014 of the commission's proposal on the eco-design of transformers. The optimal choice of transformer was determined by the factors of investment, tax, losses and growth.
- In order to optimise exploitation of the distribution network, the network operators equip their medium-voltage cabinets with remotely controlled load-break switches and remotely controlled power switches.

Exploitation measures:

- Automatic transformer tap change.
- Dynamic line rating.
- Reduce self-consumption of stations and cabins, and provide for own consumption through on-site production.
- Reduction in travel thanks to remotely controlled operation/reading.

Elia, in its capacity as a federal transmission network operator and as a manager of the local transport network in Flanders, has also conducted a number of studies on energy efficiency. For example, in the context of the investment plan for 2017 - 2019, a more thorough examination is being made of one of the measures studied to improve energy efficiency in exploitation of the network, in particular reducing the internal consumption of the substations and cabins, or providing internal consumption via local production, as this is a newly implemented measure for the local transport network, the effect of which is most

advanced. The internal consumption of a substation and cabin on the high voltage sites includes the use of a wide range of technical installations (batteries, rectifiers, security, etc.), as well as the heating and lighting of buildings in which some of these technical installations are located. Elia is conducting an analysis of such consumption. These analyses allow identification of the main consumption items in Elia's high-voltage sites as well as an estimate of the potential profit of the possible measures.

The VREG has asked the network operators to report annually on the energy efficiency measures examined and withheld.

This annex includes the components pertaining to the Flemish energy efficiency objectives.

Article 5:

Alternative policy measure	Energy savings (expressed in primary energy) in Flemish Government buildings that fall within the scope of Article 5 (see 3.3.1)
2016: optimisation of the regulation on building management, electricity consumption, etc.	3,678,191 kWh - 0.317 ktoe
2016: heating room renovation, insulation of pipes, thermostatic faucets	8,356 kWh - 0.001 ktoe
2016: relighting	61,847 kWh - 0.005 ktoe
2015: various measures - savings 2015	227,038 kWh - 0.020 ktoe
2015: various measures - savings 2016	227,038 kWh - 0.020 ktoe
2014: various measures - savings 2014	576,439 kWh - 0.050 ktoe
2014: various measures - savings 2015	576,439 kWh - 0.050 ktoe
2014: various measures - savings 2016	576,439 kWh - 0.050 ktoe
Sum of the savings over the period 2014-2016	5,931,786 kWh - 0.510 ktoe

Article 7:

Alternative policy measure	Savings achieved in 2015 expressed in final energy		Total <u>expected</u> cumulative savings by 2020 (final energy)
	Total savings achieved in 2015 (savings from new actions in 2015 <u>and</u> from actions in 2014 that continued to provide savings in 2015) (cumulative)	of which savings achieved in 2015 from new actions implemented in 2015	
Energy policy agreements with the companies (1 st generation through 2014, 2 nd generation from 2015)	4.675 TWh (0.40 Mtoe)	0.571 TWh (0.049 Mtoe)	30.081 TWh (2.59 Mtoe) (*)
Efficient energy use/public service obligations imposed on network operators	1.402 TWh (0.12 Mtoe)	0.554 TWh (0.048 Mtoe)	14.301 TWh (1.23 Mtoe)
Distance-based road charging for heavy goods vehicles	Not yet implemented	Not yet implemented	3.358 TWh (0.29 Mtoe)
Total savings	6.077 TWh (0.52 Mtoe)	1.125 TWh (0.097 Mtoe)	47.740 TWh (4.11 Mtoe)

(*): The savings were estimated in the companies' energy plans, which were drawn up following an audit.

1. Overview of the building stock (EED Article 4)

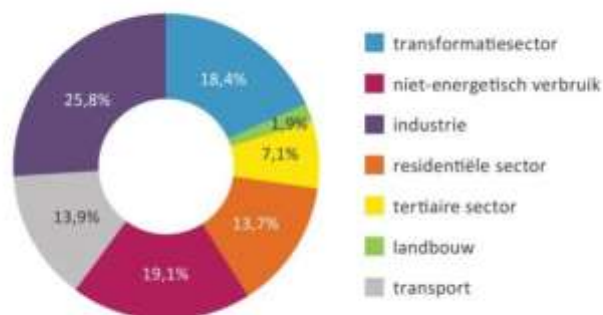
1.1. INTRODUCTION

According to the 2015 land register records, more than 2.6 million buildings are located in the Flemish region (13,522 km²).

Homes in attached structures	Homes in semi-detached structures	Homes in detached structures, farms and castles	Buildings and flat buildings with apartments	Trading houses	All other buildings	Total
647,144	570,240	887,508	115,716	83,297	333,601	2,637,506

Table 1: Number of buildings in Flemish Region (source: land register)

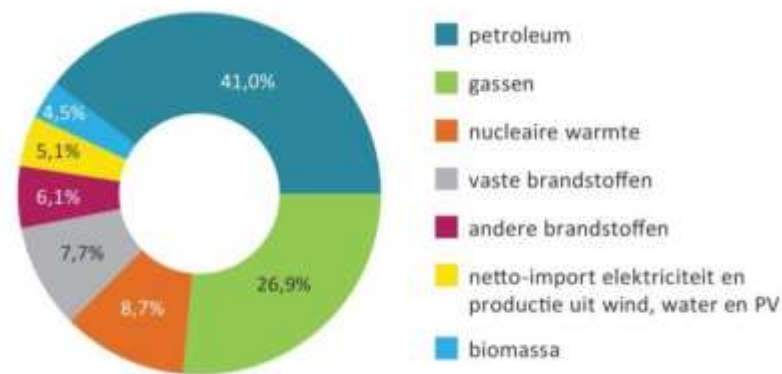
The gross domestic energy consumption in Flanders amounted to 1,489.1 PJ in 2015. The residential sector accounted for 13.7% of the total consumption.



Translation of image	
Source:	Translation:
transformatiesector	transformation sector
niet-energetisch verbruik	non-energy consumption
industrie	industry
residentiële sector	residential sector
tertiaire sector	tertiary sector
landbouw	agriculture
transport	transport

Figure 1: Distribution of gross domestic energy use in Flanders, 2015 (VITO: Energy balance sheet 2015)

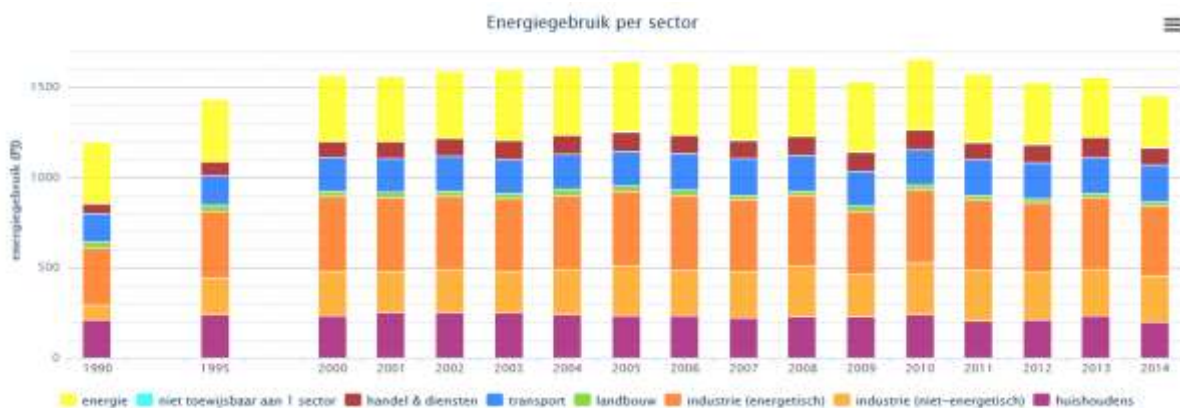
In 2015, Flemish gross domestic energy consumption was distributed as follows:



Translation of image	
Source:	Translation:
petroleum	petroleum
gassen	gasses
nucleaire warmte	nuclear power
vaste brandstoffen	solid fuels
andere brandstoffen	other fuels
netto-import elektriciteit en productie uit wind, water en PV	net import of electricity and production from wind, water and PV
biomassa	biomass

Figure 2: Distribution of gross domestic energy use in Flanders, 2015 (VITO: Energy balance sheet 2015)

Between 1990 and 2005, gross domestic energy consumption (GDEC) in Flanders increased nearly continuously. In 2008, and particularly in 2009, we see the effect of the economic crisis, after which GDEC fluctuated.



Translation of image	
Source:	Translation:
Energiegebruik per sector	Energy use per sector
energiegebruik (PJ)	energy use (PJ)
energie	energy
niet toewijsbaar aan 1 sector	not attributable to 1 sector
handel & diensten	trade & services
transport	transport

landbouw	agriculture
industrie (energetisch)	industry (energy)
industrie (niet-energetisch)	industry (non-energy)
huishoudens	households

Figure 3: Energy consumption per sector (VITO: Energy balance sheet)

Although data on energy performance are not available for each building at this time, by extrapolation the current energy performance certificate databases provide a good basis for an energy register of the building stock in Flanders.

An initial data source that can be tapped into is the energy performance certificate database (or EPC database) for newly constructed residences and for existing residences that are rented out or have been sold since the end of 2008. Consequently, both data sources are gradually being built up. For newly constructed residences (EPC data for homes with planning permission from 2006), it does not make sense to develop measures under this Directive. These shall therefore be disregarded. For existing residential buildings, data collected since the end of 2008 can be extrapolated to all residential buildings, regardless of whether or not they were ever put up for sale or rental. However, some caution is required. Housing put up for sale or rent may not be representative of the entire building stock when it comes to estimating the nature and number of works performed previously or after a performance assessment was conducted.

A second data source is the EPC database of public buildings. This database contains the energy performance certificates of the buildings located in the Flemish Region in which public organisations are located that provide public services to a large number of people and which are frequently visited by the public. The EPC for public buildings was implemented in phases, in accordance with the European buildings Directive:

- **Since 1 January 2009, the EPC has been mandatory for buildings with a useful floor area of more than 1,000 m².**
- **For buildings with a useful floor area of more than 500 m², the EPC has been mandatory since 1 January 2013.**
- **And since 1 January 2015, the EPC has been mandatory for buildings with a useful floor area of more than 250 m².**

The EPC database for public buildings was analysed by VITO in 2014.

For private non-residential buildings, various studies have been tendered in the past few years that provided useful information about their energy performance.

Based on these three data sources, the following categories of existing buildings were studied:

- **Residential buildings (single-family homes, apartments and collective residential buildings);**

- Public buildings (buildings of the following public organisations: the federal government, the Flemish government, the provincial and municipal authorities, public companies, education, welfare and health);
- Private buildings (an admittedly limited sample of offices, commercial buildings, including stores, wholesale buildings and warehouses as well as utility buildings).

1.2. RESIDENTIAL BUILDINGS

1.2.1. Analysis of the Flemish housing stock

Before considering the energy performance of the Flemish housing stock in greater depth (point 1.2.2), below is a general analysis of the housing stock, taking into account the following aspects:

- Numbers and use: primary residence, secondary residence, vacant.
- Construction year of the residences.
- Type: apartment, homes in attached, semi-detached or detached structures.
- Ratio of owners/tenants.
- Dynamics of the housing market.
- Quality of the residences.

Number of residences in Flanders

If the built-up area - based on land registry data - is viewed in relation to the total area, it appears that in 2015 the Flemish Region had a high density rate of 27.2% of a total of 13,522 km². On 1 January 2015, the Flemish Region, all of which is in the same climate zone, had approximately 3.1 million residential units. These were accommodated in 2.6 million buildings. The ratio of the number of households in the Flemish region enables the tension between supply and demand to be calculated. On 1 January 2015, the Flemish Region had 2,734,982 households. By allocating a residence to each of these households (disregarding cohousing, free housing and homelessness), it can be deduced that in Flanders there are around 360,000 homes that do not currently serve as a primary residence. At the end of 2015, according to municipal vacancy registers, 23,037 buildings were empty.

Age of the housing stock

Approximately 56% of Flemish residences date back to before 1971 and are therefore currently at least 45 years old. It goes without saying that this has a major impact on energy performance, as will become evident below.

Year of construction	%
Constructed prior to 1900	8.01

Constructed from 1900 to 1918	5.43
Constructed from 1919 to 1945	15.25
Constructed from 1946 to 1961	15.57
Constructed from 1962 to 1970	11.59
Constructed from 1971 to 1981	15.12
Constructed after 1981	29.02
Total	100.00

Table 2: Age of the residences in the Flemish Region in 2015 (source: land register)

Typology of the residences

Over the past few decades, we have seen growth in the number of apartment buildings, which means that a larger proportion is newer.

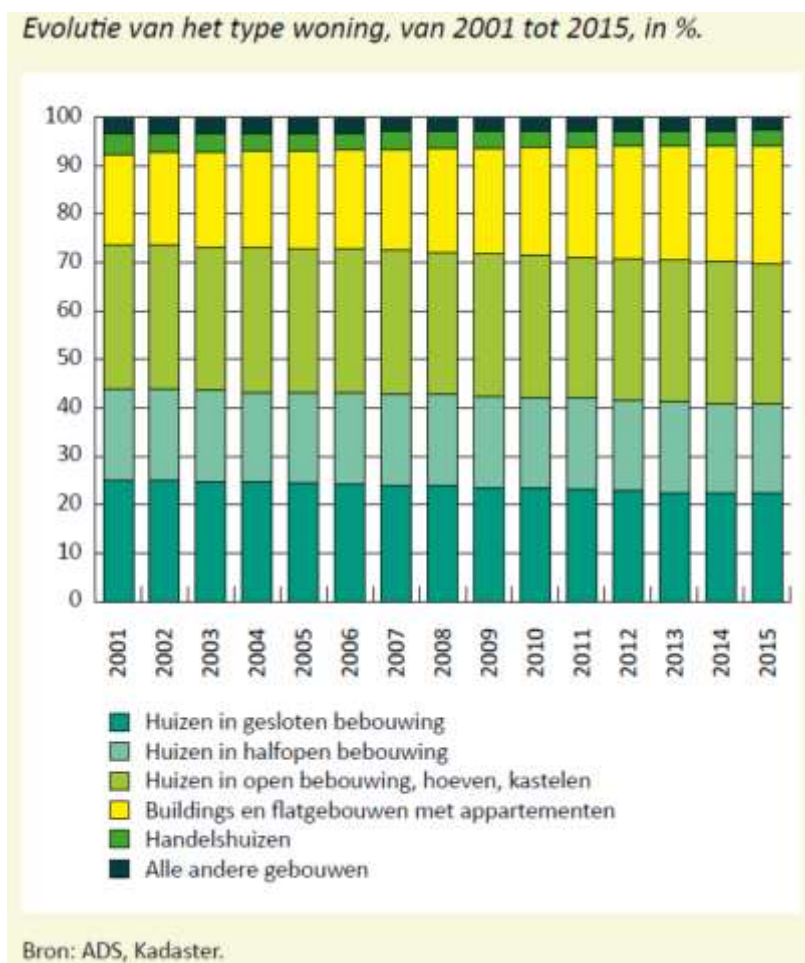
	Single-family homes (*)		Apartment buildings (**)	
	Number	%	Number	%
< 1945	620,179	29.5%	17,028	14.7%
1946-1961	331,184	15.7%	14,630	12.6%
1962-1981	557,194	26.5%	36,012	31.1%
>1981	596,335	28.3%	48,046	41.5%
Total	2,104,892		115,716	

Table 3: Overview of residential buildings by age category in the Flemish Region (source: land register data on 31 December 2014)

(*) 'Single-family homes' refers to the sum of the attached, detached and semi-detached structures for residential use. (**) Average number of dwellings per apartment building: 6.5

With an average of 6.5 dwellings per apartment building, Flanders has a total of approximately 750,000 apartments. The proportion of apartment residents in Flanders is 22%. This is low in the European context. In 2014, four out of ten people in the EU-28 lived in a flat, just over one-quarter (25.6%) in a semi-detached house and just over one-third (33.7%) in a detached house.

The composition of the housing stock is changing slowly, yet there is a clear trend over the longer term. In 1995, 17.2% of the number of residences was located in an apartment building, while in 2015 this was 24.5%. Nevertheless, residences in detached structures remains the most important housing type, and the share of their relative importance has grown slightly since 1995, namely from 28.6% to 28.9%.

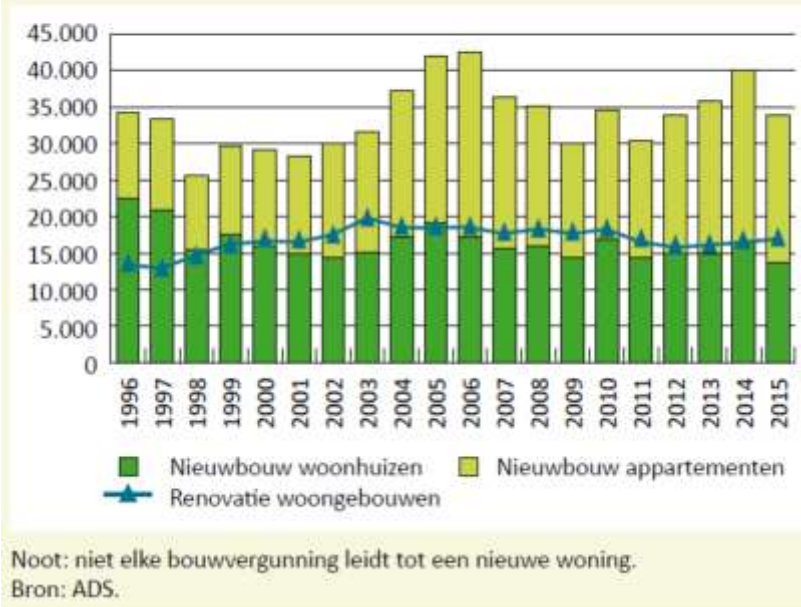


Translation of image	
Source:	Translation:
Evolutie van het type woning, van 2001 tot 2015, in %	Evolution of the type of home, from 2001 to 2015, in %
Huizen in gesloten bebouwing	Homes in attached structures
Huizen in halfopen bebouwing	Homes in semi-detached structures
Huizen in open bebouwing, hoeven, kastelen	Homes in detached structures, farms, castles
Buildings en flatgebouwen met appartementen	Buildings and flat buildings with apartments
Handelshuizen	Trading houses
Alle andere gebouwen	All other buildings
Bron: ADS, Kadaster	Source: ADS, Land register

Figure 4: Evolution of the type of residence

The new construction market in Flanders is reorienting. Since 2002, more building permits have been granted for new apartments than for homes. In 2015, 59.2% of the permits for newly constructed residences concerned an apartment. This evolution contributes to a reduction of the average living space in new construction. In 2015, the average living area for newly constructed residences fell to 97 m² from 125 m² in 2000.

Evolutie van het aantal bouwvergunningen voor nieuwbouwwoningen en voor renovatie van woongebouwen, van 1996 tot 2015.



Translation of image	
Source:	Translation:
Evolutie van het aantal bouwvergunningen voor nieuwbouwwoningen en voor renovatie van woongebouwen, van 1996 tot 2015	Evolution of the number of building permits for newly constructed residences and for renovation of residential buildings, from 1996 to 2015
Nieuwbouw woonhuizen	Newly constructed homes
Renovatie woongebouwen	Renovation of residential buildings
Nieuwbouw appartementen	Newly constructed apartments
Noot: niet elke bouwvergunning leidt tot een nieuwe woning.	Note: not every building permit leads to construction of a new home.
Bron: ADS.	Source: ADS.

Figure 5: Evolution of building permits

Owners versus renters

Flanders has an exceptionally high percentage of owner-occupied properties (+ 70%). The ‘social’ rental housing market is relatively limited, especially in comparison with neighbouring countries: 6.3% of the Belgian population and 5.4% of the Flemish population live in a house rented by a government body such as a social housing association. The European average is 17.3% (the Netherlands 34%, United Kingdom 20%, Denmark 19%, France 17%).

The number of homeowners has fallen slightly in recent years. In 2013, the Grote Woononderzoek (national housing survey) showed that 70.5% of Flemish households owned their own home. This percentage was higher in 2005, at 74.4%. The decrease went hand in hand with an increase in the proportion of private rental housing (from 18.5% to 20.4%) and a slight increase in the social rental market (from 5.6% to 6.7%). The share of residents living for free has also risen slightly (from 1.5% to 2.5%).

Eigendomsstatuut naar graad van verstedelijking, in %, Vlaanderen naar verstedelijkingsgraad, 2013.

	Grootstedelijk gebied	Regionaalstedelijk gebied	Kleinstedelijk gebied	Overgangsgebied	Platteland	Vlaams Gewest
Eigenaar	60,5	63,0	60,7	79,4	77,3	70,5
Eigenaar met hypotheek	31,7	28,6	26,4	33,2	30,4	31,0
Eigenaar zonder hypotheek	28,8	34,4	34,3	46,1	46,9	39,5
Huurder	37,9	34,9	35,2	18,0	20,3	27,1
Private huurder	28,0	25,5	26,8	14,1	15,1	20,4
Sociale huurder	9,9	9,4	8,4	3,9	5,3	6,7
Gratis bewoner	1,6	2,1	4,1	2,5	2,3	2,5

Bron: Grote Woononderzoek 2013.

Translation of image	
Source:	Translation:
Eigendomsstatuut naar graad van verstedelijking, in %, Vlaanderen naar verstedelijkingsgraad, 2013	Ownership statute by degree of urbanisation, in %, Flanders according to urbanisation degree, 2013
Grootstedelijk gebied	Metropolitan area
Regionaalstedelijk gebied	Regional urban area
Kleinstedelijk gebied	Suburban area
Overgangsgebied	Transition area
Platteland	Rural
Vlaams Gewest	Flemish Region
Eigenaar	Owner
Eigenaar met hypotheek	Owner with mortgage
Eigenaar zonder hypotheek	Owner without mortgage
Huurder	Tenant
Private huurder	Private tenant
Sociale huurder	Social tenant
Gratis bewoner	Resident living for free
Bron: Grote Woononderzoek 2013.	Source: Grote Woononderzoek (Flemish housing survey) 2013.

Table 4: Ownership status

Dynamics of the housing market

In 2015, 16% fewer permits were granted for new residence construction than in 2014, when there was a 12% increase over the previous year. In 2015, this amounts to almost 34,000 permits for new homes. That is approximately the average seen over the past 20 years. However, compared to 2014 there was an increase of 2 percentage points in the number of renovation permits granted. The municipal registers of undeveloped plots reveal that 273,935 undeveloped plots are available for construction.

In addition, since 2002 17,000 to 18,000 renovation permits for residential buildings have been granted annually. Over the past three years, the number of renovation permits has been fluctuating around 16,000. In 2015, there was an increase of 2 percentage points compared to 2014.

Quality analysis

The sample results from the last Flemish housing survey in 2013 reveal that (extrapolated to the full residential stock) 350,000 homes were of structurally insufficient quality. That is 13% of the occupied housing stock. These homes exhibit serious shortcomings, which require substantial renovation, in areas such as stability, dampness, indoor climate and ventilation, basic comfort, electrical installations, etc. While a certain proportion will be irreparable, the exact amount cannot be accurately estimated based on this survey. It mainly concerns old homes (dating to before 1945), which are mainly inhabited by households from the lowest income categories.

Of the 5,000 homes surveyed, 5.1% have serious structural engineering problems. Extrapolated to the entire residential stock, this represents approximately 136,000 homes. These are homes with serious stability problems in the roof and exterior walls and/or extensive dampness issues requiring an expensive renovation.

Year of construction	Share of residences considered of 'structurally inadequate' quality (in %)	Share of residences with serious construction technical and structural defects (in %)
< 1945	20.3%	9.0%
1946 – 1960	15.8%	6.5%
1961 – 1980	12.8%	2.9%
1981 – 2000	5.3%	2.8%
< 2000	3.9%	1.5%
Total	13%	5.1%

Table 5: Share of housing of structurally insufficient quality vs. share of housing with serious construction technical and structural defects (source: Groot Vlaams Woningonderzoek 2013)

The residences in the private rental market are, on average, of poorer quality than owner-occupied residences. Of the owner-occupied residences, the proportion of 'good' homes is 71.2% compared with 45.9% of the rental properties. Broadly speaking, one in four residences in the rental market is of poor quality, compared to one in ten in the owner-occupied market. The rent for residences of 'poor' or 'very poor' quality is, however, not lower than for residences of 'moderate' quality. This suggests high demand pressure in the lowest segment of the rental market.

Landlords in the Flemish private rental market are mainly individuals. According to the housing survey, a private landlord leases 2.2 residences on average. 60% of them rent one residence and almost 85% rent a maximum of three residences. We can therefore conclude that the private segment in the rental market is very fragmented. These are often homes or apartments acquired through an inheritance.

Frequently, owners of rented homes are also elderly and retired people who often find it difficult to invest in the improvement of the rental property. Older people are also least inclined to make efficient energy use investments.

Rental homes are often poorly insulated, have outdated windows and an old heating system. 68.7% of the private rental homes have double glazing, 74.2% have central heating. The Flemish averages are 83.6% and 80.0%, respectively.

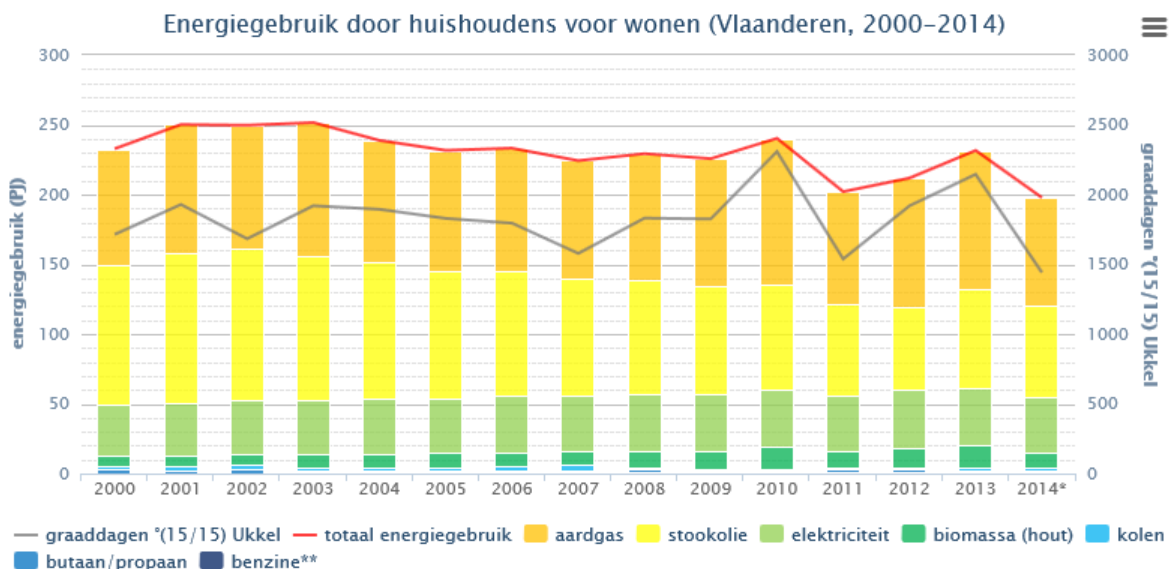
Private tenants have a lower income: 21.7% are in the lowest income quintile, 23.7% in the second-lowest income quintile. Tenants have a poverty risk that is about three times higher than that of owners, i.e. 28.4% versus 10.2%. On average, private tenants must spend a larger share of their income on housing costs: for 71.3%, the housing expense ratio is more than 20%, for 39.2% it is over 30% and for 17.3% more than 40%. The Flemish averages are 30%, 12.7% and 5.2%.

1.2.2. Energy performance of Flemish existing homes

Energy consumption in the residential sector

Household energy consumption rose by 3.7% in 2015 compared with 2014. This was mainly due to the fact that 2014 was an extremely hot year (lower number of degree days in 2014 (1,441) compared to 2015 (1,691)). Compared to 1990, household energy consumption decreased by 2.1%, while the number of households increased by 24.4% during that period. From 1990-2015 there was also a switch from fuel oil to natural gas: 42% of households consumed natural gas and 30% fuel oil in 2015, while in 1990 this was 28% and 49%, respectively.

The total degree day-adjusted energy consumption of households shows a slight downward trend over the period 2000-2014. The drop in average energy consumption per capita fell slightly more sharply than total energy consumption but less than average energy consumption per household. The latter is because the average family size is decreasing and smaller families use more energy per capita on average



Translation of image

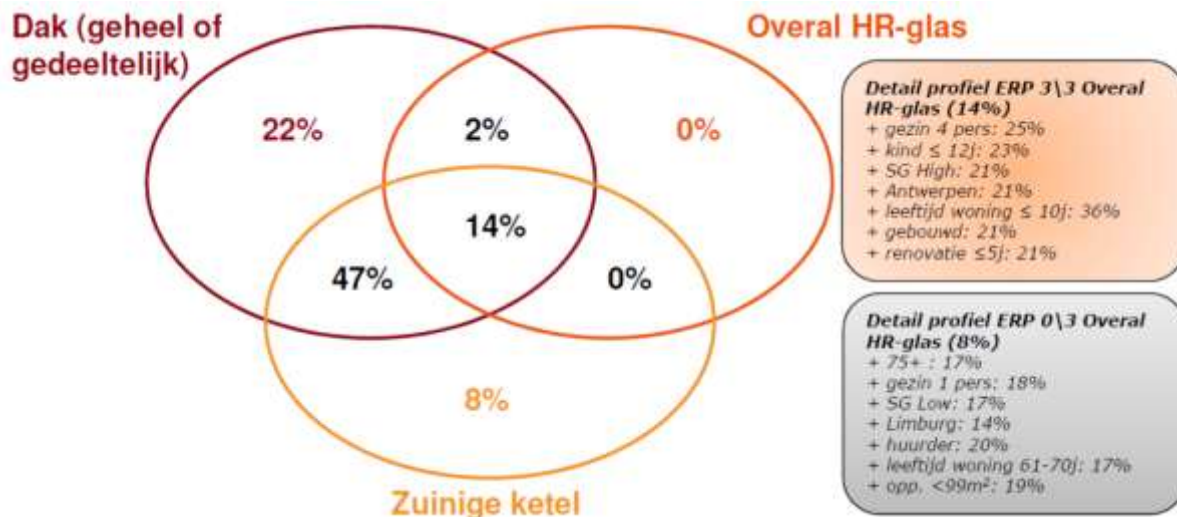
Source:

Translation:

Energiegebruik door huishoudens voor wonen (Vlaanderen, 2000-2014)	Energy use for residential households (Flanders, 2000-2014)
energiegebruik (PJ)	energy use (PJ)
graaddagen °(15/15) Ukkel	degree days °(15/15) Ukkel
totaal energiegebruik	total energy use
aardgas	natural gas
stookolie	fuel oil
elektriciteit	electricity
biomassa (hout)	biomass (wood)
kolen	coal
butaan/propaan	butane/propane
benzine**	petrol**

Figure 6: Household energy consumption (source: Energy balance sheet Flanders VITO)

Although the Flemish Energy Agency's biennial survey on energy awareness and behaviour (approximately 1,000 families) shows that the housing insulation rate has risen slightly since 2011, 53% of homes had no wall insulation in 2015, 18% had no roof or attic floor insulation and 11% still had single glazing. The penetration rate of efficient heating boilers has also increased. Yet, 53% of the fuel oil users with an individual heating system still had an ordinary boiler in 2015. For natural gas, this was 21%. When looking at the combination of the insulation rating and heating system, it appears that 49% of residences have a fully insulated roof, double glazing, and an economical boiler. 14% has a fully insulated roof, high-efficiency glazing throughout and an efficient boiler.



Translation of image	
Source:	Translation:
Dak (geheel of gedeeltelijk)	Roof (whole or partial)
Overall HR-glas	HE glass throughout
Zuinige ketel	Energy-efficient boiler
Detail profiel ERP 3\3 Overaal HR-glas (14%)	ERP profile detail 3\3 HE glass throughout (14%)
+ gezin 4 pers: 25%	+ family 4 people: 25%
+ kind ≤ 12j: 23%	+ child ≤ 12y: 23%
+ SG High: 21%	+ SG High: 21%
+ Antwerpen: 21%	+ Antwerp: 21%
+ leeftijd woning ≤ 10j: 36%	+ age of home ≤ 10y: 36%
+ gebouwd: 21%	+ constructed: 21%

+ renovatie ≤ 5j: 21%	+ renovation ≤ 5y: 21%
Detail profiel ERP 0\3 Overall HR-glas (8%)	ERP profile detail 0\3 HE glass throughout (8%)
+ 75+ : 17%	+ 75+: 17%
+ gezin 1 pers: 18%	+ family 1 person: 18%
+ SG Low: 17%	+ SG Low: 17%
+ Limburg: 14%	+ Limburg: 14%
+ huurder: 20%	+ tenant: 20%
+ leeftijd woning 61-70j: 17%	+ age of home 61-70y: 17%
+ opp. <99m ² : 19%	+ opp. <99m ² : 19%

Figure 7: Combination measures (source: FEA survey on energy awareness and behaviour 2015)

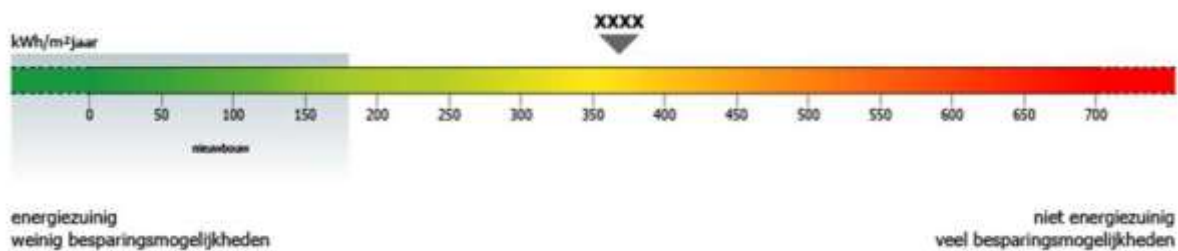
The energy performance of Flemish residences

At the end of 2016, 932,238 valid energy performance certificates had already been drawn up for existing residential buildings. The average figure from the EPCs submitted up to the end of 2016 for an apartment is 293 kWh/m² per year. For a single-family residence, the average figure is 489 kWh/m² per year.

	Apartment		Collective residential building		Single-family home	
	Number	Figure	Number	Figure	Number	Figure
A: ≤1920	16052	373	793	405	41850	549
B: 1921-1945	17252	380	607	421	61455	541
C: 1946-1970	94671	343	939	394	155227	549
D: 1971-1985	65915	273	215	332	71023	418
E: 1986-1995	45787	246	176	260	35221	330
F: 1996-2005	57622	195	141	235	32573	236
G: >2005	26331	153	95	193	7799	186
H: unknown	73036	365	1433	407	126033	538
Total (Years)	396666	293	4399	386	531181	489

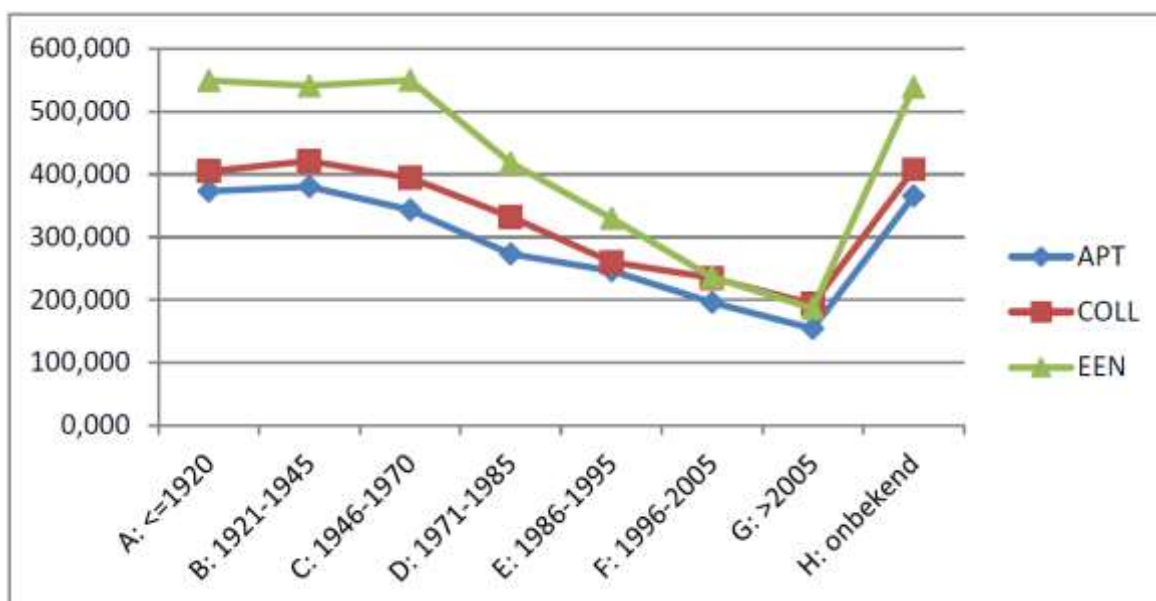
Table 6: Average figures from the EPCs (energy rating) for residential buildings according to year of construction and type of residential building

An analysis of the figures according to the year of construction shows that the newer the building, the better the energy rating. Residences that were built after the introduction of insulation regulations (1993) already score significantly better, while residences built after the implementation of the energy performance regulations (2006) tend to be more quickly placed in the green zone of the EPC colour bar.



Translation of image	
Source:	Translation:
kWh/m ² jaar	kWh/m ² year
nieuwbouw	new construction
energiezuinig	energy efficient
weinig besparingsmogelijkheden	limited savings opportunities
niet energiezuinig	not energy efficient
veel besparingsmogelijkheden	considerable savings opportunities

Figure 8: Image EPC



Translation of image	
Source:	Translation:
APT	APT
COLL	COLL
EEN	ONE
H: onbekend	H: unknown

Figure 9: Evolution of the energy rating for residential buildings according to the year of construction and type of residential building

Apartments usually score better in the area of energy which is largely explained by the fact that they often have less energy loss through walls, roofs and floors. Hence, row houses are generally more energy-efficient than semi-detached buildings, which in turn

are more energy-efficient than detached structures. On average, a detached structure requires 20% more energy for heating than an attached structure.

	Attached structures	Semi-detached structures	Detached structures
A: <=1920	456	605	707
B: 1921-1945	459	596	685
C: 1946-1970	448	554	625
D: 1971-1985	333	402	450
E: 1986-1995	270	314	345
F: 1996-2005	200	226	256
G: >2005	159	174	226
H: unknown	451	578	664
	429	507	532

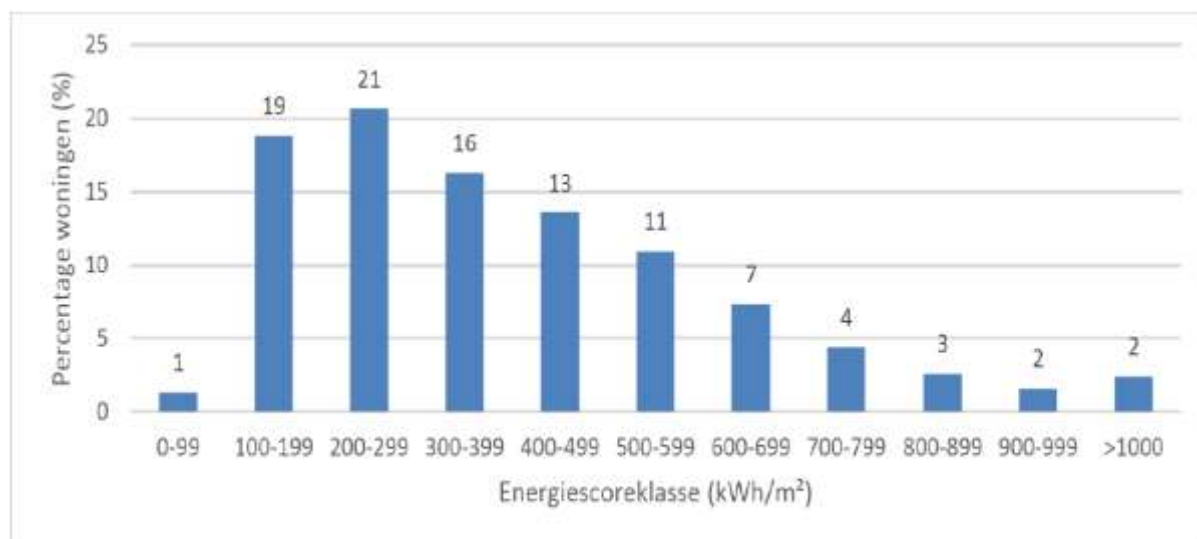
Table 7. Average energy rating according to the year of construction and type of single family home

A recent newly constructed residence, on average, scores nearly three times better in the area of energy than a house built before 1970 and twice as well as a house from the period 1971-1985. Homes that were built after 1996 also have a significantly lower energy rating (only half) compared to homes built before 1970.

A more comprehensive analysis was carried out in 2015 by the Policy Research Centre Housing (Steunpunt Wonen)⁵ based on the 724,345 energy performance certificates available at that time.

The figure below shows the percentage of homes according to energy rating category. There are very few homes with a very low energy rating: only 1.4% have an energy rating below 100 kWh/m². However, 20.4% of homes have an energy rating below 200 kWh/m². By comparison: on the energy performance certificate, the colour bar – which is a graphical scale for the energy rating – new construction is given as a benchmark for homes with an energy rating below 180 kWh/m². This means that around 20% of the homes in the database will approximate the energy performance of newly constructed residences. In addition, 50.9% of homes with energy performance certificates have an energy rating of between 200 and 500 kWh/m² and 17.9% an energy rating between 500 and 700 kWh/m². And 11% homes have an energy rating higher than 700 kWh/m².

⁵ The Policy Research Centre Housing is funded by the Flemish government within the programme 'Policy Research Centres 2012-2015' and is a collaboration between the KU Leuven, the University college of science and arts, Hasselt University, the University of Antwerp and the OTB Research Institute of the TUDelft (the Netherlands).

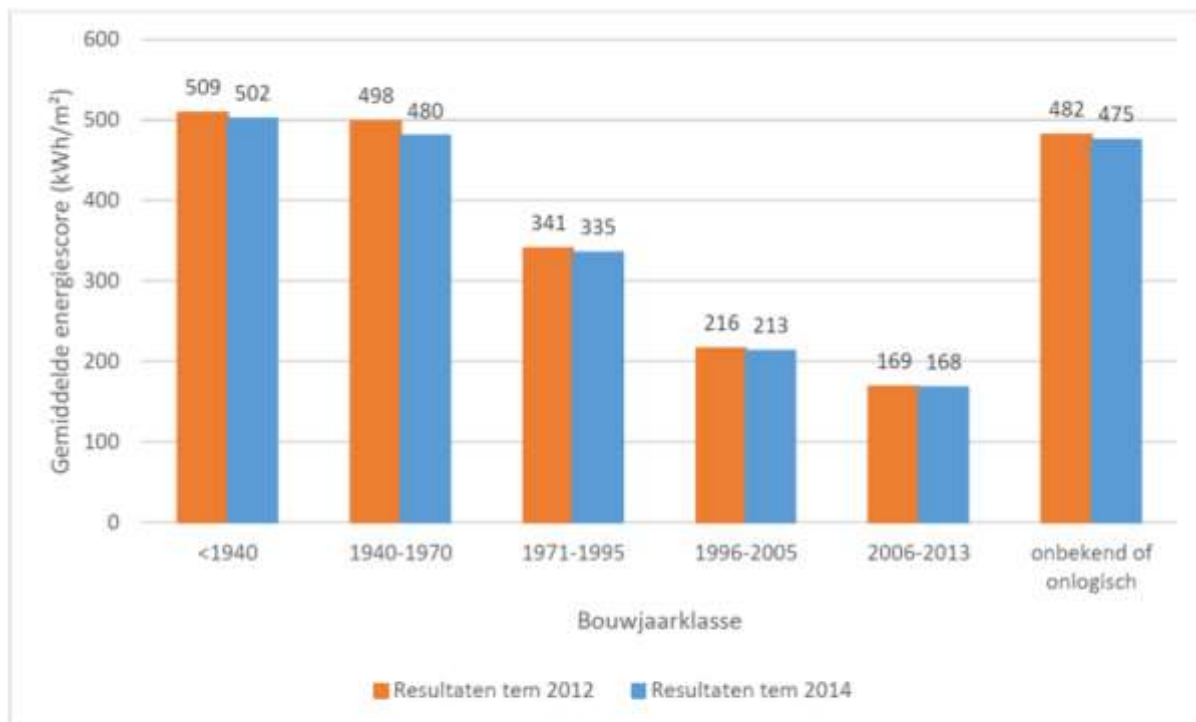


* Resultaten op basis van 724.345 woningen aanwezig in de Energieprestatiecertificatendatabank

Translation of image	
Source:	Translation:
Percentage woningen (%)	Percentage of homes (%)
Energiescoreklasse (kWh/m ²)	Energy rating category (kWh/m ²)
* Resultaten op basis van 724.345 woningen aanwezig in de Energieprestatiecertificatendatabank	* Results based on 724,345 homes included in the Energy Performance Certificate database

Figure 10: Percentage of homes according to energy rating category (source: Verbeek G. & Ceulemans W. 2015)

If we look at the relationship between the energy rating and the construction year category, it is clear that from the 1950s/1960s, the average energy rating by construction year category systematically declines as the homes become newer. The houses built before 1960 have an average energy rating of 500 kWh/m² or more. This figure then drops below 400 kWh/m² from the 1970s, reaching under 300 kWh/m² in the 1990s and as low as 200 kWh/m² and lower from 2000. For the houses with an unknown year of construction, the energy rating is high (482 kWh/m²). This is linked on the one hand to the fact that these are most likely older homes, which means that data on the year of construction is no longer available. On the other hand, the unknown year of construction has an impact on the standard values for insulation in the different envelopes (most negative), unless a renovation year is available or information about the insulation or installations is available. In the analysis at residence level, a renovation year for the home as a whole cannot be determined, because renovation years do not always have to be submitted, and renovation years are submitted per envelope. Of course, renovations can impact the energy rating, provided that they involve energy renovations for which information is available and submitted. However, in general, the analysis of the relationship between the year of construction and energy rating shows that there is a correlation between the energy rating and the year of construction, namely that the newer the home, the better the energy rating. Compared to the 2012 results, there was a slight decline in average energy ratings for all construction year categories.



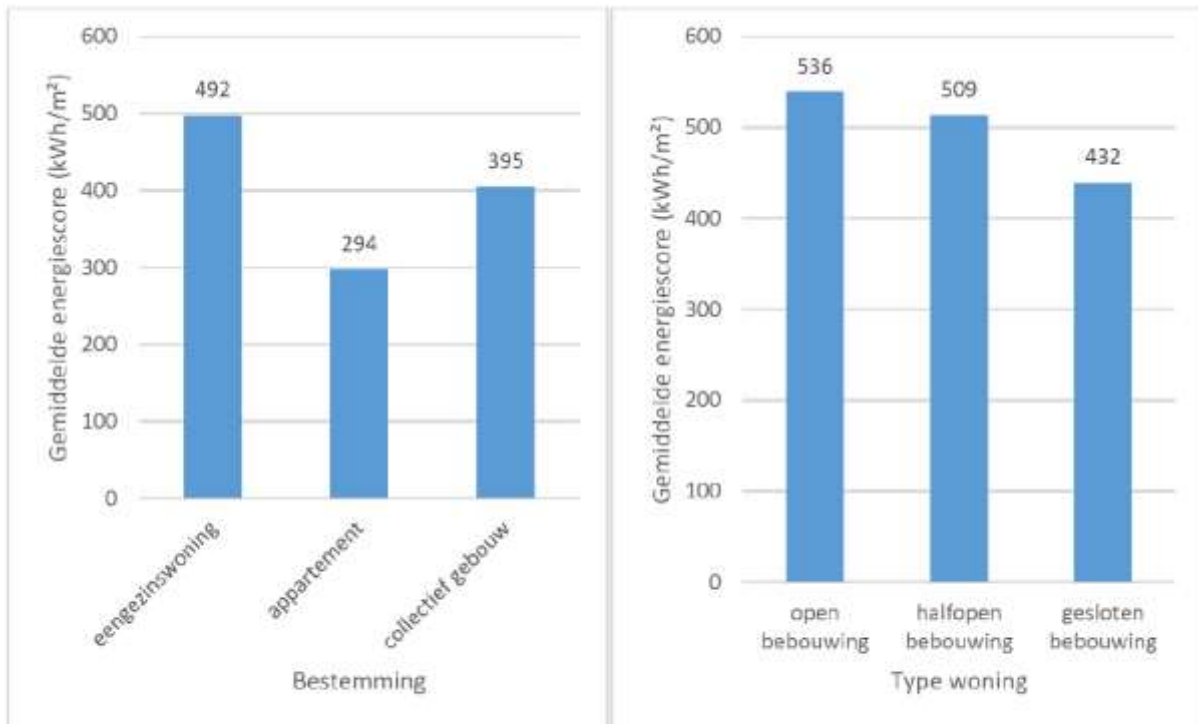
* Resultaten op basis van 617.486 woningen aanwezig in de Energieprestatiecertificatendatabank tem 2012 en 724.345 woningen aanwezig in de Energieprestatiecertificatendatabank tem 2014
 Bron: -Energieprestatiecertificatendatabank (woningen tem 2012 en tem 2014)

Translation of image	
Source:	Translation:
Gemiddelde energiescore (kWh/m ²)	Average energy rating (kWh/m ²)
onbekend of onlogisch	unknown or illogical
Bouwjaarklasse	Year of construction category
Resultaten tem 2012	Results through 2012
Resultaten tem 2014	Results through 2014
* Resultaten op basis van 617.486 woningen aanwezig in de Energieprestatiecertificatendatabank tem 2012 em 724.345 woningen aanwezig in de Energieprestatiecertificatendatabank tem 2014	* Results based on 617,486 homes included in the Energy Performance Certificate database through 2012 and 724,345 homes included in the Energy Performance Certificate database through 2014
Bron: Energieprestatiecertificatendatabank (woningen tem 2012 en tem 2014)	Source: Energy Performance Certificate database (homes through 2012 and through 2014)

Figure 11: Average energy rating

The designated use and type of single-family home have a clear influence on the average energy rating. For apartments, the energy rating is significantly lower than for single-family homes or collective residential buildings. If we make a distinction between the type of structure for single-family homes, it appears that a 4-storey home has a higher energy rating than a 3-storey home and that a row house has the lowest energy rating of single-family homes. The known influence of compactness on the energy performance of buildings is clearly visible here in the results. For the apartments, the year of construction can also play an additional role, as apartments on average are somewhat newer than single-family homes.

Also, the average energy ratings by designated use and type of (single-family) home are slightly lower than those in 2012. At that time, the average energy rating for a single-family home was 498 kWh/m², for an apartment it was 298 kWh/m² and for a collective building 405 kWh/m². A detached single-family home had an average energy rating of 539 kWh/m², a semi-detached home 514 kWh/m² and an attached home 439 kWh/m².



* Resultaten op basis van 724.345 woningen (waarvan 398.467 eengezinswoningen) aanwezig in de Energieprestatiecertificatendatabank
Bron: Energieprestatiecertificatendatabank (woningen tem 2014)

Translation of image	
Source:	Translation:
Gemiddelde energiescore (kWh/m ²)	Average energy rating (kWh/m ²)
eengezinswoning	single-family home
appartement	apartment
collectief gebouw	collective building
Bestemming	Designated use
Gemiddelde energiescore (kWh/m ²)	Average energy rating (kWh/m ²)
open bebouwing	detached structure
halfopen bebouwing	semi-detached structure
gesloten bebouwing	attached structure
Type woning	Type of home
* Resultaten op basis van 724.345 woningen (waarvan 398.467 eengezinswoningen) aanwezig in de Energieprestatiecertificatendatabank	* Results based on 724,345 homes (of which 398,467 are single-family homes) included in the Energy Performance Certificate database
Bron: Energieprestatiecertificatendatabank (woningen tem 2014)	Source: Energy Performance Certificate database (homes through 2014)

Figure 12: Average energy rating per designated use/type

For the sake of completeness, we note that our detailed analysis also contains a lot of data on the relationship between the figure and the different envelopes (facades, roofs,

walls, floors, windows) and installations (heating, sanitary hot water including solar water heater, ventilation and photovoltaic panels individually).

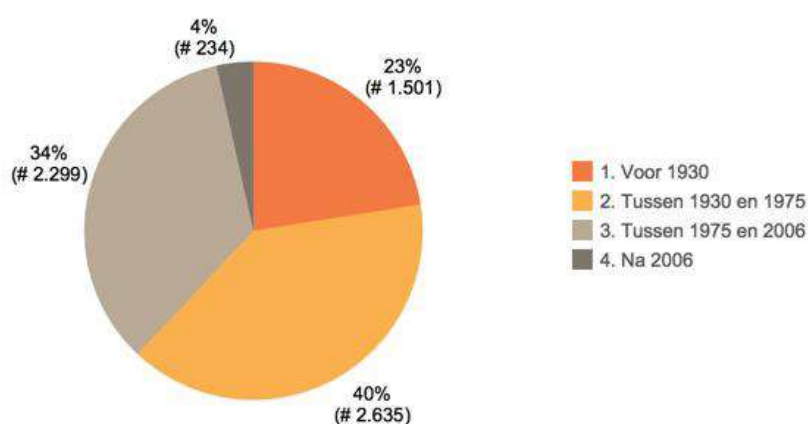
1.3. NON-RESIDENTIAL BUILDINGS

For the analysis of the Flemish building stock of non-residential buildings, the following studies were used as information sources:

- “Strategienota renovatie niet-residentiële gebouwen” (Strategy paper on the renovation of non-residential buildings): a study conducted by Efika containing an overview of the building stock and a possible strategy to precipitate renovations (December 2016).
- “Studie naar kostenoptimale niveaus van de minimumeisen inzake energieprestaties van niet-residentiële gebouwen” (Study of cost-optimal levels of minimum requirements for energy performance of non-residential buildings): for the EPB requirements, a study was carried out by VK engineering, KU Leuven (department of construction physics) and Royal Haskoning (October 2016).

Our overview of the non-residential building stock starts with the public buildings. There is a good overview of this sector given that, since 2015, it is required to create an EPC for all public buildings with an available floor area of more than 250 m². The EPC figure shows actual primary energy consumption per usable floor area (kWhp/m²) and must be calculated based on measured consumption over the period of one full year. In contrast to the EPC for residential buildings, this is not about theoretical consumption, which therefore enables us to get a realistic picture of effective consumption.

To get a general idea of the stock of public buildings, we first provide information about the age and function of the buildings. The diagram below divides the different public buildings according to year of construction:

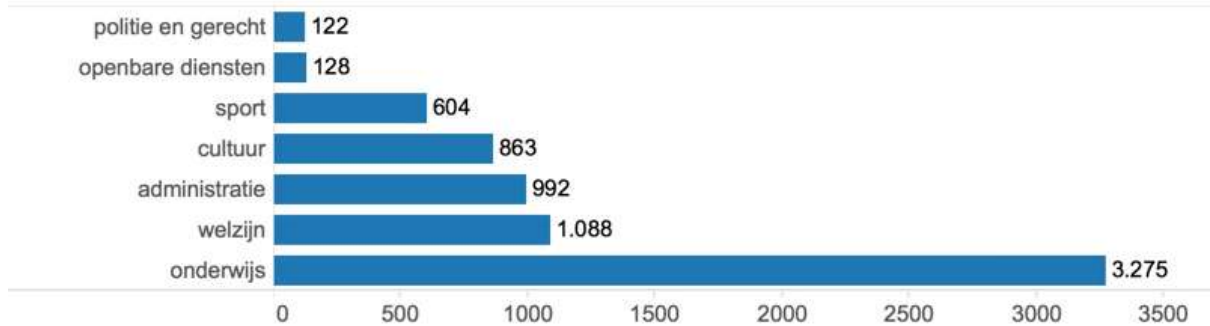


Translation of image	
Source:	Translation:
1. Voor 1930	1. Before 1930
2. Tussen 1930 en 1975	2. Between 1930 and 1975
3. Tussen 1975 en 2006	3. Between 1975 and 2006

4. Na 2006	4. Post-2006
------------	--------------

Figure 13: Public buildings by year of construction

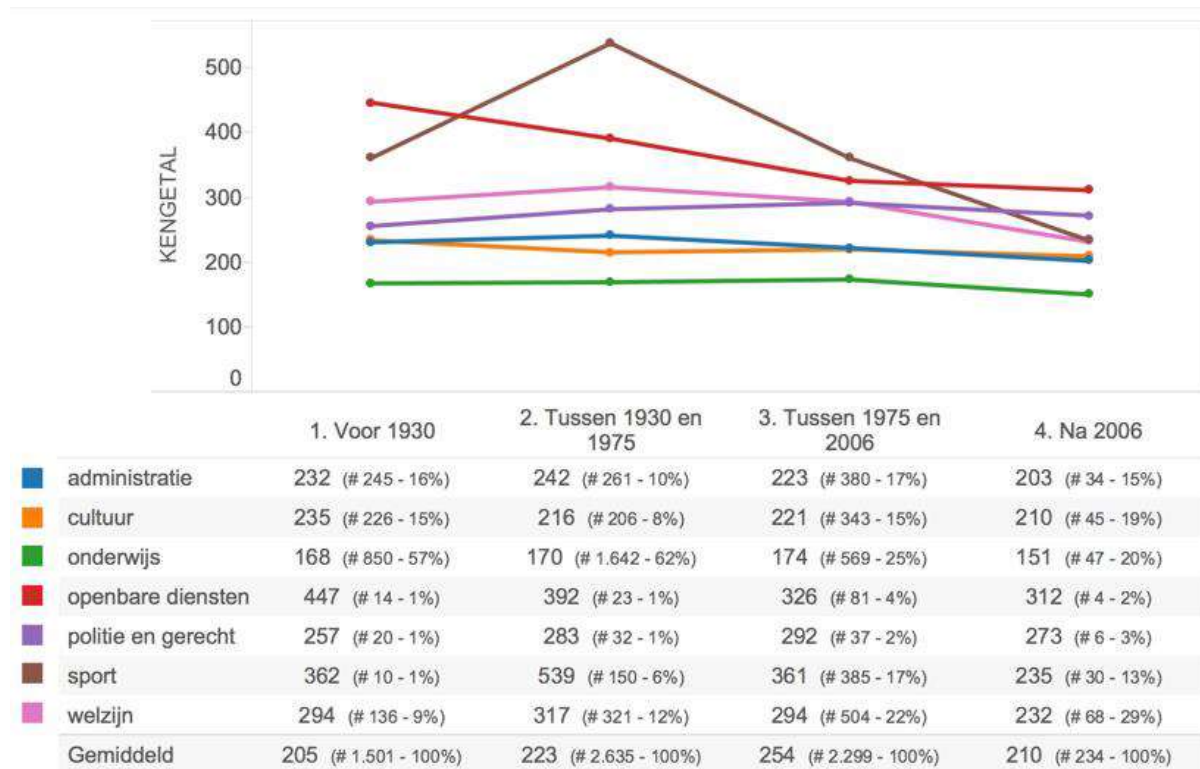
The following bar chart gives an idea of which buildings come under public buildings and how these numbers relate to each other:



Translation of image	
Source:	Translation:
politie en gerecht	police and justice
openbare diensten	public services
sport	sports
cultuur	culture
administratie	administration
welzijn	well-being
onderwijs	education

Figure 14: Number of public buildings per sector

Thanks to the EPC, we gain insight into the consumption of these public buildings; the figure below provides an overview of the EPC figures by sector and by construction period:



Translation of image	
Source:	Translation:
KENGETAL	FIGURE
1. Voor 1930	1. Before 1930
2. Tussen 1930 en 1975	2. Between 1930 and 1975
3. Tussen 1975 en 2006	3. Between 1975 and 2006
4. Na 2006	4. Post-2006
administratie	administration
cultuur	culture
onderwijs	education
openbare diensten	public services
politie en gerecht	police and justice
sport	sports
welzijn	well-being
Gemiddeld	Average

Figure 15: Average EPC figure according to construction year and subsector

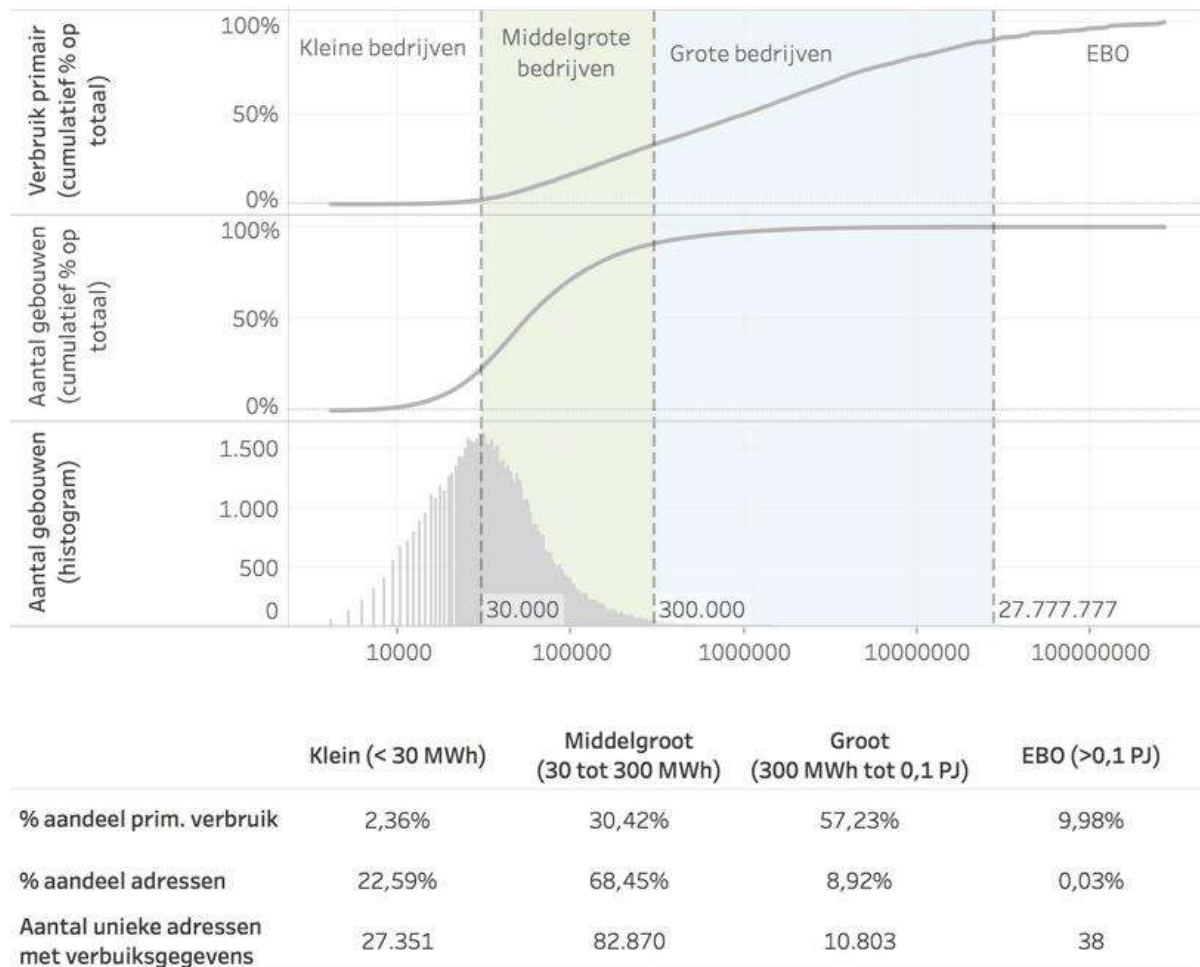
Of course the non-residential building stock goes far beyond the public sector alone. In the Efika study, three other sectors are defined as non-residential, which do not belong to the public sector: hospitality, trade and office buildings. For further analysis, we divide the non-residential building stock into five sectors and one residual category: education, care, trade, hospitality and office buildings. With respect to primary energy consumption, they relate to each other as follows (based on data from the distribution network operators):

	Elektriciteit (kWhp)	Gas (kWhp)	Verbruik totaal (kWhp)	Verbruik totaal primair (%)
Andere gemeenschaps-, sociale en ..	3.093.832.437	1.415.469.371	4.509.301.808	12%
Gezondheidszorg en maatschappel..	2.425.974.285	1.593.536.744	4.019.511.029	10%
Handel	8.038.620.789	2.614.259.621	10.652.880.410	28%
Horeca	2.296.622.766	1.339.367.790	3.635.990.556	9%
Kantoren en administraties	9.514.168.500	4.514.731.537	14.028.900.037	36%
Onderwijs	853.296.575	1.012.711.819	1.866.008.394	5%
Totaal	26.222.515.353	12.490.076.881	38.712.592.234	100%

Translation of image	
Source:	Translation:
Elektriciteit (kWhp)	Electricity (kWhp)
Gas (kWhp)	Gas (kWhp)
Verbruik totaal (kWhp)	Total consumption (kWhp)
Verbruik totaal primair (%)	Total primary consumption (%)
Andere gemeenschaps-, sociale en ..	Other community, social and ..
Gezondheidszorg em maatschappel..	Healthcare and social..
Handel	Trade
Horeca	Catering service provider
Kantoren en administratie	Offices and administration
Onderwijs	Education
Totaal	Total

Table 8: Primary energy consumption per sector

If we look specifically at the companies, the distribution of energy consumption by size of companies is as follows:



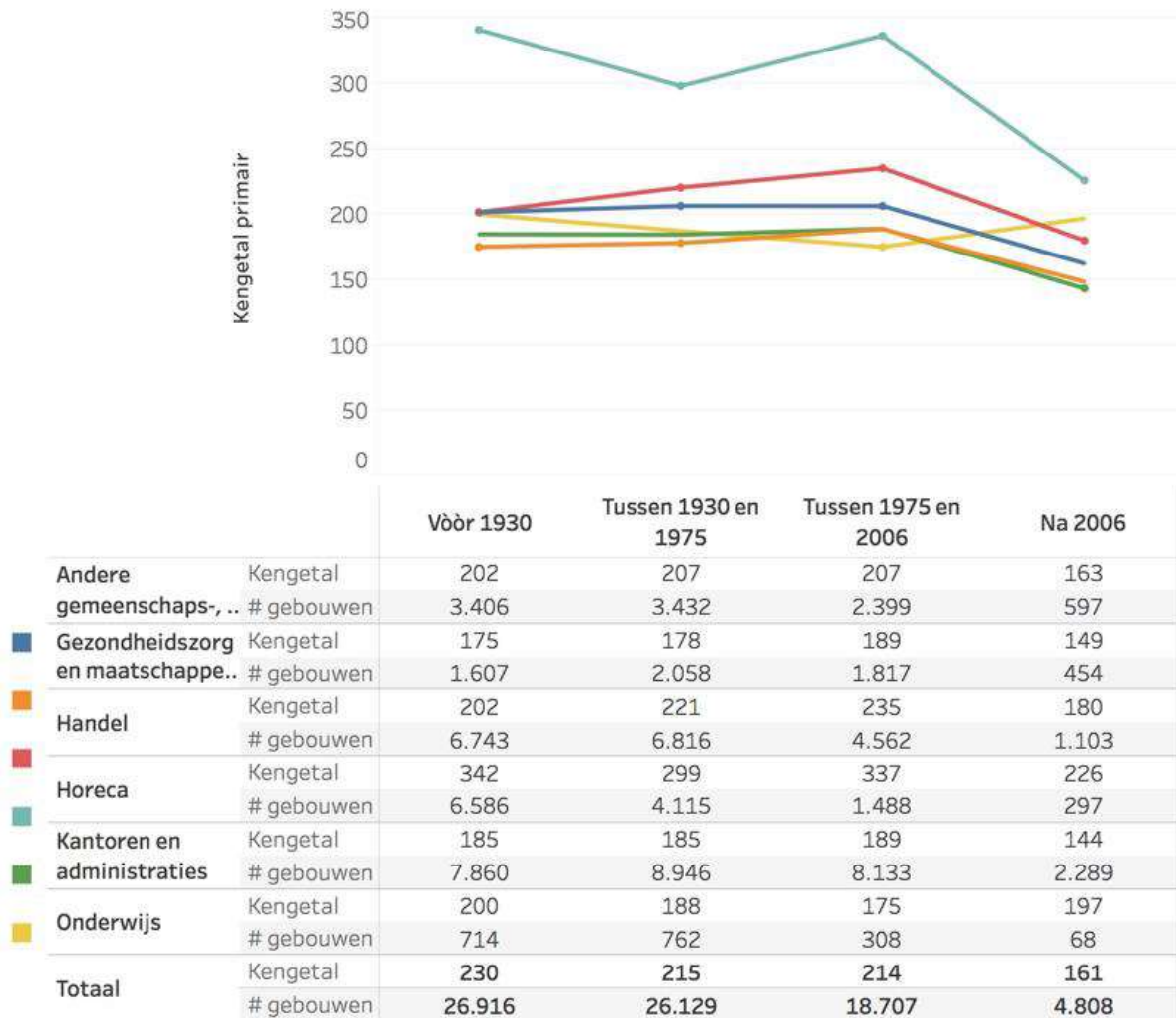
Translation of image	
Source:	Translation:
Kleine bedrijven	Small companies
Middelgrote bedrijven	Medium-sized companies
Grote bedrijven	Large companies
EBO	EPA
Verbruik primair (cumulatief % op totaal)	Primary consumption (cumulative % of total)
Aantal gebouwen (cumulatief % op totaal)	Number of buildings (cumulative % of total)
Aantal gebouwen (histogram)	Number of buildings (histogram)
Klein (< 30 MWh)	Small (< 30 MWh)
Middelgroot (30 tot 300 MWh)	Medium-sized (30 to 300 MWh)
Groot (300 MWh tot 0,1 PJ)	Large (300 MWh to 0.1 PJ)
EBO (>0,1 PJ)	EPA (>0.1 PJ)
% aandeel prim. verbruik	% share prim. consumption
% aandeel adressen	% share addresses
Aantal unieke adressen met verbruiksgegevens	Number of unique addresses with consumption data

Figure 16: Share in energy consumption according to size

From the above figure it is clear that most consumption is concentrated in a small percentage of buildings. It will therefore be here that the biggest savings gains can be achieved. When we consider this together with the proportions of the different sectors in

relation to each other, we can conclude that the policy must be geared as a first priority to the large buildings in the offices and trade categories.

Consumption could then be combined with data from the land register, thus determining the year of construction and the useful floor area per building. Using this data, the energy figure could be determined as well as the evolution of this figure over the years. The figure below gives an overview:



Translation of image	
Source:	Translation:
Kengetal primair	Figure primary
Andere gemeenschaps-, ..	Other community, etc.
Gezondheidszorg em maatschappe..	Healthcare and social..
Handel	Trade
Horeca	Catering service provider
Kantoren en administratie	Offices and administration
Onderwijs	Education
Totaal	Total
Kengetal # gebouwen	Figure # buildings
Vòòr 1930	Prior to 1930
Tussen 1930 em 1975	Between 1930 and 1975

Tussen 1975 en 2006	Between 1975 and 2006
Na 2006	Post-2006

Figure 17: Evolution of figures per sector

In this graph, we see a clear downward trend in all sectors, except education, since 2006. This can be explained by the introduction of thermal insulation requirements. It is clear that these regulations have been effective.

2. Cost-effective approaches that are relevant to the different building categories and the climate zone (EED Article 4).

The Flemish Government regularly commissions studies on the cost-optimal levels of minimum energy performance requirements for buildings. The study reports comprise three different parts: 1) new residential construction, 2) residential renovation, and 3) new construction and renovation of non-residential buildings. The most recent reports date back to 2015 and can be consulted at

<http://www.energiesparen.be/bouwen-en-verbouwen/epb-voor-professionelen/epb-regelgeving/epb-evaluatie>.

The studies show that, unlike the new construction, it is difficult to determine one optimal energy performance level for renovations. The cost-optimal energy performance level is highly dependent on the initial situation and the renovation options for a specific building.

In general, insulation measures in homes are quickly cost-effective if low-cost options are available such as insulating the attic floor, insulating a sloping roof if a sub-roof is present and no interior finishing is provided, cavity filling, adding to insulation in a flat roof and insulating a basement ceiling. However, when existing structures, such as the cavity wall and the roof, already have a minimum insulation layer, it will be difficult to balance the energy savings of the (more expensive) insulation measures against the investment cost. If a decision is made to go ahead with renovation work, to replace the roof cover for example, the cost-optimal insulation level will meet or even exceed the future required cost-optimal level of new construction. It is therefore more desirable to execute a solid insulation measure than to do the work in several steps, and thus only partly. The cost of the new finishing layer weighs heavily in this decision. Moreover, major renovations that combine different measures can be attractive because they can provide better solutions for thermal bridges and increased airtightness. And in a home that is well-insulated in advance, a smaller heating system can be installed. These conclusions also apply to the systems themselves. When a new heating boiler is installed, it is best to have a condensing boiler, but heat pumps or (in collective buildings) micro-CHPs can also be attractive.

For old office buildings with little or no insulation, it became clear that the overall renovation of the building is preferable to a (step-by-step) renovation of the various

building envelopes. The difference is mainly due to the application of floor insulation and the ability to achieve a greatly improved airtightness in a total renovation.

2.1 RESIDENTIAL BUILDINGS

We base our conclusions on the “Study of cost-optimal EPB requirements for residential buildings” (Energy Knowledge Centre (Thomas More Kempen / KU Leuven), June 2015).

Following the evaluation of the energy performance regulations in 2013 and on the basis of the study of the cost optimisation carried out in 2012 (conducted by the non-profit Thomas More Kempen, commissioned by the FEA), the E-level of E90 was defined for construction projects with urban building permit applications from 2015 for a new ‘nature of the works’, the ‘major energy renovation’ or a renovation in which the technical installations are completely replaced and at least 75% of existing and new partition structures that are adjacent to the outside environment are insulated (during or after).

The purpose of this 2015 study was to determine the cost-optimal energy performance requirement levels for renovated existing residential buildings according to the European established methodology, to define measures or packages of measures that lead to a major energy renovation and to compare cost-optimal energy performance requirement levels with the currently applicable requirement levels.

A number of benchmark buildings were chosen, which are considered representative of the Flemish housing stock. These are fictional homes designed to match the parameters and variables of these buildings with common values in the real Flemish residential stock. In order to be representative of the Flemish housing stock in terms of typology, size, age, method of construction, etc., the following types were chosen for renovation of existing residential buildings.

- **Single-family homes**
 - Row house 1: small row house
 - Row house 2: large row house
 - Semi-detached home 1
 - Semi-detached home 2 (smaller)
 - Detached home 1: Architectural home
 - Detached home 2: Farmhouse
- **Multi-family homes and/or apartments**
 - Apartments (different location in the building + individual and collective heating/hot water system)

The energy saving measures were broken down into structural measures and technical installation measures, and extensively documented. The key economic target variable is the Total Current Cost (TCC) or the life-cycle cost of the home over the actualisation period. This includes investment costs, energy costs, maintenance costs, reinvestment costs and disposal costs/residual value. To calculate the TCC over a 30-year period for a home/package of measures, account will be taken of:

- Initial investment costs.
- Consumption costs.
- Total annual maintenance costs.
- Replacement costs.
- Residual value of investments.
- Subsidies.
- CO₂ emissions costs.

A package of measures was then continually applied to this original home, which meant the home just complied with the definition of major energy renovations, in particular:

- At least 75% of the separation structures to the outside environment are insulated (during or after) according to the 2015 requirements package (see Annex B: EPB requirements 2015).
- Ventilation system is provided.
- Heat production system is replaced.
- E90 must be achieved.

The calculations were performed from both a macroeconomic (social) and microeconomic (private) perspective. In the optimisation process, these objectives were weighed against each other using the pareto optimisation method.

The macroeconomic optimum for the worker's house is in line with the average expected rise in energy prices at E48. Both the front and rear façades have a 12 cm thick outer insulation layer ($U = 0.20\text{W/m}^2\text{K}$). The sloping roof is also renovated with a sarking insulation system that can bring the U-level to $0.16\text{W/m}^2\text{K}$. Insulation is applied to the floor above the basement up to the minimum U value of $0.10\text{W/m}^2\text{K}$. The windows ($U_{\text{prof}} = 2.2\text{W/m}^2\text{K}$) are replaced on both facades including improved double glazing ($U_g = 1.0\text{W/m}^2\text{K}$, $g = 0.5$). A new gas condensing boiler is connected to the existing radiators and a C3 ventilation system is selected, incorporating additional individual CO₂ sensors and actuators that improve the efficiency of the demand-side management of the extraction system. This total renovation (cost 47,055 euros) requires an additional investment of 11,000 euros compared with the benchmark renovation, but provides an additional primary energy savings of 45% which is enough to reduce the total current cost by approximately 3,000 euros.

The optimum for a large row house is achieved at E43. By way of illustration, for the type of large row house, the table with the detailed packages of measures indicates the cost-optimal approach, which can be found in the study for each of the types of housing.

Financiële parameters			Energetische parameters				Opmerkingen
TAK	Totale investering	TVT	E-peil	K-peil	NEB	PEV	
€	€	jaar	-	-	kWh/m ²	kWh/m ²	
							referentie : Uvoorgevel = 1.70, Uachtergevel = 0.24, Udak = 0.24, Vloer grond - kelder = 0.68-0.78, Uprofiel = 2.2, Uglas = 1.1, v50 = 6h ⁻¹ , ventilatiesysteem C1, Stookolieketel HR met HT radiatoren + mazoutboiler, 47% opengaande ramen
98075	50095	0	88	59	75	125	
87726	49521	-1	87	59	70	123	(1) = referentie + gasketel + ventilatiesysteem C2 + geiser
85788	50453	1	79	59	70	112	(2) = (1) + gascondensatieketel
84447	51506	2	73	53	62	103	(3) = (2) + Uvloer kelder = 0.20
84261	52214	3	71	51	60	100	(4) = (3) + Uvloer kelder = 0.13 + Udak = 0.16
83916	53006	4	68	53	62	96	(5) = (3) + douchewarmteterugwinner
83628	53302	4	65	53	52	91	(6) = (3) + ventilatiesysteem C3
83469	54010	5	63	51	50	88	(7) = (4) + ventilatiesysteem C3
82273	55142	6	64	44	52	91	(8) = (2) + Uvoorgevel = 0.24 + Udak = 0.20
81995	55214	6	64	38	45	90	(9) = (8) + Uvloer kelder = 0.24 + Uglas = 1.0 maar gasketel
81021	56146	7	59	38	45	83	(10) = (9) + gascondensatieketel
80914	56777	7	57	36	43	80	(11) = (10) + Udak = 0.16 + Uvloer kelder = 0.13
80229	58573	8	49	36	33	69	(12) = (11) + ventilatiesysteem C3
79699	60073	9	44	36	33	62	(13) = (12) + douchewarmteterugwinner
79625	60788	9	43	35	32	60	(14) = (13) + Uvoorgevel = 0.13
79672	60966	10	43	35	32	60	(15) = (14) + Uvloer kelder = 0.10
79887	61654	10	41	33	30	58	(16) = (14) + Uprofiel = 1.40
80030	62444	11	40	32	29	56	(17) = (16) + Uvoorgevel = 0.10 + Udak = 0.13 + Uvloer kelder = 0.10
80413	62869	11	39	30	27	55	(18) = (16) + Uglas = 0.60
80423	68517	13	28	35	32	39	(19) = (16) + 2500Wp maar Uprof = 2.2
80828	70173	14	25	32	29	35	(20) = (17) + 2500Wp
81102	70845	14	24	31	28	34	(21) = (20) + Uachtergevel = 0.16
82043	73385	15	17	31	28	23	(22) = (21) + 3750Wp
82710	73557	14	13	35	32	17	(23) = (19) + 5000Wp
82660	74430	15	14	29	25	20	(24) = (22) + Ventilatiesysteem C4 maar Uvoorgevel = 0.16
82540	74600	15	15	28	25	20	(24) = (22) + Uglas = 0.60
83326	75885	15	9	31	28	12	(25) = (21) + 5000Wp
84998	78874	17	5	27	22	6	(26) = (25) + Uglas = 0.60 + Ventilatiesysteem C4
85534	79689	17	4	26	21	5	(27) = (26) + Uglas = 0.50
86232	81002	17	-2	31	28	-2	(28) = (21) + 7500Wp
87133	82720	18	-5	28	24	-6	(29) = (28) + Uglas = 0.60 + Ventilatiesysteem C4
88741	84954	18	-7	27	20	-10	(30) = (29) + Ventilatiesysteem D5
90263	86854	19	-10	27	17	-13	(31) = (30) + ventilatiesysteem Dwtw4
92145	88568	21	-13	27	20	-17	(32) = (30) + compactmodule
91591	89105	20	-12	24	15	-16	(33) = (31) + Uvoorgevel=0.13 + Uhellenddak=0.1 + Uglas = 0.5
94002	92068	23	-15	27	18	-20	(34) = (32) + ventilatiesysteem Dwtw3
94769	93231	24	-16	28	22	-22	(35) = (32) + zonneboiler
98256	97900	26	-20	24	16	-28	(36) = (34) + Uvoorgevel = 0.13 + Udak = 0.10 + Uglas = 0.50 + zonneboiler
99960	100230	27	-21	24	16	-29	(37) = (36) + zonneboiler-XL
99455	100691	27	-21	23	15	-29	(38) = (36) + Uvloer grond = 0.13 maar Udak = 0.13
101761	103879	28	-23	20	11	-32	(39) = (38) + ventilatiesysteem Dwtw4
109287	113157	32	-26	18	9	-37	(40) = (39) + Udak = 0.10 + Uvloergrond = 0.10 + Uprof = 0.90 + zonneboiler-XL + 30% extra opengaande ramen
114833	119031	35	-27	18	7	-38	(41) = (40) + v50 = 1,00
115928	121590	36	-27	19	10	-38	(42) = (40) + WP bodem-water COP4,4 Ltrad
124709	130986	40	-29	18	7	-40	(43) = (41) + WP bodem-water COP4,8 Ltrad
140168	147683	48	-29	18	7	-41	(44) = (43) + automatische zonnewering in het vlak van venster, maar slechts 20% extra opengaande ramen

Translation of image	
Source:	Translation:
Financiële parameters	Financial parameters
Energetische parameters	Energy parameters
TAK	TCC
Totale investering	Total investment
TVT	TVT
E-peil	E-level

K-peil	C-level
NEB	NZE building
PEV	PEV
Opmerkingen	Comments
jaar	year
kWh/m ² j	kWh/m ² y
kWh/m ² j	kWh/m ² y
referentie: Uvoorgevel = 1.70, Uachtergevel = 0.24, Udak = 0.24, Vloer grond – kelder = 0.68-0.78, Uprofiel = 2.2, Uglass = 1.1, v50 = 6h ⁻¹ , ventilatiesysteem C1, Stookolieketel HR met HT radiatoren + mazoutboiler, 47% opengaande ramen	reference: Ufront facade = 1.70, Urear facade = 0.24, Uroof = 0.24, Floor ground - basement = 0.68-0.78, Uprofile = 2.2, Uglass = 1.1, v50 = 6h ⁻¹ , ventilation system C1, Fuel oil boiler HE with HT radiators + heating oil boiler, 47% outward opening windows
(1) = referentie + gasketel + ventilatiesysteem C2 + geiser	(1) = reference + gas boiler + ventilation system C2 + geyser
(2) = (1) + gascondensatieketel	(2) = (1) + gas condensing boiler
(3) = (2) + Uvloer kelder = 0.20	(3) = (2) + Ufloor basement = 0.20
(4) = (3) + Uvloer kelder = 0.13 + Udak = 0.16	(4) = (3) + Ufloor basement = 0.13 + Uroof = 0.16
(5) = (3) + douchewarmteterugwinner	(5) = (3) + shower heat recovery system
(6) = (3) + ventilatiesysteem C3	(6) = (3) + ventilation system C3
(7) = (4) + ventilatiesysteem C3	(7) = (4) + ventilation system C3
(8) = (2) + Uvoorgevel = 0.24 + Udak = 0.20	(8) = (2) + Ufront facade = 0.24 + Uroof = 0.20
(9) = (8) + Uvloer kelder = 0.24 + Uglass = 1.0 maar gasketel	(9) = (8) + Ufloor basement = 0.24 + Uglass = 1.0 but gas boiler
(10) = (9) + gascondensatieketel	(10) = (9) + gas condensing boiler
(11) = (10) + Udak = 0.16 + Uvloer kelder = 0.13	(11) = (10) + Uroof = 0.16 + Ufloor basement = 0.13
(12) = (11) + ventilatiesysteem C3	(12) = (11) + ventilation system C3
(13) = (12) + douchewarmteterugwinner	(13) = (12) + shower heat recovery system
(14) = (13) + Uvoorgevel = 0.13	(14) = (13) + Ufront facade = 0.13
(15) = (14) + Uvloer kelder = 0.10	(15) = (14) + Ufloor basement = 0.10
(16) = (14) + Uprofiel = 1.40	(16) = (14) + Uprofile = 1.40
(17) = (16) + Uvoorgevel = 0.10 + Udak = 0.13 + Uvloer kelder = 0.10	(17) = (16) + Ufront facade = 0.10 + Uroof = 0.13 + Ufloor basement = 0.10
(18) = (16) + Uglass = 0.60	(18) = (16) + Uglass = 0.60
(19) = (16) + 2500Wp maar Uprof = 2.2	(19) = (16) + 2500Wp but Uprof = 2.2
(20) = (17) + 2500Wp	(20) = (17) + 2500Wp
(21) = (20) + Uachtergevel = 0.16	(21) = (20) + Urear facade = 0.16
(22) = (21) + 3750Wp	(22) = (21) + 3750Wp
(23) = (19) + 5000Wp	(23) = (19) + 5000Wp
(24) = (22) + Ventilatiesysteem C4 maar Uvoorgevel = 0.16	(24) = (22) + Ventilation system C4 but Ufront facade = 0.16
(24) = (22) + Uglass = 0.60	(24) = (22) + Uglass = 0.60
(25) = (21) + 5000Wp	(25) = (21) + 5000Wp
(26) = (25) + Uglass = 0.60 + ventilatiesysteem C4	(26) = (25) + Uglass = 0.60 + ventilation system C4
(27) = (26) + Uglass = 0.50	(27) = (26) + Uglass = 0.50
(28) = (21) + 7500Wp	(28) = (21) + 7500Wp
(29) = (28) + Uglass = 0.60 + Ventilatiesysteem C4	(29) = (28) + Uglass = 0.60 + Ventilation system C4
(30) = (29) + Ventilatiesysteem D5	(30) = (29) + Ventilation system D5
(31) = (30) + ventilatiesysteem Dwtw4	(31) = (30) + ventilation system Dwtw4
(32) = (30) + compactmodule	(32) = (30) + compact module
(33) = (31) + Uvoorgevel = 0.13 + Uhellenddak = 0.1 + Uglass = 0.5	(33) = (31) + Ufront facade = 0.13 + Usloping roof = 0.1 + Uglass = 0.5
(34) = (32) + ventilatiesysteem Dwtw3	(34) = (32) + ventilation system Dwtw3
(35) = (32) + zonneboiler	(35) = (32) + solar water heater
(36) = (34) + Uvoorgevel = 0.13 + Udak = 0.10 + Uglass = 0.50 + zonneboiler	(36) = (34) + Ufront facade = 0.13 + Uroof = 0.10 + Uglass = 0.50 + solar water heater

(37) = (36) + zonneboiler-XL	(37) = (36) + solar water heater-XL
(38) = (36) + Uvloer grond = 0.13 maar Udak = 0.13	(38) = (36) + U floor ground = 0.13 but Uroof = 0.13
(39) = (38) + ventilatiesysteem Dwtw4	(39) = (38) + ventilation system Dwtw4
(40) = (39) + Udak = 0.10 + Uvloergrond = 0.10 + Uprof = 0.90 + zonneboiler-XL + 30% extra opengaande ramen	(40) = (39) + Uroof = 0.10 + Ufloor ground = 0.10 + Uprof = 0.90 + solar water heater-XL + 30% extra outward opening windows
(41) = (40) + v50 = 1,00	(41) = (40) + v50 = 1.00
(42) = (40) + WP bodem-water COP4,4 Ltrad	(42) = (40) + WP soil-water COP4.4 Ltrad
(43) = (41) + WP bodem-water COP4,8 Ltrad	(43) = (41) + WP soil-water COP4.8 Ltrad
(44) = (43) + automatische zonnewering in het vlak van venster, maar slechts 20% extra opengaande ramen	(44) = (43) + automatic sun blinds on the plane of the window, but only 20% extra outward opening windows

Table 9: Packages of measures on the macroeconomic pareto front of the large row house

The house is well insulated, including interior insulation against the front wall, which makes it fairly inexpensive to install thicker insulation packages and, if space allows, the U value can drop to 0.13 W/m²K. The sloping roof is completely renewed and insulated to a U value of 0.16 W/m²K. The floor at the bottom is retained while the floor above the basement is insulated underneath (U = 0.13 W/m²K). In addition, the windows are replaced with better double glazing (U = 1.0 W/m²K) and profiles as adopted in the benchmark (U = 2.2 W/m²K). Moreover, due to this intensive renovation, the airtightness falls to v50 = 4.00 m³/m²h, and nodes on window anchors and, when connected to the wall-roof, are virtually free of thermal bridges. The central heating consists of a condensing gas combination boiler. This total renovation (cost: 60,788 euros) requires an additional investment of 10,700 euros compared to the benchmark renovation, but provides an additional primary energy savings of 5% which is enough to reduce the total current cost by approximately 18,450 euros.

The following table also includes the optimal E-levels for the other types of single-family homes and, for comparison, for the situations where E60 and E30 are achieved with the corresponding investment cost and total current cost.

Woning	arbeiderswoning	herenhuis	halfopen1	halfopen2	fermette	architecturale woning
Referentie	K55 E86 NEB85	K59 E88 NEB75	K62 E89 NEB95	K48 E87 NEB100	K60 E87 NEB85	K83 E89 NEB174
investering TAK	36500 68900	50000 98000	31750 74250	25500 58000	48500 109000	54500 135000
Optimum	K39 E48 NEB41	K35 E43 NEB32	K41 E57 NEB50	K48 E80 NEB100	K60 E80 NEB82	K56 E73 NEB107
investering TAK	47000 65700	60750 79650	47500 73100	27000 57500	47800 93000	59500 100500
E60	K52 E60 NEB59	K38 E59 NEB45	K43 E58 NEB51	K48 E60 NEB100	K60 E58 NEB82	K56 E59 NEB107
investering TAK	40700 66350	56000 81000	47000 73200	34800 58000	60000 95000	70000 102500
E30	K39 E28 NEB41	K35 E28 NEB32	K43 E28 NEB51	K48 E30 NEB73	K38 E30 NEB48	K56 E30 NEB107
investering TAK	54750 66500	68500 80400	60000 76300	44000 61000	86900 99000	87000 110000

Translation of image	
Source:	Translation:
Woning	Home
arbeiderswoning	worker's house
herenhuis	town house
halfopen1	semi-detached 1
halfopen2	semi-detached 2
fermette	farmhouse
architecturale woning	architectural home
Referentie	Reference
investering TAK	Investment TCC
Optimum	Optimum

Table 10: Optimum E-levels

This study material formed an important source of data in determining the long-term objective for the renovation of the Flemish housing stock (see also point 4, section on Renovation Pact).

2.2. NON-RESIDENTIAL BUILDINGS

In 2014, the Flemish Government established the tightening process for the E-level for offices and schools: E55 in 2016, E50 in 2018 and E45 in 2020. From 2021, every new office and school must at least meet the NZE requirements (nearly zero energy). Offices

and schools submitting permit applications or notifications from 2021 must respect the E40 level.

To guarantee that the pre-set requirements are feasible and affordable, a new study of the cost-optimal E-levels is conducted every two years. If necessary, this pre-set process will be adjusted.

The European Directive 2010/31/EU obliges the Member States to impose a requirement on every new building, with possible exceptions for certain industrial and agricultural buildings. In the context of interregional cooperation on the energy performance calculation method, the E-level calculation method was completed in 2015 for the other specific designated uses, such as hospitals, commercial buildings, catering, etc. The decision of the Flemish Government to introduce an E-level requirement for all non-residential designated uses for permits requested from 1/1/2017 received definitive approval on 18 December 2015.

Based on the assessment of the energy performance regulations in 2015 and the study conducted in that context, the Flemish Government has established a roadmap for all types of non-residential new construction and major energy renovation.

In the study of the cost optimum⁶, several scenarios were calculated for 11 buildings with a total of 26 functions. The new EPN method (Energy Performance of Non-Residential Buildings) and the new benchmark were also used for offices and schools. An unambiguous comparison with the previous level of requirements and the previous 2013 study was therefore not possible. As a result, when assessing the tightening processes that were already established, only the results of the most recently conducted study (2015) were considered.

Since 2016, the requirement for offices and schools has been somewhat lower than the cost optimum. It was therefore decided not to maintain the stated tightening process for the E-level for the new construction of schools and offices. The reason for this may be the interplay of studying other buildings, the adjustment of the methodology, or an excessively limited evolution of the cost optimum through time, but this is not certain. Still, the tightening process for major energy renovations will be retained.

In establishing the EPN requirements for new construction in 2018 and 2021, the cost optimum will be the limit as an even more excessive tightening is not considered to be “rational”. It has been decided to approximate the cost-optimal level for EPN functions from 2018 and, for the time being, not to seek further tightening in 2021. In 2021, only the requirement for offices (‘office’, ‘technical spaces’, and ‘community’ functions) will be tightened to E50 because a requirement of a maximum of E50 has been in place for public offices since 1/1/2016.

⁶ “Studie naar kostenoptimale niveaus van de minimumeisen inzake energieprestaties van niet-residentiële gebouwen” (Study on cost-optimal levels of the minimum requirements for energy performance of non-residential buildings) (VK engineering, KU Leuven (department of construction physics) and Royal Haskoning, October 2015)

For the comprehensive energy renovation, the cost-optimal level according to the study conducted will be approximated in 2021. For education, the calculated optimum is E93, for offices the cost-effective E-level ranges from E82 to E115. Prior to 2018, a choice was made for an interim tightening. The reason for this was to not unnecessarily increase the tension between new construction and major energy renovations for those functions.

The E-level requirement for major energy renovations was previously E90 (permit applications/notifications before 2017) for offices and schools. For permit applications or notifications after January 1, 2017, an E-level requirement applies for major energy renovations of all non-residential buildings which varies depending on the function of the EPN unit. An energy renovation is considered significant if all technologies (ventilation and heating) are completely replaced and at least 75% of existing and new partition structures that are adjacent to the outside environment (i.e. not the floors) are insulated. In addition to the existing minimum ventilation facilities (now extended to all non-residential functions), a minimum share of renewable energy (at least ≥ 10 kWh / m² per year) is now also applicable.

If the buildings consist of only one functional part, the requirements listed in the following table must be met, depending on the functional part.

E_{eis, fct f}	2017
Logeerfunctie	130
Kantoor	90
Onderwijs	90
Gezondheidszorg met verblijf	130
Gezondheidszorg zonder verblijf	130
Gezondheidszorg operatiezalen	105
Bijeenkomst hoge bezetting	130
Bijeenkomst lage bezetting	130
Bijeenkomst cafetaria/refter	120
Keuken	120
Handel	120
Sport: sporthal, sportzaal	115
Sport: fitness, dans	115
Sport: sauna, zwembad	115
Technische ruimten	90
Gemeenschappelijk	90
Andere	130
Onbekend	130

Translation of image	
Source:	Translation:

$E_{eis, fct f}$	$E_{requirement, fct f}$
Logeerfunctie	Accommodation function
Kantoor	Office
Onderwijs	Education
Gezondheidszorg met verblijf	Healthcare with accommodation
Gezondheidszorg zonder verblijf	Healthcare without accommodation
Gezondheidszorg operatiezalen	Healthcare operating theatres
Bijeenkomst hoge bezetting	Meeting with high attendance
Bijeenkomst lage bezetting	Meeting with low attendance
Bijeenkomst cafetaria/refter	Meeting cafeteria/student restaurant
Keuken	Kitchen
Handel	Trade
Sport: sporthal, sportzaal	Sport: sports hall, gym
Sport: fitness, dans	Sport: fitness, dance
Sport: sauna, zwembad	Sport: sauna, swimming pool
Technische ruimten	Technical spaces
Gemeenschappelijk	Common
Andere	Other
Onbekend	Unknown

Table 11: E-level requirements for EPN units that undergo a major energy renovation

If the EPN unit contains different functional parts, the requirement for the EPN unit is determined as a weighting according to the useful floor areas of the existing functional parts.

In the context of the planned evaluation of the energy performance regulations in 2017, the FEA wishes to gain insight into the ratio of current and planned Flemish EPB requirements to the cost-optimal energy performance levels for new non-residential buildings and existing ones that have undergone a major energy renovation. This study is carried out in accordance with the method laid down in the Commission delegated Regulation No. 244/2012 of 16 January 2012.

The main objective of this task is to provide a detailed study of the total costs compared to the total primary energy consumption, calculated according to the method for non-residential buildings (EPN calculation method), of a number of energy saving measures and/or packages of measures that are applied to a set of benchmark buildings and building components. In this way, the cost-optimal and cost-efficient requirement levels can be determined for all types of non-residential buildings.

- Information on the policy and measures to stimulate cost-effective extensive renovations of buildings, including extensive renovations in phases (EED Article 4(c)).

3.1 RESIDENTIAL BUILDINGS

The Flemish housing market is characterised by a large proportion of old homes and a low renovation rate (<1%). Despite the relative success of awareness-raising and premium measures, citizens feel there are significant obstacles to undertaking extensive renovation of old energy-guzzling homes due to:

- A lack of knowledge concerning energy saving measures.
- Uncertainty about the end result.
- Little experience with energy renovations, limited number of experienced advisors.
- Lack of financial resources.
- Split incentive/landlord-tenant problems.
- Co-ownership.

Using an evolving set of interrelated measures, the Flemish Government is encouraging families to make a thorough valuation of the energy performance of their home.

Energy performance regulations

From 2015, major energy renovations of homes, apartments, offices and schools were required to comply with a global energy performance requirement E90 (Decision of the Flemish Government of 29 November 2013). A major energy renovation has been defined as a renovation in which the heating and/or cooling system is completely replaced and at least 75% of the existing and new partition structures that envelop the protected volume and that are adjacent to the outside environment are insulated, but are not a dismantling.

For dismantling of existing buildings with a protected volume exceeding 3000 m³, an E-level requirement has already been applied since 2006. A dismantling is a conversion that maintains the support structure of the building, but whereby the systems for obtaining a specific indoor climate are replaced, along with at least 75% of the façades. The 'major renovation' is analogous to decommissioning but without the corresponding volume limit and with less extensive work on the envelopes.

From 2015, major renovations must not only meet the overall energy performance requirement, but also the requirements for thermal insulation of construction components (applied during or after the renovation) and the same ventilation requirements as new buildings. The thermal requirements for the construction components were tightened in 2016 and from the beginning of 2017 a requirement for a minimum share of renewable energy is in force (≥ 10 kWh/m² per year). A new strategy will also apply for non-residential buildings from 2017 (see further 3.2).

More information on the applicable requirements can be found on <http://www.energiesparen.be/epb/welkeisen>.

Example projects and inventory of extensive renovations

As part of the reinforcement of the front runner policy for near-zero energy renovations, a study was carried out on behalf of the FEA to determine how an increase in the number of thorough energy housing renovations can be stimulated. The intention was to gain

insight into available and proven tools, methods and strategies for thorough energy renovations and the way in which the use and impact of these solutions can be increased in Flanders. Starting from an inventory of existing European and Belgian demonstration and research projects on ‘thorough energy renovations,’ an analysis of 180 promising solutions was conducted. Based on this analysis, four key guidelines for pooled action on thorough energy housing renovation were developed: ‘innovation in the area of finance’, ‘support for technical innovation in housing renovation’, ‘anchoring quality renovation processes’ and ‘knowledge building and communication’. These key guidelines were translated into specific desired actions for different target groups such as interest groups, training centres, financial institutions, building materials producers, etc. See also section 3.1.4 Cohereno

The “Home renovation: innovation in energy-efficient renovations” pilot

On 22 November 2013, the Flemish Government decided to set up the home renovation pilot. This initiative is part of the front runner strategy and aims to stimulate scalable and reproducible renovation techniques to provide affordable solutions for key parts of the building stock. Extensive coordination of the actors in the building chain must lead to qualitative, integrated, but particularly also reproducible, scalable and affordable solutions. Research, development and demonstration activities are carried out in the pilot on the basis of real renovation projects.

A pilot is a structured testing environment in which companies or organisations can test innovative technologies, products, services and concepts using a representative group of individuals (or organisations), the test population, that are used as testers in their own living and working environment.

The “Residential renovation: innovation in energy-efficient renovation” pilot aims to contribute to improved market conditions for extensive renovations of homes by:

- Developing scalable and reproducible renovation concepts.
- Stimulating cooperation between suppliers, developers and executors.
- Strengthening the demand side using a group approach and alternative forms of financing.
- Demonstrating the feasibility of cost-optimal energy performance levels.

The home renovation pilot is comprised of an infrastructure of (groups of) housing units, representative of the Flemish residential building stock: e.g. a neighbourhood (parcelling, social housing, etc.), apartment buildings, street row houses, dispersed systems assembly homes, etc. Concrete renovation processes form the platforms on this infrastructure (with close involvement of owners and/or residents as a test population), on which the pilot projects are carried out. In addition to the different pilot projects, the pilot will also include an overarching coordinating and knowledge platform. This central coordination and knowledge platform will be responsible for the matching and follow-up of the projects, the quality assurance (including performance monitoring analysis) and knowledge management (collecting, bundling, disseminating). The pilot has an economic and/or social thrust. At the social level, attention is paid to both the cost-effectiveness of energy-efficient renovations for owners and/or residents

(maintaining home comfort and lifelong living) as well as taking the necessary steps in accordance with the climate policy (renovation rate of the housing stock).

On 22 November 2013, the Flemish Government decided to set up the 'housing renovation: innovation in energy-efficient renovation' pilot. On 7 February 2014, the Flemish Government then decided to reserve an additional 2 million euros from SALK funds (Strategic Action Programme Limburg Squared 2013-2019). As a result, the pilot projects have an available budget of 5 million euros. Support for the consortia for setting up the pilot platforms and implementing the projects is granted for a period of up to 4 years. In principle, the coordination and knowledge platform will receive support for a maximum of 5 years.

The Flemish Knowledge Platform Home Renovation has the overall objective of achieving 'Innovation in Renovation' and creating a positive innovation climate for the renovation of homes. As partners, this knowledge platform has the Belgian Building Research Institute BBRI, Pixii (formerly the Passive House Platform) and the following professional organisations: Flemish Construction Federation, the Bouwunie (Flemish federation for SMEs in the construction sector), NAV (Netwerk Architecten Vlaanderen or Flanders network of architects) as well as the following universities: KU Leuven, Ugent, Thomas More college and the Flemish Institute for Technological Research VITO. In 2014, a website was launched <http://www.kennisplatform-renovatie.be/> that presents the individual pilot projects together with the results and lessons learned to all construction actors. Good practices at home and abroad are illustrated in a brief sheet for each initiative, focusing on the rollout possibilities for Flanders. Interaction with the various pilots takes place twice a year by means of a pilot project board consultation and close individual contacts are maintained with each pilot coordinator to capture the current state of affairs, possible barriers and innovative solutions developed.

In 2016, the knowledge platform identified a few priority knowledge dissemination themes that were supplemented by obstacles, concerns and solutions implicitly provided by the various pilots during the individual consultation. Interaction between the pilots themselves and discussion of these priority themes are facilitated by the organisation of workshops, among other things. Workshops were set up in 2016 on financing and business models, sustainable construction and lifelong living, LCA (life-cycle analysis) and prefab renovations. In addition, consultation between the clusters of pilots was organised on certain transversal themes and moderated by the knowledge platform. Within the project, various tools and methods were developed and tested to formulate renovation advice. The intention is to launch these on the market once they are finalised.

Various pilots are currently yielding their first results and have already developed solutions and tools, which the knowledge platform is currently collecting and analysing before their dissemination. For example, the NZE renovation of the *Drie Hofsteden* apartment block in Kortrijk was successfully tendered in consultation with the contractor, so via a construction team. They aimed for a six-month lead-time (due in part to the use of prefabricated steel structures) and a minimum level of nuisance for residents during the implementation (starting in early 2017). Moreover, the pre-set NZE objective is feasible. For *RenBen*, a range of tools were developed to support the

renovation supervisors. Their scorecard was developed into an app that systematically and automatically maps the various building components and suggests appropriate solutions. The result is then communicated to the landlord, together with renovation advice. A five-step methodology for this renovation advice was already set up. And the *Renoseec* pilot (Sint-Amandsberg) worked out a system of scanning homes and is therefore fully involved with the renovation advice. A set of other tools and accompanying tools was created within the *Werfgoed* pilot, in which a data management system clusters homes and residents to then provide appropriate renovation advice. The *duwolim+*- loan (rolling fund for housing renovation) is a financial tool that has already been widely acclaimed and was launched in the course of this pilot. The *De Schipjes* pilot focuses on energy renovation of heritage sites using innovation techniques, and its target group is assisted living. The study has been largely completed and the pilot is ready to be implemented. They are organising in-house workshops on the specific issues they face in their pilot: the tension between an energy renovation and the heritage site, and dealing with residents and their behaviour. A initial pilot prefab renovation was carried out in Limburg through the *Mutatie+* pilot. They captured the lessons learned from this initial pilot before starting a second home in early 2017. *Ecoren* is also focused on prefabrication as a means of fully renovating a home in just a few days.

The results from the 10 pilots are communicated using various focus themes, such as the customer, financing, business models, energy, costs and sustainable construction as well as lifelong living. A partner from the knowledge platform is responsible for each of these themes, depending on their expertise. For each theme, a data sheet was developed that is available on the website. The project is linked to the Renofase project where contractors, architects and material suppliers and producers are supported to realise efficient and high-quality renovation projects (www.renofase.be). The knowledge from the pilots and partners will be disseminated to the contractor and architect in a tailored way through the communication channels of the partners, workshops, conferences and seminars. New materials, products and systems are tested and validated; ideas and tools are developed and implemented through case studies. The housing renovation pilot is a beneficial area for this.

Energy performance certificate regulations for homes and for public buildings

Each home sold or rented has an energy performance certificate. At the end of 2016, 932,238 valid energy performance certificates had already been drawn up for existing residential buildings. The EPC ensures a basic awareness-raising among both owners and buyers as well as tenants, regarding the energy performance of the residence. In addition to an energy rating, the EPC mainly includes standard measures to improve the residence's energy performance. Currently, a project is being developed to extend the certification software with an advice section concerning the process involved to comply with the long-term objective (2050) for existing homes that was laid down under the Renovation Pact (see below).

Energy standards in the Flemish Housing Code

Since 1 January 2015, the roof insulation standard applies to all “independent” homes located in the Flemish Region. A lack of sufficient roof insulation will progressively weigh more heavily in the assessment of the quality of the housing, which means that from 2020, homes without adequate roof insulation will no longer comply with the applicable minimum standard framework in terms of quality, safety, health and energy performance. Moreover, on 15 July 2016, the Flemish Government decided to introduce an addition to the standard framework and will require double-glazing from 2020.

Premiums and subsidies for energy saving works

Efficient energy use among household and non-household customers is encouraged through the public service obligations concerning efficient energy use for the electricity distribution network operators. Under the Energy Decision of 19 November 2010, the operators are required to comply with a number of action commitments to encourage their end customers to save energy. The premium conditions and amounts have been the same throughout Flanders since 2012 and are periodically adjusted to avoid the implementation of suboptimal insulation works and the corresponding lock-in as well as to expand a stimulating framework for the combination of energy saving works.

In 2016, the Flemish Government implemented a number of changes (in force from 2017) in the framework of the efficient energy use/public service obligations for the existing buildings section:

As regards individual investments:

- As of 2017, extensions/new building envelopers are also eligible for insulation and glazing premiums;
- A new premium will be introduced for insulation of interior walls;
- A number of premiums will gradually be phased out: roof insulation, cavity wall insulation, glazing, solar water heater (from 2019);
- For a number of premiums, the substantive conditions will be tightened: roof insulation, external wall insulation, floor insulation;
- For some measures, a link with a quality system will be provided (in time): internal wall insulation, external wall insulation, solar water heater and heat pump;
- Heat pumps will be switched to flat-rate premiums according to the type of heat pump, which will greatly increase the support for geothermal heat pumps in particular.

From 2014, network operators have issued a combined premium for homes in which a simultaneous investment is made in wall insulation and the existing windows are replaced (Flemish Government Decision of 29 November 2013). This premium was scrapped and, from 2017, replaced by the more extensive Total renovation bonus for projects combining at 3 three different measures in a period of 5 years. In that case, in addition the individual premiums, total renovation bonuses are awarded from the third investment.

following implementation of	flat-rate bonus per home	flat-rate bonus per apartment
the third investment	1250 euros	625 euros
the fourth investment	additional 500 euros	additional 250 euros
the fifth investment	additional 1000 euros	additional 500 euros
the sixth investment	additional 1000 euros	additional 500 euros
the seventh investment	additional 1000 euros	additional 500 euros

Table 12: Overview of total renovation bonuses

In addition to this stimulus for the phased implementation of renovation works, from 2017 efforts will be made to ease the associated burden and provide guidance by starting collective renovation projects (= at least 10 homes from the same neighbourhood that are investing in such works) under the supervision of project supervisors throughout the project. The project supervisor provides support for the citizen in the realisation of energy saving investments. To this end, the supervisor takes on as many of the citizen's tasks as possible, such as energy screening of the home, timing, advice on the energy renovation and action plan, drawing up measurement data, searching for contractors, site follow-up, administrative support for premium applications and financing, etc. The premium for collective renovation projects amounts to up to 400 euros per house or housing unit and is paid to the project supervisor responsible for assuming the complete burden of the owner of a house or apartment in the collective renovation project. The resident receives the regular premium.

For apartment buildings, the premium falls from the sixth housing unit to 100 euros per housing unit. The premium is capped at 5000 euros for the building.

And finally, the support for vulnerable target groups will be further expanded:

- A substantial increase in the premium for an individual condensing boiler for protected customers (from 800 euros to 1800 euros);
- For protected customers, 50% higher premiums for exterior wall, inner wall, floor insulation and total renovation bonuses, 20% higher premiums for solar water heaters and heat pumps. The premium for glazing is fixed at 56 euros per m², for roof insulation at 10.5/5.25 euros per m² and for cavity wall insulation at 9 euros per m² (in contrast to the regular premiums, these will not be decreased over the coming years);
- The social roof insulation projects for vulnerable tenants on the private rental market are being expanded to include social cavity wall projects and social glazing projects. Vulnerable families are often forced to rent an energy-guzzling house on the private market. Although investing in roof insulation, cavity wall insulation or high efficiency glazing can lower the energy bill, it is not easy for the tenants to realise such investments. And the landlord himself often fails to invest because he has little vested interest as he does not pay the energy bill. The social energy efficiency projects help remedy this situation with tailored guidance and an extra high premium. The technical conditions to be met are identical to those that apply to the ordinary energy premiums of the network operators. The support

is comprised of a flat-rate premium for the project promotor of 200 euros per work completed, supplemented by a maximum of 20 euros per m² of roof or attic insulation installed, a maximum of 12 euros per m² of cavity wall insulation installed or a maximum of 85 euros per m² of high-efficiency glazing installed.

Inexpensive to interest-free energy loans

A network of Energy Houses allocates energy loans financed with public funds for energy saving investments under the coordination of the FEA. Over 9,000 loans were granted since the beginning of 2015. Vulnerable families receive a 0% interest rate and intensive supervision during the process.

At the Flemish climate and energy summit on 1 December 2016, ING, BNP Paribas Fortis and BPost Bank committed themselves to offering cheap energy loans in 2017 at interest rates of less than 2 percent. By offering inexpensive energy loans, the banking sector is helping to create an energy efficient future. They are not only giving citizens the opportunity to invest in renewable energy in their homes, but to carry out energy saving renovations.

Premiums for renovation

A number of premiums, such as the renovation premium and the improvement and conversion premium, are provided from the Living policy area.

Through the renovation premium, the Flemish government supports owners who wish to renovate their home, which must be at least 30 years old, or who wish to transform an existing building into a home. The premium is calculated per category of work and equals 20% to 30% of the invoice amounts to be taken into account. Each category of work must involve an invoice amount of at least 2,500 euros (excluding VAT). The 30% calculation (with a premium capped at 3,333 euros per category of work) applies to:

- owner-occupiers with an income of less than 30,060 euros (to be increased by 1,570 euros per person covered);
- those who rent the home to a social housing agency.

All others receive a compensation of 20% (with a premium capped at 2,500 euros per category of work). The maximum amount of the premium for the two requests jointly is fixed at 10,000 euros for everyone. The works are divided into four categories.

- Category 1: the structural elements of the home: works involving the foundation, the walls, the supporting floors and the stairs;
- Category 2: the roof: works involving trusses, roofing, gutters and drainage;
- Category 3: the external carpentry: works involving windows and exterior doors. Moreover, since 1 July 2016 they must comply with the ventilation provisions in the Energy Decision;
- Category 4: the technical installations: works involving the electrical system, the sanitary system in the bathroom and toilet as well as the central heating.

In 2015, 13,665 people received renovation premiums, which amounted to a total amount of 81.6 million euros. The average renovation premium amounts to 5,970 euros.

The improvement and conversion premium (verbeterings- en aanpassingspremie or VAP) is a premium for improvements to homes of at least 25 years old for people with modest incomes as well as for conversions to make the home more suitable for senior citizens and the disabled. Depending on the building component, the premium varies between 500 and 1250 euros.

In 2015, 10,217 people received premium amounts, adding up to a total of 12.5 million euros. In 2015, the average premium award was 1,227 euros.

Both premiums can be cumulated with the energy premiums from the distribution network operators.

More information is available on the website <https://www.wonenvlaanderen.be/verbouwen>.

Social housing

The social housing patrimony in Flanders includes approximately 145,000 homes (52% houses, 48% apartments).

To support the Energy Renovation Programme 2020, the Flemish Government initially provided an overall budget of 28,525,000 euros for thorough energy renovations (at least 2 works) via the Flemish Government's decision of 10 January 2014 for the period 2012-2019. Through the Flemish Social Housing Company, the Social housing associations were able to obtain premiums for the replacement of single glazing by high-quality thermal window systems, the replacement of outdated heating devices by high efficiency devices, roof insulation, subsequent insulation of facades and floors, the installation of solar water heaters and heat pumps.

In 2016, the Flemish Government decided to reserve an additional 80 million euros from the Climate Fund for the renovation and/or replacement construction (demolition + reconstruction) of social housing, which accelerated efforts to bring the entire patrimony up to a proper level of energy efficiency by 2020 and enabled the government to take an exemplary role.

Information and labelling

See point 3.1 Horizontal measures from the Action Plan for the emphasis placed on the evolution towards more thorough total renovations.

Fiscal measures – 6% VAT for renovation

For homes that are older than 10 years, renovation works (conversion, renovation, rehabilitation, improvement, repair, maintenance) billed directly to the end user (owner or tenant) will be subject to a reduced VAT rate of 6% (instead of 21% for new construction).

Fiscal measures – property tax discount

From 1 October 2016, the discount property tax discount for energy efficient new construction, which has been in existence for years, was extended to major energy renovations of residential buildings for which a building permit application must be submitted:

- if the E-level is a maximum of E90, the reduction is 50% of the property tax for 5 years;
- if the E-level is a maximum of E60, the reduction is 100% of the property tax for 5 years.

The ‘major energy renovation’ is a renovation in which the technical installations are completely replaced and at least 75% of the existing and new envelope are (subsequently) insulated.

Fiscal measures – lower gift tax for energy renovation

On 1 July 2015, the Flemish Government reduced the gift taxes for property. Anyone who makes an energy saving renovation for a total amount of at least 10,000 euros (excluding VAT) within five years also enjoys an additional reduced rate.

Upon registration of the deed, the ordinary gift tax rate for real estate will be levied. Then, if the terms of the reduced rate are met, the difference between the previously levied normal rate and the reduced rate will be refunded.

Tranches (€) – rates from 1/7/2015	Direct line (grand)parents – (grand)children, between partners	Direct line – energy renovation	Non-direct line	Non-direct line – energy renovation
0-150,000	3%	3%	10%	9%
150,000.01 - 250,000	9%	6%	20%	17%
250,000.01 - 450,000	18%	12%	30%	24%
> 450,000	27%	18%	40%	31%

Table 13: Gift tax rates in Flanders

Fiscal measures – tax deduction for those who lend money for renovation agreements

Parties who lend money to a relative or acquaintance for renovation works on a property that is registered as vacant, neglected, uninhabitable or unfit can receive a tax deduction. The condition is that the borrower (or one of the borrowers) must live in the property for at least 8 years. The tax deduction amounts to a maximum of 625 euros per year, for the term of the loan and as long as the borrower uses the home as his principal residence. For loans up to 25,000 euros, the tax reduction is 2.5% of the borrowed amount (calculated on the average of the amounts used on 1 January and 31 December,

respectively, of the income year). The borrower receives an inexpensive loan at no additional cost.

Tax measures - Renovation discount

The tax base for the attribution of registration rights for the purchase of a vacant or uninhabitable property is reduced by 30,000 euros if the property is purchased with the aim of establishing a principal residence within the two years after the purchase. See <http://belastingen.vlaanderen.be/renovatie-abattement>

Future policy

See the information on the Renovation Pact under point 4.

3.2 NON-RESIDENTIAL BUILDINGS

The existing policy focuses on eliminating barriers that hinder investment in energy saving measures. From the previously mentioned Efika study, it appears that roughly three major barriers can be defined:

- **Lack of knowledge:** the owner of the buildings does not know what the energy consumption is, what savings can be realised or the technical knowledge to implement the investments is lacking.
- **Lack of time/priority:** since energy is not the core task of companies or facilities and is only a small cost item, it receives little attention.
- **Lack of profitability:** the energy saving materials often have an excessively long payback period in a commercial environment, which prevents their implementation.

Below is an overview of the existing policy measures followed by a summary of future policies that have been decided and planned.

Financial measures

- **Increased investment deduction (see also 3.4):** companies can obtain a tax deduction on their taxable profit of 13.5% if they invest in an energy saving measure. See <http://www.energiesparen.be/verhoogdeinvesteringsaftrek>.
- **Network operator premiums for efficient energy use (see also 3.4):** the network operators (in Flanders, Eandis and Infrax) ensure support for energy saving measures by granting subsidies for certain measures. These measures are: external wall insulation, roof/attic insulation, floor/basement insulation, high-efficiency glass, heat pump, solar water heater and relighting. The expected savings are calculated in Table 7.

- **Post-audit premium of the network operator (see also 3.4):** in addition to the previous list of measures, the company can also receive a premium if it makes investments after carrying out an energy study or energy audit. However, these measures may not be included in the previous list and should also be implemented effectively.
- **Ecology premium plus (see also 3.4):** through the Flemish Agency for Innovation and Entrepreneurship VLAIO, companies can apply for support for innovative technologies that are included on an exhaustive list. This includes more than energy saving measures. See <http://www.vlaio.be/themas/ecologiesteun>.
- **Reduction of property tax:** the reduction can only be granted for new construction or reconstruction after complete demolition or building shell conversion (dismantling) or for major energy renovations. In the latter case, all technical installations are completely replaced and at least 75% of the existing and new envelope are (subsequently) insulated.

For major energy renovations with urban building permit application or notification from 1 October 2016 and, on 1 January of the fiscal year an E-level of:

- a maximum of E90, the reduction is 50% of the property tax;
- a maximum of E60, the reduction is 100% of the property tax.

The reduction of the property tax is automatically granted based on the EPB declarations (EPB reporter) for buildings that are submitted to the FEA. See <http://www.energiesparen.be/korting-onroerende-voorheffing>.

Obligations

- EPC Public

An energy performance certificate (EPC) for public buildings is required for buildings where public organisations are located that provide government services to a large number of people. The implementation was systematically tightened. Initially, the EPC for public buildings was only mandatory for large public buildings with a useful floor area of 1000 m². Since 1 January 2015, the requirement applies to buildings larger than 250 m². This is more specifically about buildings of: the federal government, the Flemish Government, the provincial authorities, the municipal authorities, public companies, educational institutions, welfare and health services.

- EPB (EPN)

From 1 January 2017, there are additional EPB requirements for all non-residential designated uses, namely concerning the E-level and the minimum share of renewable energy, and these fall into the category EPN unit (Energy Performance of Non Residential Buildings). While there were previously only requirements for schools and offices in force, now they also apply to each space with another specific designated use (andere specifieke bestemming or ASB). Also note that an E-level requirement is determined per space and not per building as a building may have multiple functions, with each function

having specific characteristics. For the purpose of determining the E-level requirement for the building as a whole, a weighted average is taken based on the floor space used per space.

Other measures

In addition to financial support and commitments, the policy also aims to act as an awareness raising tool. To this end, the following have been developed:

- Information brochure on catering

The Flemish Agency for Innovation and Entrepreneurship (VLAIO) and Horeca Vlaanderen (Flemish catering sector) jointly publish a brochure in which they have bundled specific practical examples, available support measures and tips. The practical examples illustrate what measures have been taken and their financial return.

- SME energie-wizjer.be

On the website kmo-energiewijzer.be, SMEs can make their own estimate of where they stand by entering a number of basic details and then comparing them with a benchmark. This site was developed by ZES (Zero Emission Solutions) and NSZ (Neutral Trade Union for the Self-Employed) with a project subsidy from the Flemish government.

- Information brochure on lighting

An information brochure aimed at all companies that guides them in the choice of lighting, not only in terms of energy performance but also comfort. For SMEs, this is an essential factor as it concerns employees' well-being and their productivity at work.

Future policy

The Flemish Energy Company (VEB) is developing an information platform for semi-public entities. This project, called Terra, will enable entities to permanently view the most current energy-related data and compare them with other entities.

On 1 July 2016, the Flemish Government approved the energy efficiency action plan for the Flemish administration. As a starting point, all segments of the Flemish central Government have adopted the following binding objective from 2017: primary energy consumption (buildings and technical infrastructure) will decrease by at least 2.09% per year and per entity starting in 2017 up to 2020.

In addition to these decisive issues, an energy and climate pact was signed in the context of the Flemish Energy and Climate Summit of 1 December 2016, which set out further concrete measures. This pact is the most important document for the Flemish Government's future energy and climate policy and energy efficiency is an indispensable element here. A summary of the relevant measures is given below:

The action plan for schools focuses on awareness raising as well as on actual investments in energy efficiency and a package of 10 measures was worked out for this purpose, whereby the following are relevant to energy efficiency:

- Call for energy saving investments at colleges and universities.
- Adjustment of boilers.
- Efficient energy use investments for compulsory education.
- Energy management at schools.
- Energy performance contracts for schools.

Concrete measures were also developed for the care sector to make care institutions more aware of the energy performance of the buildings:

- Sustainability criteria for infrastructure projects (via the responsible VIPA agency).
- Energy performance diagnosis with possible progression to ESCO.
- Rolling fund for the care sector.

The following measures will apply to the other sectors:

- Investigate and, if necessary, introduce and finance an ESCO fund for investment in energy efficiency.
- Facilitate innovative energy efficiency techniques, at least through the EPB regulations.

The FEA is also developing an action plan to stimulate and support investments in energy saving measures in non-residential buildings. As a basis, it is using the study paper that was prepared by Efika in 2016. As the non-residential building stock is very diverse and the bulk consumers are dealt with first, actions per sector will be developed, with a focus on trade and offices. The various actions proposed and developed in the context of the current transition projects, such as Rapid Acceleration, Vision 2050 (Stroomversnelling, Visie 2050) and Climate Vision 2050 (Klimaatvisie 2050) as well as the Flemish Parliament's resolution of 25 November 2016 on a strong Flemish climate policy will be embedded in the action plan.

4. Future-oriented perspective to steer investment decisions by individuals, the construction sector and financial institutions (EED Article 4(d)).

4.1. HOMES: THE FLEMISH RENOVATION PACT

Article 4 of the European Directive on energy efficiency (EED) 2012/27/EU requires Member States to establish a long-term strategy to commit to investments in the renovation of the national, public and private stock of residential and commercial buildings.

An initial version of the long-term strategy was required to be delivered to the European Commission by 30 April 2014. For Flanders, this strategy is included in the third Flemish

energy efficiency action plan. As a basic strategy for housing, the Energy Renovation Programme 2020 was announced, backed up by the development of a front runner strategy (determining the objective as well as example projects and taking inventory of extensive renovations and pilot home renovation). The aim of this emergency programme was that by 2020

- all roofs be insulated;
- all single glazing be replaced by insulating glass;
- outdated heating boilers be eliminated from Flemish homes.

Although this strategy provided a good basis, it is not enough to meet the ambitious energy and climate objective.

Increasing the renovation rate of the Flemish housing stock and, at the same time, carrying out extensive renovations is not only crucial within the EED but also in the context of achieving the other European climate and energy objectives, particularly the greenhouse gas reduction target for non-ETS sectors and the renewable energy objective. Indeed, this objective is calculated as part of renewable energy in gross energy consumption. By reducing the denominator (gross final energy consumption) in 2020, realising the targeted share of renewable energy can be achieved more quickly.

There are significant challenges to be faced in moving towards a building stock with a significantly better energy performance. The government can facilitate and support this transformation, but other stakeholders, such as the construction sector, will have to join in the effort. We must work on this together through a mobilisation effort facilitated by an appealing “Renovation Pact”, whereby investing in an improved energy performance of our housing stock becomes a matter of course. This requires an appropriate support framework, but also a broad-based positive message about the social importance of this transformation for our housing stock.

At the end of 2014, a project was launched to determine whether stakeholders could be prepared to shape a Renovation Pact with the objective of developing a coherent action plan that, from a short, medium and long-term perspective, leads to a strong increase in the renovation rate of our Flemish housing patrimony and optimises the energy performance of that patrimony to a near zero energy level.

Thirty-four partner organisations (construction sector, real estate, government, civil society, poverty reduction) have committed themselves actively and constructively cooperate in the development of a Renovation Pact. Under the coordination of the FEA, they consulted intensively during the first semester of 2015 on a strategic policy framework for a Renovation Pact and the selection of a number of leverage actions that will have a clear impact on the basic objective of the Renovation Pact, in particular a substantial increase in the renovation rate of the Flemish housing stock:

- Long-term objective for the energy performance of existing homes.
- Good action examples.
- Integrated policy framework.
- Financing.
- Obligations.

- Communication.

On 17 July 2015, the Flemish Government established the building blocks and recruitment efforts for the Renovation Pact. The FEA was tasked with launching a subsequent phase for the further development of the Renovation Pact and to make the leveraged actions described above more concrete. Once again, a multi-stakeholder approach was taken that gave further substance to the long-term objective. We provide a brief overview of the state of affairs.

Long-term objective for renovation

For the energy performance of existing homes, a long-term target for 2050 has been established, which consists of two equivalent tracks: a package of measures and an energy performance indicator. By 2050, the existing homes must reach the same or a comparable energy performance level as newly constructed residences for which permit applications were submitted in 2015.

The package of measures is composed as follows:

1° maximum U-values for the envelope:

- roofs and ceilings: $U_{max} = 0.24 \text{ W/m}^2 \cdot \text{K}$;
- walls: $U_{max} = 0.24 \text{ W/m}^2 \cdot \text{K}$;
- windows (profiles and glazing): $U_{max} = 1.5 \text{ W/m}^2 \cdot \text{K}$ and $U_{glass} = 1.1 \text{ W/m}^2 \cdot \text{K}$;
- doors and gates (including frame): $U_{max} = 2.0 \text{ W/m}^2 \cdot \text{K}$;
- floor surfaces: $U_{max} = 0.24 \text{ W/m}^2 \cdot \text{K}$.

2° a heating system comprised of:

- condensing boiler or;
- (micro) CHP or;
- heating system based on a renewable energy source (heat pump, etc.) or;
- decentralised heating appliances with a total maximum capacity of 15 W/m^2 or;
- connected to an efficient heating network;

and functioning in accordance with the European, Belgian and Flemish regulations.

The communications must pay particular attention to ventilation, airtightness and sun protection.

For the alternate energy performance indicator track, the aim is an energy level equivalent to an energy rating (EPC figure) of 100 kWh/m^2 or E60. Initially, no minimum envelope indicator “S-level” will be established. The S-level will be stated for information purposes.

Knowing that the above long-term objective may not be sufficient to achieve the climate target, it is advisable to encourage the builder by means of communication and incentives to go beyond the above objective.

In order to track the evolution of the housing stock as it moves towards the long-term objective, a government contract was issued for the concrete implementation of the

follow-up indicator. In the spring of 2017, Hasselt University will provide a final report with the follow-up indicator.

In order to track the evolution at housing level, a “housing ID” is being developed by a partnership including multiple government actors (FEA, Public Waste Agency of Flanders (OVAM), Flanders Space, the Flemish housing agency Wonen-Vlaanderen, LNE department). The housing ID is conceived as a unique integral digital file for each property, which can be consulted by the homeowner and his authorised representatives. It provides a means of following the evolution of each home towards the long-term goal. The housing ID is a tool that provides the user (owner/buyer/tenant) with insight into all relevant building aspects of his home, including energy aspects, the quality of the home and the evolution towards the long-term goal. The housing ID is a digital vault and personalised guideline for all past and future works. The housing ID is a portal for all building information, including energy. Through time, documents with information about the home can be added to the housing ID. The housing ID forms a single dynamic, modular whole, to which different modules (energy, housing quality, health, etc.) will be added over time.

With the ‘Energy’ module, the FEA wishes to offer citizens a tool that:

- provides an overview of the current energy situation (energy performance as-is);
- provides an overview of the improvements that can be made (insight into potential and the different steps of the renovation advice);
- enables the evolution of the energy performance to be monitored and compared (benchmark);
- and supports those involved in this evolution by providing insight into the construction process and reporting on obligations, necessary certificates and obtaining financial compensation through a single central channel.

The housing ID is being developed over a period of four to six years, but will first be applied in 2018.



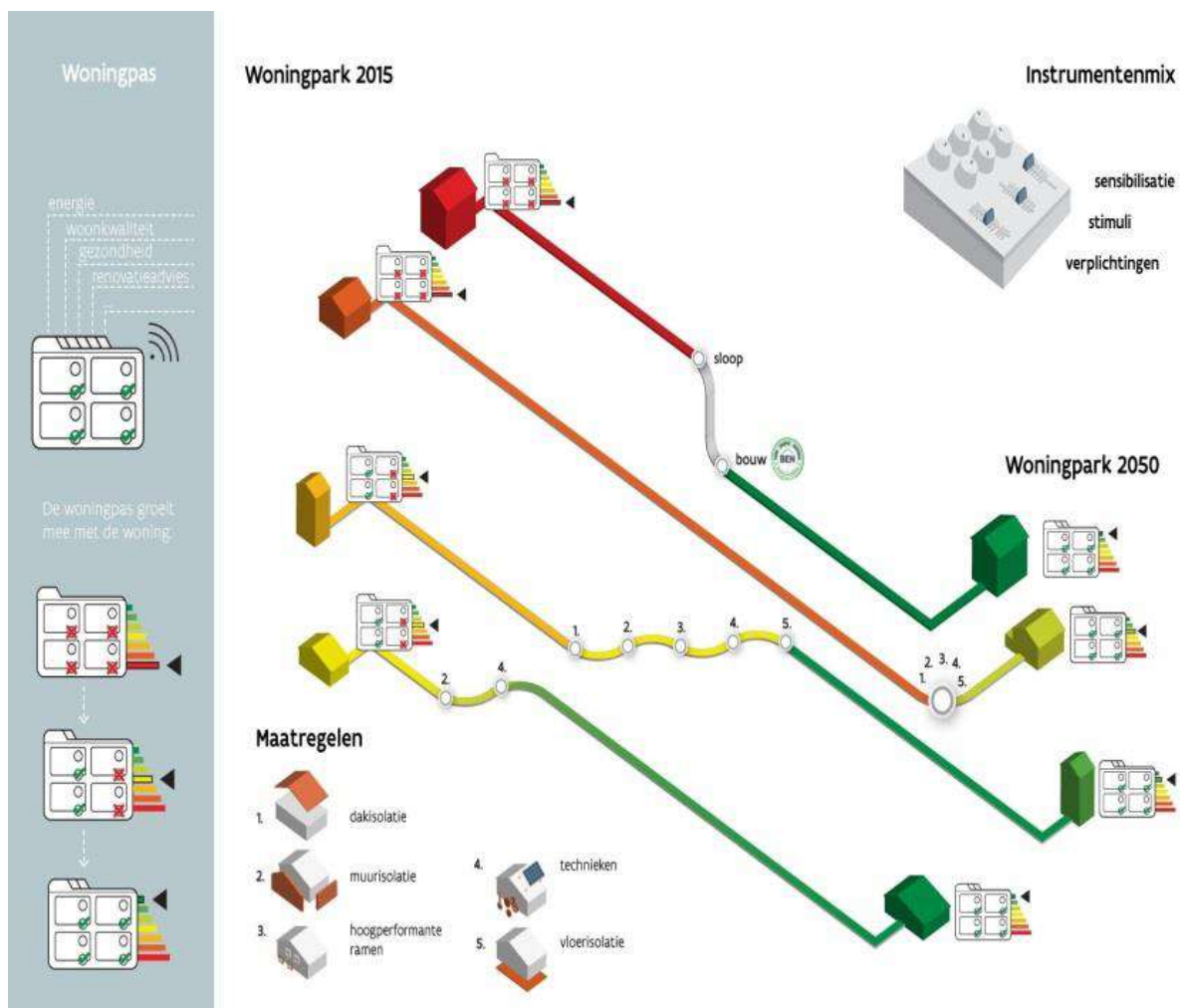
Translation of image	
Source:	Translation:
Woningpas Light	Housing ID Light
Woningpas Medium	Housing ID Medium
Woningpas Full	Housing ID Full
en verder ...	and further ...

The stakeholder consultation strongly emphasised the need for neutral and reliable renovation advice. The renovation advice that has been in development since mid-2016 describes the steps that need to be taken to bring the current energy performance of the home to the level of the long-term target. It also includes recommendations for a number of other major attention points involved in an extensive renovation (airtightness,

ventilation, considering whether demolition and reconstruction are preferable to renovation, etc.).

The EPC+, which is an upgrade of the current EPC, is a basic version of the renovation advice and will be prepared for sales or rentals. The standard recommendations from the current EPC are replaced in the EPC+ by a customised package for the specific home. The package of measures describes the works and the associated standard investment costs needed to renovate the home in accordance with the long-term target for 2050. Through the package of measures, EPC+ informs potential buyers and tenants about the broad strokes of the home's renovation process, moving towards the long-term objective.

The extensive renovation advice is intended for homeowners and provides the homeowner with a concrete roadmap for the long-term objective. The renovation advice gives the homeowner insight into the costs and the various possible renovation stages, thus helping the homeowner to make a well-considered, future-oriented planning of his renovation works. The renovation advice is analogous to EPC+ but goes more in-depth and is tailored to the owner in question.



Source:	Translation:
Woningpas	Housing ID
energie	energy
woonkwaliteit	housing quality
gezondheid	health
renovatieadvies	renovation advice
De woningpas groeit mee met de woning	The housing ID evolves with the home
Woningpark 2015	Housing stock 2015
Instrumentenmix	Mix of instruments
sensibilisatie	awareness raising
stimuli	stimuli
verplichtingen	obligations
sloop	demolition
bouw	construction
Woningpark 2050	Housing stock 2050
Maatregelen	Measures
dakisolatie	roof insulation
muurisolatie	wall insulation
hoogperformante ramen	high-efficiency windows
technieken	technologies
vloerisolatie	floor insulation

Figure 18 Illustration of Renovation Pact (FEA)

The EPC+/renovation advice will be available in early 2019.

Although the short-term focus will be awareness-raising and support, it cannot be ruled out that imposing requirements will eventually be needed to achieve the long-term objective.

A system has been developed in the context of the Renovation Pact to identify good action examples and publish them on a web page (www.kennisplatform-renovatie.be/goede-praktijken).

With a view to the accelerated implementation of the long-term strategy, in April 2017 a project proposal will be submitted in the context of the LIFE Integrated Projects Climate Action programme by a partnership consisting of, among others, the Flemish and Walloon Region, the Belgian Building Research Institute (BBRI) and several Flemish and Walloon municipalities.

Because the long-term strategy covers all Flemish residences, steps have been taken to raise awareness and provide targeted support to vulnerable target groups so that their homes will eventually meet the long-term objective. In connection with this, the Flemish Government approved an Energy Poverty Programme on 4 March 2016. The paper contains 34 actions both for the protection against disconnection section and for the section concerning efficient energy use toolbox for target groups. In the implementation of the draft paper, processes were initiated to develop, implement and, where applicable, regulate the selected measures together with the implementing actors and report on these measures to the Flemish Government annually. From the beginning of 2017, the mechanism of the existing social roof insulation programmes (high support and integral

guidance) will be extended for private rental homes to include cavity wall insulation and the placement of high-efficiency glass.

With a view to realising levers for renovation within other policy areas, an action plan was developed and validated by the Flemish Government on 10 June 2016, which provides solutions for bottlenecks in the area of spatial planning.

For more information on the Renovation Pact, we refer to <http://www.energiesparen.be/renovatiepact>.

The further development of the Renovation Pact was embedded in the various transition projects launched by the Flemish Government in 2016 and show a political will to work in the long term:

- Vision 2050: a long-term vision for Flanders (draft paper of 25 March 2016), with the energy transition as one of the seven priorities.
- Climate Vision 2050 (Flemish Government draft paper of 22 April 2016), including a buildings working group.
- Rapid acceleration of development of energy vision and energy pact (Flemish Government draft paper of 19 February 2016).

In the context of the Rapid Acceleration process, the energy efficiency working group proposed the following concrete measures for residential buildings:

- Establish long-term energy performance targets, including clear interim targets for 2030 and 2040. Use transaction moments to match these with obligations.
- Quick development of a renovation advice, EPC+ and housing ID. Require renovation advice for obtaining (certain) premiums.
- Develop EPA with banks so that banks use the recalculator and in their lending policy, take account of their real energy profit after renovation.
- Tightening of the Flemish Housing Code in terms of energy performance (implement a maximum EPC figure or minimum requirement in the area of the envelope for homes with the worst energy performance).
- Make full use of Flemish fiscal instruments to encourage renovation, for example:
 - Adjust the home bonus to create a building and renovation bonus, where the level of the home bonus is linked to the energy performance of a home or of the energy-efficient investments carried out.
 - Expansion of the energy renovation benefit for gifts, so that the benefit is also advantageous for smaller donations.
 - Expansion of the renovation discount (the tax base for registration rights is currently reduced by 30,000 euros if the property is renovated within 2 years).
 - Reduction of property tax for renovations other than major energy renovations.
 - Tax reductions for families implementing energy-efficient investments with a focus on total renovation (tax reduction according to overall energy performance).

- Develop a faster procedure in the EPB regulations for recognising new technologies with significant market potential and a proven positive impact on the energy performance of the home.
- More strongly encourage conversion following demolition of old homes without heritage value and with poor energy performance based on a demolition assessment framework/rebuilding versus renovation.
- Tighter control of efficiency of old central heating systems using fuel oil and natural gas. Enter a replacement requirement for heating systems that do not achieve minimum efficiency.
- Scale up local unburdening measures and collective renovation projects that have already proven successful (IOK (waste management), Province of Limburg, Leiedal, etc.). Guide homeowners in the planning and execution of renovation works.

In the Flemish Parliament, the majority parties and two opposition parties approved a so-called climate resolution in November 2016. In the resolution, parliamentarians ask the Flemish Government to phase out the use of fossil fuels, to create sustainable and near-zero energy-based prosperity, and to better protect the open spaces in Flanders. This resolution is an additional sign that the Flemish political arena wishes to make a transition to a low-carbon society.

4.2. NON-RESIDENTIAL BUILDINGS

Within the framework of the Flemish Energy and Climate Summit of 1 December 2016, strong efforts are being made to take concrete measures in non-residential buildings, especially in government buildings, schools and care institutions. With the long-term goals of 2050 in mind, the Flemish Government wants to draw up a plan of action in consultation with the various stakeholders (through round tables, project Rapid acceleration, etc.). This consultation should serve as a catalyst for developing partnerships and stimulating measures to achieve the goals. By involving the various stakeholders, the aim is to gain more commitment and involvement from stakeholders. See <http://www.stroomversnelling.vlaanderen/>.

A facilitating framework for ESCOs is being developed specifically for the education and care policy areas. In this way, the institutions are being encouraged to enter into energy performance contracts. In addition to this facilitation framework, pilot projects have also been launched to present the sectors with good examples. One of the services offered by the Flemish Energy Company to semi-public entities or local authorities is precisely the facilitation of these energy performance contracts.

In the context of the Rapid Acceleration process, the energy efficiency working group proposed the following concrete measures for non-residential buildings:

- Establish long-term energy performance objectives, including clear interim objectives for 2030 and 2040. Use transaction moments to match these with obligations.

- Exemplary role of the government: for new construction, only build NZE buildings and set up a renovation process for existing buildings in order to extensively renovate at least 3% of government buildings annually.
 - Benchmark real energy usage data of tertiary buildings by sector or sub-sector to stimulate demand for energy services.
 - Introduce a mandatory audit for major tertiary buildings and measures to speed up implementation of identified measures.
 - Development of a building ID (cf. housing ID for homes). For large non-residential buildings, building IDs must include a long-term planning. For relatively recent smaller non-residential buildings (construction year from 2000), building IDs must include a short-term planning for optimisation of technical installations. Indeed, many technical installations are currently not properly adjusted.
 - The government must stimulate the ESCO market by dissemination information and implementing successful exemplary projects.
 - Set up learning networks.
5. An estimate of the expected energy savings and the benefits in a broader sense based on actual data (*EED Article 4(e)*).

The available estimates of energy savings are included in Table 2 of the action plan.

5.1. RESIDENTIAL BUILDINGS

The emissions of buildings account for about 30% of Flemish non-ETS emissions. The residential sector is responsible for approximately 75% of these emissions. In line with the European climate targets, a reduction of at least 80% of the greenhouse gas emissions is expected by 2050 (compared to 1990). Achieving the long-term target means, on average, a reduction of the EPC figure by 75%, which should lead to a decrease from the current 406 (for single-family homes and apartments) to 100.

5.2. NON-RESIDENTIAL BUILDINGS

The initial saving potential revealed by the Efika study indicates that optimisation and proper adjustment of existing installations already provide significant savings potentials, up to about 10%.

In addition, on the basis of two scenarios, it was estimated which savings could be realised. The first scenario is based on a renovation in the coming years of all buildings constructed prior to 1985 according to the average figures for 2006. This would allow an overall savings of around 20%:

		Verbruik vòòr renovatie	Verbruik na renovatie	Besparing
Andere gemeenschaps-, sociale en persoonlijke ..	Andere gemeenschaps-, sociale en ..	4%	2%	2%
	Total	4%	2%	2%
Gezondheidszorg en maatschappelijke dienstverlening	Gezondheidszorg en maatschappelij..	1%	1%	1%
	Instellingen en tehuizen met huisv..	1%	1%	0%
	Ziekenhuizen	3%	2%	1%
	Total	6%	4%	2%
Handel	Detailhandel	7%	4%	3%
	Groothandel	1%	1%	1%
	Handel andere	1%	1%	0%
	Total	9%	5%	4%
Horeca	Drinkgelegenheden	1%	1%	1%
	Eetgelegenheden	5%	3%	2%
	Horeca overige	1%	0%	0%
	Hotels	1%	1%	0%
	Vakantiewoningen	1%	0%	0%
	Total	9%	5%	4%
Kantoren en administraties	Kantoren en administraties	12%	6%	6%
	Total	12%	6%	6%
Onderwijs	Beroeps en technisch onderwijs	0%	0%	0%
	Hoger onderwijs	1%	0%	0%
	Kleuteronderwijs	0%	0%	0%
	Lager onderwijs	1%	1%	0%
	Onderwijs overige	0%	0%	0%
	Secundair onderwijs	0%	0%	0%
	Total	3%	1%	1%
Totaal		44%	24%	20%

Translation of image	
Source:	Translation:
Verbruik vòòr renovatie	Consumption before renovation
Verbruik na renovatie	Consumption after renovation
Besparing	Savings
Andere gemeenschaps-, sociale en persoonlijke ..	Other community, social and personal ..
Andere gemeenschaps-, sociale en ..	Other community, social and ..
Total	Total
Gezondheidszorg en maatschappelijke dienstverlening	Healthcare and social services
Gezondheidszorg en maatschappelij..	Healthcare and social..
Instellingen en tehuizen met huisv..	Institutions and homes with accom..
Ziekenhuizen	Hospitals
Handel	Trade
Detailhandel	Retail
Groothandel	Wholesale
Handel andere	Trade other
Horeca	Catering service provider
Drinkgelegenheden	Beverage serving services
Eetgelegenheden	Food serving services
Horeca overige	Catering other
Hotels	Hotel services
Vakantiewoningen	Holiday homes
Kantoren en administraties	Offices and administrations
Onderwijs	Education
Beroeps en technisch onderwijs	Vocational and technical education
Hoger onderwijs	Higher education services
Kleuteronderwijs	Pre-primary education services
Lager onderwijs	Primary education

Onderwijs overige	Education other
Secundair onderwijs	Secondary education
Totaal	Total

Table 14: Savings potential (scenario 1)

The second scenario is more ambitious and sets the level of renovation on the figure of percentile 25 of each subsector. This would mean a primary energy savings of 36%, and creates the following picture for all subsectors:

		Verbruik vòòr renovatie	Verbruik na renovatie	Besparing
Andere gemeenschaps-, sociale en persoonlijke ..	Andere gemeenschaps-, sociale en ..	6%	3%	4%
	Total	6%	3%	4%
Gezondheidszorg en maatschappelijke dienstverlening	Gezondheidszorg en maatschappelij..	2%	1%	1%
	Instellingen en tehuizen met huisv..	2%	1%	1%
	Ziekenhuizen	5%	2%	3%
	Total	10%	4%	5%
Handel	Detailhandel	10%	4%	6%
	Groothandel	2%	1%	1%
	Handel andere	1%	1%	1%
	Total	13%	5%	8%
Horeca	Drinkgelegenheden	2%	1%	1%
	Eetgelegenheden	8%	3%	5%
	Horeca overige	1%	1%	1%
	Hotels	1%	1%	1%
	Vakantiewoningen	1%	0%	1%
	Total	14%	6%	8%
Kantoren en administraties	Kantoren en administraties	16%	7%	9%
	Total	16%	7%	9%
Onderwijs	Beroeps en technisch onderwijs	0%	0%	0%
	Hoger onderwijs	1%	0%	0%
	Kleuteronderwijs	1%	0%	0%
	Lager onderwijs	2%	1%	1%
	Onderwijs overige	1%	0%	0%
	Secundair onderwijs	1%	0%	0%
	Total	4%	2%	2%
Totaal		63%	27%	36%

Source:	Translation:
Verbruik vòòr renovatie	Consumption before renovation
Verbruik na renovatie	Consumption after renovation
Besparing	Savings
Andere gemeenschaps-, sociale en persoonlijke ..	Other community, social and personal ..
Andere gemeenschaps-, sociale en ..	Other community, social and ..
Total	Total
Gezondheidszorg en maatschappelijke dienstverlening	Healthcare and social services
Gezondheidszorg en maatschappelij..	Healthcare and social..
Instellingen en tehuizen met huisv..	Institutions and homes with accom..
Ziekenhuizen	Hospitals
Handel	Trade
Detailhandel	Retail
Groothandel	Wholesale
Handel andere	Trade other

Horeca	Catering service provider
Drinkgelegenheden	Beverage serving services
Eetgelegenheden	Food serving services
Horeca overige	Catering other
Hotels	Hotel services
Vakantiewoningen	Holiday homes
Kantoren en administraties	Offices and administrations
Onderwijs	Education
Beroeps en technisch onderwijs	Vocation and technical education
Hoger onderwijs	Higher education services
Kleuteronderwijs	Pre-primary education services
Lager onderwijs	Primary education
Onderwijs overige	Education other
Secundair onderwijs	Secondary education
Totaal	Total

Table 15: Savings potential (scenario 2)

5.3. BROADER BENEFITS

Construction, energy and environmental companies already account for approximately 25% of GDP and account for about 13% of the employment in Flanders. This business cluster has the ambition and the potential to form the engine of the Flemish economy.

In a survey on the public importance of renovation projects in the government budget (December 2014), KPMG used a concrete renovation project and investigated which funds flowed back to the government in the form of labour tax, property tax, corporation tax and VAT. About 34% of the total turnover from the project flowed back as government revenue. In addition, the renovated property has a positive impact on energy consumption (and CO2 emissions), as well as a beneficial effect on employment and thus an additional favourable effect for the government through lower unemployment costs.

To investigate the impact of the finalised long-term strategy on the economy and society in more detail, the University of Leuven is conducting research with a focus on the following:

- **The economic return on investments in energy saving measures in all buildings.**
- **Optimisation of (residential) fiscal matters and the existing subsidy policy. Focus on renovation/energy saving, less so on property acquisition.**
- **Macroeconomic consequences of the renovation stimulus, including the impact on employment in the construction sector.**

The study will be completed in the course of 2017.

The implementation of the long-term strategy for the renovation of buildings is also connected with the following social benefits:

- **Better cooperation between different Flemish Government policy areas.**
- **Trigger for innovation in the construction sector.**
- **Development of new business models in the implementation of renovation works.**

- **Mobilisation of dormant savings.**
- **Social inclusion and poverty reduction, provided that the homes of vulnerable families are also extensively renovated.**