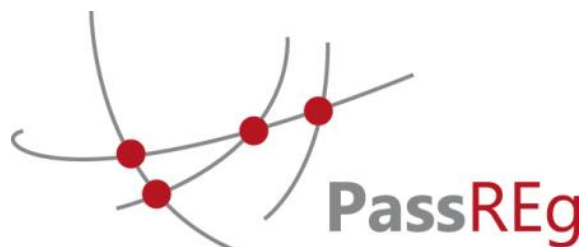




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# IEE PassREg

## PASSIVE HOUSE REGIONS WITH RENEWABLE ENERGY

**Success Model**

City of Antwerp

Prepared by: Passiefhuis-Platform vzw, PHP



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## INTRODUCTION

*The **Success Model** is a description of the terms, documents and actions that would ensure accelerated implementation of "nearly zero-energy buildings" (based on the "passive house standard with renewable energies") throughout the city of Antwerp, an Aspiring Region in the PAssREg project.*

*Items included in this Success Model are described in two horizons - today (baseline) and future state (success model). The description of today's policies and practices present results achieved until beginning of the PassREg project (2012). The description of future (2012-2015, and beyond by 2020), policies and instruments outlines the means by which to achieve the objectives of the PassREg project and in a wider scope – the European and national climate and energy efficiency building policy:*

***from 2019/2021, new buildings will be designed and constructed according to the "nearly zero-energy" standard.***

*For the preparation of this Success Model a reflection was made to the experience of the PassREg Front Runner Regions (Capital Region of Brussels, Belgium, City of Hannover, Germany and Province of Tirol, Austria) in establishing their pathway to nZEB.*

## ROADMAP

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This section summarizes the results of the SWOT analysis of the Success Model for city of Antwerp by addressing and assessing main strengths and opportunities that the model reveals, and its vulnerabilities and risks (threats). Based on the results of this analysis a Roadmap for developing and implementing the Success Model for the region (municipality) by 2020 is proposed.

### SWOT Analysis

The table below shows the strengths and opportunities that this Success Model suggests on the one hand and describes identified weaknesses and potential threats and risks to its successful implementation on the other.

#### Local nZEB Policy

- Signatory of the Covenant of Mayors
- CO2 neutral city 2050
- -30% CO2 base line 2005
- Flemish nZEB (BEN) policy mandatory share of renewables
- Mandatory policy for passive house standard in all new built schools
- Mandatory policy requirements for 'green roofs'

**S W**

- Little or no policy on efficiency and quality for the private market developers
- Lack of local policy on energy efficient renovation

- Covenant of Mayors as driver for energy efficiency and renewables in the local policies
- As the city has many historic buildings, it can focus on setting up more ambitious policies for newbuilt buildings
- Set ambitious policies for major renovations
- The initial ambitious pilot projects supported by the City, with requirements for passive house standard, renewables, collective heat production and easy connection to district heating network, can act as catalizator for replication
- The regional approach to nZEB policy making in Belgium (the Brussels Capital Region, the Flemish Region and the Walloon Region) can be as inspiration for making the local policy especially on renovations

**O T**

- Postponing of clarification on local policies and action plan on nZEB, renovations and share of renewables

**Local buildings related economic aspects**

<ul style="list-style-type: none"> <li>• Number of passive house standard non residential buildings with use of renewable sources on the increase</li> <li>• New large development using passive house standard and renewables are emerging (e.g. Nieuw Zuid, Cadix), whereby private market developers are involved</li> <li>• New typologies of buildings in passive house standard with renewables are emerging (e.g. Kindergardens, police stations, local clubs, etc.)</li> </ul>	<p><b>S W</b></p> <ul style="list-style-type: none"> <li>• Very high space heating and primary energy use in all residential buildings older than 2005 (similar situation is observed in non residential buildings, however data is more difficult to obtain)</li> <li>• Less available buildings related data exists on non residential buildings</li> <li>• Almost half of all buildings are apartments, 45% are single-family houses, mostly row houses), and almost 6% have shop on the ground floor. Compared to the overall Flemish level, in the number of apartments is significantly higher (49% compared to 20%), also significantly less detached single-family houses (1% compared to 34%).</li> </ul>
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<ul style="list-style-type: none"> <li>• Most of the renovations (73%) is with single-family houses and 27% with apartments</li> <li>• The city to play a facilitators role to stimulate ambitious renovations are stimulated, especially solutions for the apartment buildings</li> </ul>	<p><b>O T</b></p> <ul style="list-style-type: none"> <li>• Less available buildings related economic data on non residential buildings may hamper establishing an environmental policy</li> <li>• 53% of the residential units are occupied by owners or co-owners (while average for Flanders is 75%). This increases the likelihood of split-incentives situation by energy efficient renovations</li> </ul>
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**Funding**

<ul style="list-style-type: none"> <li>• Large number of subsidies and tax reduction exist for energy efficient measures, at federal, regional and local level</li> <li>• In addition, the city gives extra financial stimulus for “green technology” (water savings, green roofs, solar boilers, cheap loans for energy saving measures, etc.)</li> </ul>	<p><b>S W</b></p> <ul style="list-style-type: none"> <li>• The financial stimulus are fragmented and given by the federal, regional and local level, causing fragmented process and additional administrative burden for their use</li> </ul>
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<ul style="list-style-type: none"> <li>• Establishing programme of additional financial stimulus for ambitious renovations with use of renewables (integrated approach, taking into account the life cycle)</li> <li>• Financial incentives measures to be linked with quality of building works and energy performance</li> <li>• ESCO market development, also for larger residential developments and renovation works</li> <li>• Banks and financiers to develop new financial possibilities and business models</li> </ul>	<p><b>O T</b></p> <ul style="list-style-type: none"> <li>• Higher initial investment costs hamper the level of ambition in newbuilt and renovations</li> <li>• Split incentive between investor and user prevents ambitious decisions</li> </ul>
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**Key Actors** City Administration and other stakeholders

- EcoHuis Antwerpen, EHA is an actor of the local administration specifically established to provide a range of activities (mainly for home owners) with a facilitators role in support to energy efficiency
- EHA's activity include collaboration with the Passievhuis-Platform vzw, non-for-profit organization for knowledge transfer on passive house buildings
- EHA's activity include collaboration with the VIBE vzw, non-for-profit organization focusing on knowledge transfer on bio-ecological building materials
- AG VESPA, an autonomous city company for city projects, is involved in wide range of city developments, including realization of passive house buildings

**S W**

- Collaboration is at early stage with other stakeholders who have direct contact with home owners (e.g. Home owner's associations, syndicus)

- EcoHuis Antwerpen to increase its assistance to home owners on renovations, esp. at neighbourhood level, apartment buildings and collective energy saving measures
- AG VESPA to increase the type and scale of passive house developments and implementation of renewables on buildings
- City planners and architects to gain more awareness on the impact of their work on the energy performance in their projects

**O T**

- The availability of city budget for the working of the EcoHuis Antwerpen may have an effect on the scale and type of its activities

**Local Capacity Trainings**

- Employees of AG VESPA and EcoHuis have attended trainings for passive house standard
- Custom made training for AG VESPA employees was made possible through the activities of PassREg project
- Courses on nZEB is available from commercial training providers in Antwerpen
- Architects federation also gives courses to its members
- Some building companies and product manufacturers organize on occasions courses/workshops, or participate in courses/workshops of third parties

**S W**

- Typically companies in the building sector have little time and resources to attend trainings
- Lack of interest by companies to attend specialized courses on passive house and renewable energy technologies if their work with clients does not demand it

- EcoHuis Antwerpen increases its supporting activities on trainings, including collaboration with local stakeholders
- AG VESPA employees gain knowledge through high quality trainings
- Companies invest in own staff knowledge via trainings
- High quality trainings on ambitious building renovations are available for the local administration and other actors in the renovation activities

**O T**

- The training offer is not in line with needs and expectations of the employees of the local administration
- The local administration does not attend available trainings due to lack of resources and/or time to participate

**Market for Passive House Buildings with Renewables**

- Many companies and product manufacturers offer products suitable for passive house buildings and for building integration of renewables
- Most of the companies offer technical support for their products
- Bio ecological materials are available on the market
- Specific events (construction fairs) exist showing passive house and renewable energy technologies as well as bio ecological materials

**S W**

- Prices for individual building components for passive house and renewable technologies are (in cases) high
- Majority of private developers do not choose passive house standard on reasons of costs
- Investors typically do not take the life cycle costs in their investments decisions (e.g. Return on investment on short time horizon)
- Banks rarely take into account the reduced energy bills for the owners as part of their payment capability (for loans)

- New products with better efficiency, solutions for renovation and building integration of renewables come onto the market
- Market could be helped by events specialized in bringing together different actors capable of providing integrated solutions for passive buildings, renewables, ambitious renovations
- Large urban exemplary projects (newbuilt and renovations) with innovative solutions to help the market at its introductory phase and reduce barriers, serve as examples

**O T**

- The price of components and systems prevents wider use in building projects
- Lock in effect of less energy efficient components presents market increase of ambitious renovations
- Demand does not increase for majority companies to increase their competences highly efficient buildings and use of renewables

**COMMUNICATION STRATEGY**

- City of Antwerp has its own magazine that is spread to all its citizens
- Annual event as open house days ('Ecobouwers') whereby house owners open doors to visitors
- Peer to peer exchange information on passive house building experience, use of renewables, use of ecological building materials
- Specific workshops and info sessions organized by the EcoHuis
- Annual event of house visits 'mijn huis mijn architect' promoting architectural and environmental qualities, including passive houses
- Information about the Flemish programme of passive house standard newbuilt schools, includes realizations in Antwerp

**S W**

- The information to house owners is insufficiently developed from perspective of different owner segments

- The city magazine to be used for raising awareness and opportunities of citizens on energy efficiency, passive houses and renewables, available support and events
- Target groups such as large building stock owners, property developers, home sales agents, home owners associations, to be addressed with tailored communication

**O T**

- The communication channels and information is not having the expected impact to the recipients
- Insufficient communication on benefits of living and working in passive house buildings hinders raising the awareness and demand

## QUALITY CONTROL

- Procedure for certification of passive house standard buildings exists
- Procedure for certification with advise to the design and building team during building phases exists
- Private house owners can make use of the certification procedure

## S W

- The subsidy that was linked to the certification procedure for individual home owners was abolished in Flanders
- Certification is additional cost for a building owner
- Building owners needs to be convinced of the effect of certification on quality

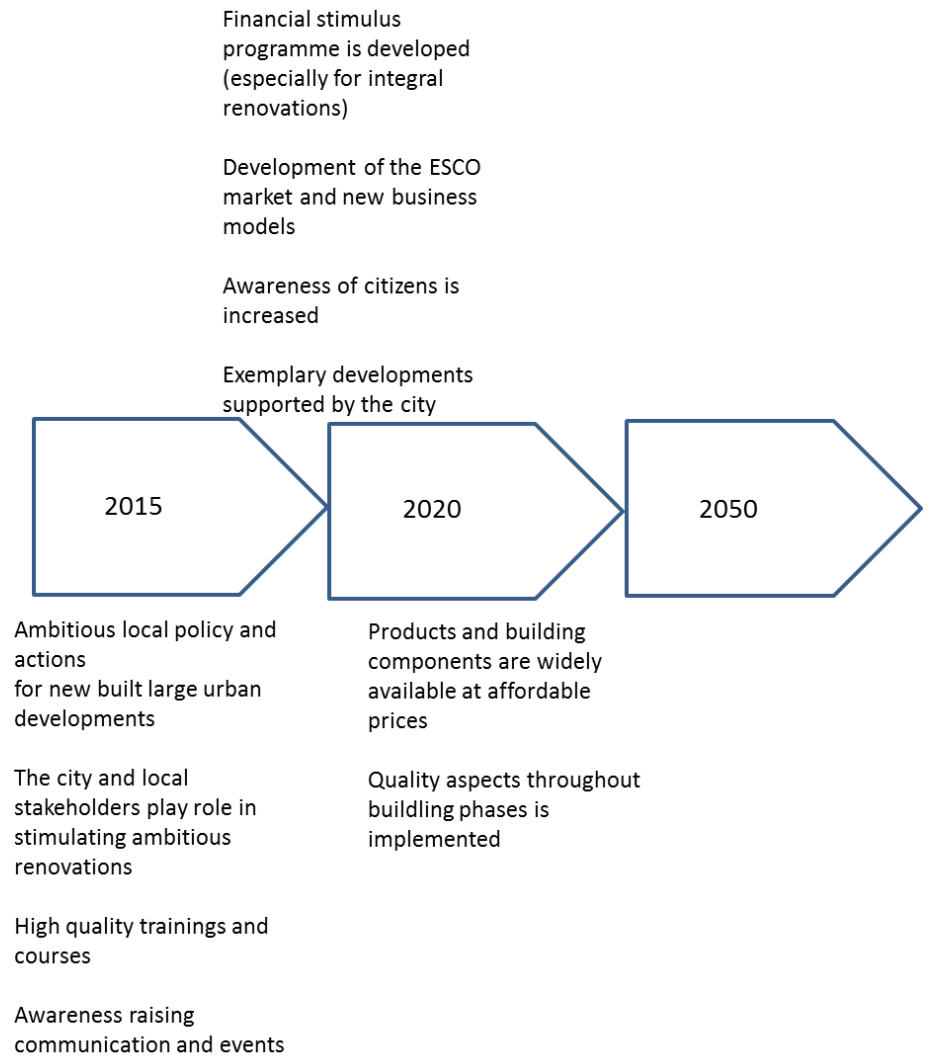
- The quality of design and construction leading to passive house standard buildings is increasingly of interest of investors, “key on door” building companies and developers to ask for certification
- Certification is addressing passive house buildings that have reached the zero energy or energy plus energy performance
- Research projects in Flanders provide knowledge on qualitative step wise ambitious house renovations

## O T

- The certification procedure for passive house standard is insufficient for addressing larger and more complex urban developments
- No financial insentives for private house owners reduces their demand for certification



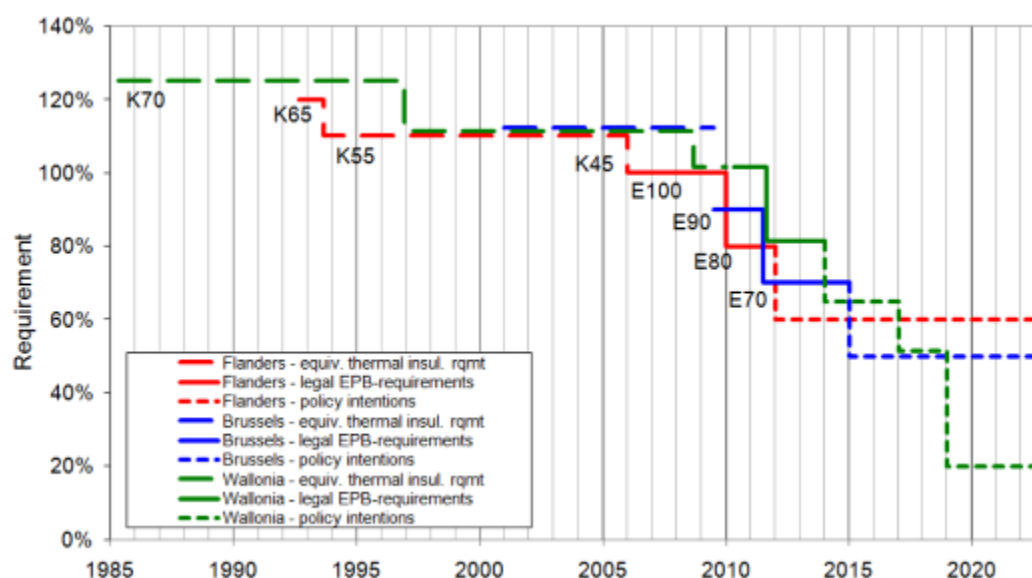
## ROADMAP



## ENERGY AND BUILDING POLICY

### Local, Regional and National Policy for nZEB

#### Baseline



As can be seen on graph above, the speed and ambition targets regarding energy efficiency of buildings in the building regulations vary between the regions in Belgium. The City of Antwerp belongs to Flanders Region (red line).

For Antwerp, the implementation of the recast of the European Energy Performance of Buildings Directive and the Energy Efficiency Directive is determined by the Flemish Energy Agency (VEA). According to Flemish policy all new public buildings should be nearly zero-energy by 2019, all new buildings by 2021.<sup>1</sup> Furthermore, from 2014 onwards new houses and major home renovations in Flanders have a minimum renewable energy share.. Starting from 1/1/2014 a minimum portion of renewable energy demanded for all new buildings in the EPB demands in the region of Flanders (thus also applicable for Antwerp). In 2015 minimal demands for installations in renovations will be added to the EPB demands. On 9 January 2009, the City of Antwerp has signed the European Covenant of Mayors. By signing the Covenant the City of Antwerp pledged to reach a number of goals:

- by 2020 the city council wants to achieve a reduction of at least 20 % of CO<sub>2</sub> emissions compared to 2005, covering the whole urban territory.
- For the city itself the reduction of 30% was set as a goal.<sup>2</sup>
- The final objective is to become a CO<sub>2</sub>-neutral city by 2050.

As the city is confronted with a large historic building stock, to be able to reach these goals, it is important to be as ambitious as possible not only in new developments, but also in renovation projects in the existing building stock.

<sup>1</sup> Ref.: E40 + renewable energy for office buildings, E30 + renewable energy for houses.

<sup>2</sup> Ref.: <http://www.antwerpen.be/eCache/ABE/80/83/693.Y29udGV4dD04MDM0MTA4.html>

For the moment, apart from regional directives on energy performance of new buildings and initiatives in the own building stock and municipal land use, little or no local policy exists on energy efficiency and quality regarding existing private market developments in Antwerp. However, there are some ambitious initiatives!

In 2010 the local policy of the city decided that in the newly built private developments a collective heat production unit must be installed (no separate production units for each housing unit) and the buildings must allow for easy connection to a district heating network in the future. This policy is implemented in the development "**Nieuw Zuid**" (**New South**), which is also a **Beacon Project in PassREg**. Within a sustainable approach to urbanism, *passive house standard and a renewable energy share are also required for the new buildings of this large development.*

Another policy initiative since the end of 2008 is that the Antwerp city council decided to build *all new city schools* in the passive house standard. The first buildings are now being realized.

At the same time, the city is rethinking the school building's portfolio. The city owns a large building stock of about 250 existing school buildings which are mostly not insulated at all. They have bad comfort (inadequate temperatures, condensation, mould growth, bad indoor air quality, ...) and a very high energy bill (7.5 million euro per year). On top of that, the demographic evolution in the city population is quite dramatic. In the period till 2020-2030, the city needs capacity for about 10-30.000 extra school children.

### S u c c e s s M o d e l

The **new national policies** for "nearly zero-energy building"

In Belgium, the implementation of the EPBD differs in the various regions (Brussels Region, Flemish Region, and Walloon Region). Overall, all Belgian regions have provided detailed lists of actions on the policy, innovation, communication and financial framework, as roadmaps towards nZEB buildings (NPNZEB\_BE, 2012).

Some elements of the national policy, for example from the Brussels Capital Region can inspire local policy, especially on how to deal with renovation issues.

### Brussels Region

The final decision of the Brussels Capital Region (21 February 2013) was published 26 March 2013 as an amendment to the regional implementation of the Energy Performance of Buildings Directive. As such it also addresses renovations that require a building permit. In the meanwhile, Brussels Region amended in 2011 the Energy Performance of Buildings Ordinance (MB, 2011) stipulating that from **January 2015 onwards, all new public and residential buildings have to fulfill a heating need at a level equivalent to Passive House standard<sup>3</sup>.**

The requirements are different for residential and non-residential buildings:

#### Residential buildings

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<sup>3</sup> Passive House (Passivhaus) is a well-established voluntary standard for ultra-low energy buildings, requiring a small amount of energy for space heating and cooling (PH, 2013).

- a primary energy consumption for heating, domestic hot water and auxiliary energy below or equal to 45 kWh per m<sup>2</sup> per year;
- a net heating need below or equal to 15 kWh per m<sup>2</sup> per year
- Offices and Educational buildings
  - a primary energy consumption (for everything except plug loads) below or equal to  $(95-2.5 \cdot C)$  kWh per m<sup>2</sup> per year, with C defined as the compactness, that is the ratio between the volume enclosed and the area (maximum C is 4);
  - a net heating need below or equal to 15 kWh per m<sup>2</sup> per year;
  - a net cooling need below or equal to 15 kWh per m<sup>2</sup> per year;

Some exceptions exist when, due to a bad configuration of a building in terms of compactness or solar availability, the energy requirement can't be reached. In those cases, the energy demand is recalculated to correspond with a full use of Passive House components for the given building.

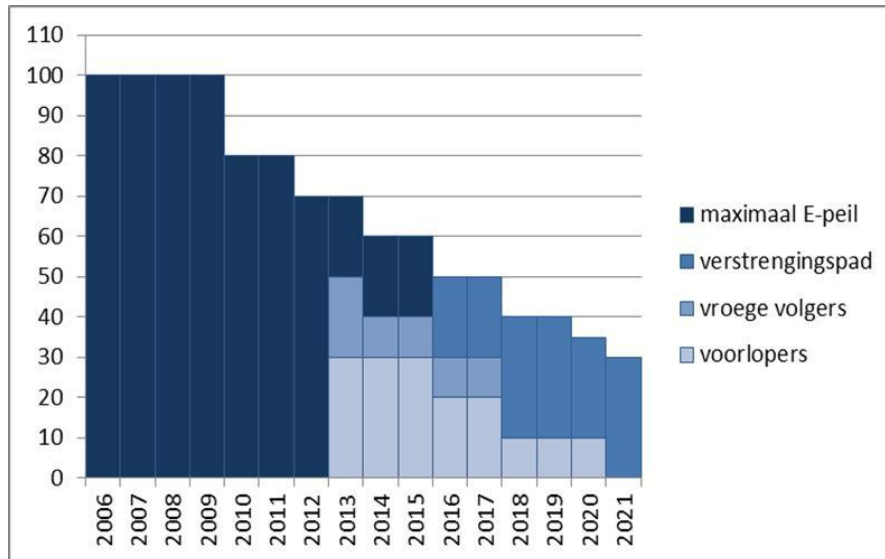
### Refurbishment of existing buildings

The legislation in the Brussels Region makes a distinction between major and small renovations. A renovation is considered to be major whenever the renovation activities cover at least 75% of the heat loss surface area and the HVAC system. Major renovations are considered to be almost new construction, so the same requirements apply, but all limits for requirements are multiplied with a factor 1.2, except for indoor temperature overrun. Small renovations only have to fulfill requirements on thermal insulation (U-values and risk assessment of thermal bridges) and ventilation.

It is important to note that from 1 January 2015 each submission of a building permit can follow two directions: either complying with the 'passive house' concept or complying with an alternative solution taking account of specific urban characteristics such as a poor compactness and/or less solar gains. As such, the legislation avoids that 'unfortunate' buildings require excessive investment. The alternative route requires thermal insulation (U-) values of the building skin (average U-value 0.85 W/m<sup>2</sup>K for transparent parts; average U-value 0.12 W/m<sup>2</sup>K for non-transparent parts).

### **Flemish region (City of Antwerp is located in this region)**

The expected evolution of obligatory E-levels for houses is illustrated in the figure below (Source: VEA, presentation at the NZEB symposium by Maarten De Groote, 18 October 2013). In order to prepare for the changes VEA suggests that the ambition levels in today's frontrunner projects should be determined according to expected reinforcement of energy performance levels (E30, i.e. the ambition level of most passive houses). The frontrunner projects will be supported by VEA with a communication campaign (BEN).



A dimensionless primary energy demand (E-peil) calculation for nZEBs will include heating, cooling, ventilation, domestic hot water and auxiliary energy (monthly balancing period).

The principal decision of the Flemish Government (VR 19 July 2013) branded the nZEB-level as 'BEN' (Bijna Energie Neutraal). A BEN house or apartment will need to have an E-level of E30 and will have to comply with some other cost-optimal sub requirements (e.g. K-level, U-values, net energy use).

Furthermore, a minimum share of renewable energy is required. In residential buildings, at least one of the following arrangements will be necessary from 1 January 2014: thermal solar, photovoltaic panels, a bio-mass heating boiler, a heat pump, connection to a district heating or to participate in a local renewable energy-project.

Additional criteria are specified for the chosen arrangements (VEA, 2012). If these arrangements are not made, the overall energy performance (E-level) needs to be 10% lower than the requirements.

A BEN office building will have to comply to E40 and cost-optimal sub requirements, as well as minimum renewable energy share.

Beyond the Flanders Region process of defining nZEB approaches, the Province of Antwerp, announced in June 2013 to apply the Passive House standard in all public new buildings and complete renovations. This decision supports the ambitious province's climate plan to reach carbon neutrality by 2020.

The provincial and regional development and insights in the own building stock now show that in time the City of Antwerp should clarify its ambitions with an action plan that is more related to:

- BEN ambitions;
- definition of actions and policy for renovations;
- examining the feasibility of being a frontrunner regarding BEN newly-built and renovation in the city and its surroundings;
- definition of an overall renewable energy share for the building stock in the city and its surroundings.

### Walloon region

Tenders for a public service contract were called for by the Walloon Region at the end of 2011 to conduct a study (Co-ZEB Study). The study has not yet determined the nZEB reference level in kWh/m<sup>2</sup> per year. However, the study qualifies any nZEB by a level of energy performance of the building's envelope close or equivalent to the passive standard.

Nevertheless, an nZEB does not necessarily have to comply with all of the criteria set by the passive standard given the highly constraining nature of these criteria for certain types of building and/or in certain locations (in particular the criterion regarding the airtightness of the building envelope, which imposes a specific level of performance that is often difficult to achieve in construction terms).

Hence, in the Walloon region, regarding new buildings, all construction will comply with the 'very low energy' standard from 2014 onwards.

Construction will also comply with the 'passive' standard or equivalent from 2017.

From 2019 onwards, all new buildings – in addition to the passive standard – will be required to comply as a minimum with the 'net zero' standard and tend towards positive-energy buildings (i.e. buildings where the production of renewable energy is equal to or greater than the consumption of non-renewable primary energy on an annual basis).

In order to set an example, from 2012 onwards the Walloon Region will apply these standards for all public buildings, as well as for granting subsidies, making donations or any other form of aid for property investments that the Region grants to other public or associated bodies.

In the same context, any new building will tend towards the 'very low energy' standard from 2014 onwards, while complying as a minimum with requirements regarding a dimensionless energy performance value ( $E_w \leq 60$ ) and regarding the thermal insulation and compactness of the building ( $K \leq 35$ ) (NPNZEB\_BE, 2012).

## ECONOMICS AND FINANCE

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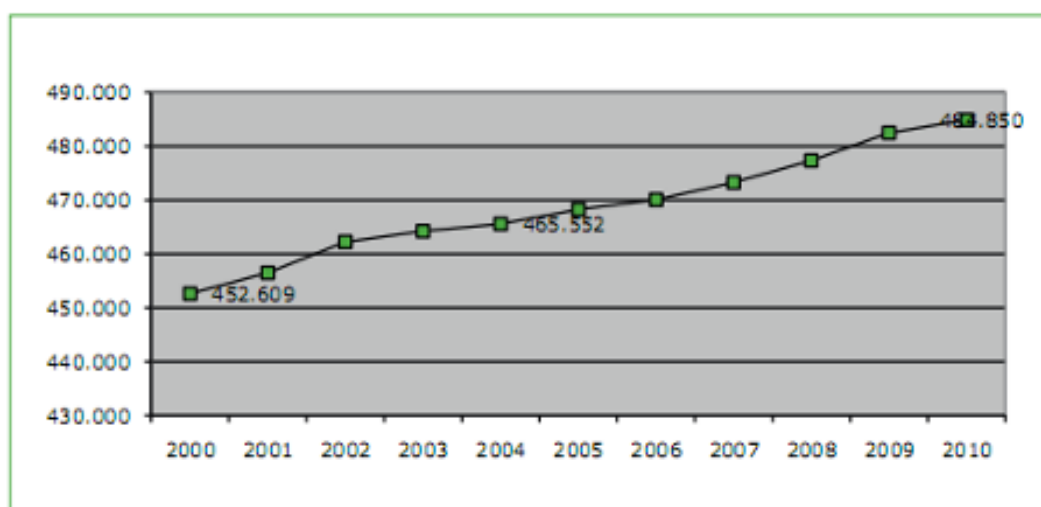
### Local economic aspects

#### Baseline

##### Data about population

The population of the City of Antwerp, in the last decade (2000-2010) has grown with 7 percent, from 452.609 to 484.850 (+32.241).

The total number of households in 2010 is 233.456. This is increase of 2 percent in comparison with 2004. *Figure: evolution of number of inhabitants in the City of Antwerp*



2000-2010.

Source: Stad Antwerpen, Districts-en Loketwerking. Preparation: Stad Antwerpen, Studiedienst Stadsobservatie.

##### General information about the building stock in the region:

###### Residential buildings

The residential area of the city is 5.462 hectares or 204,5km<sup>2</sup>. This represents 26,7%, whereby the total area is 20.426 hectares (source: Stad Antwerpen, Stadsontwikkeling, Gewestplan en BPA/RUP (2010) en Districts- en Loketwerking, 1 January 2010). The average number of households per 1 hectare of residential area is 41.

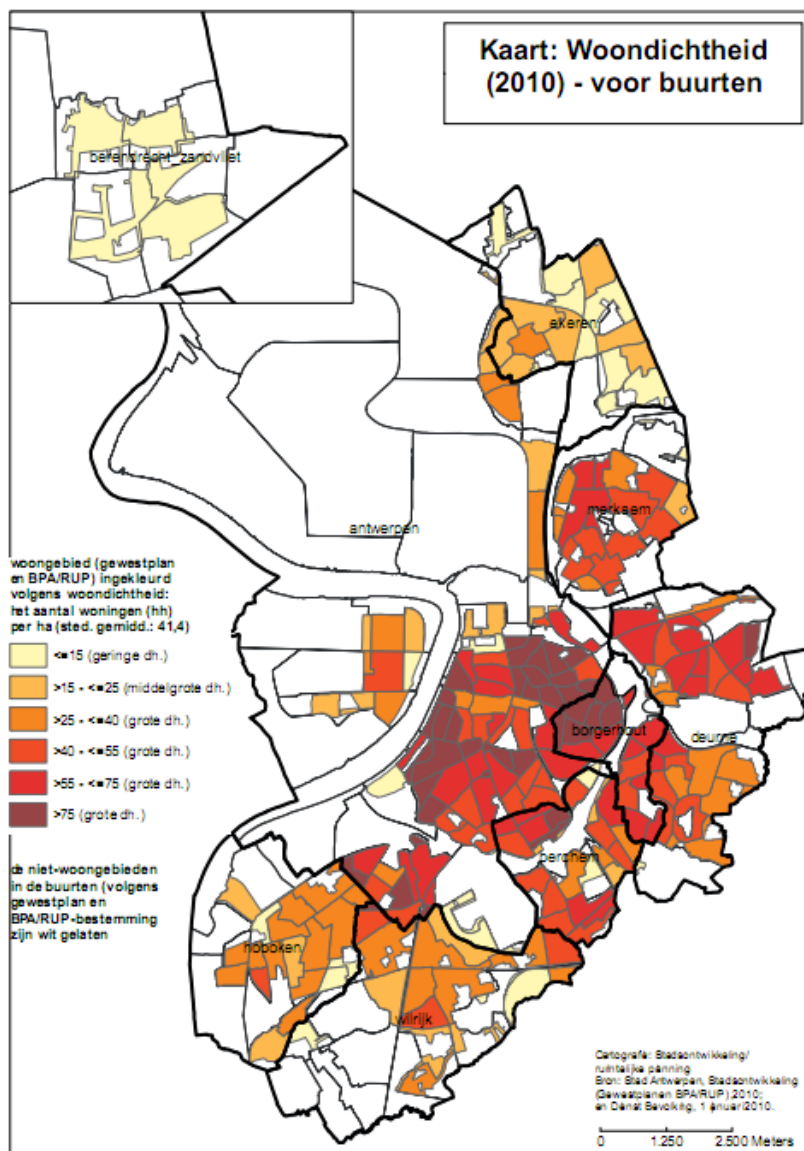


Figure: The number of households per 1hectare in different neighbourhoods of the city.  
 Source: Stad Antwerpen, Stadsontwikkeling, Gewestplan en BPA/RUP (2010) en Districts- en Loketwerking, 1 januari 2010. Preparation: Stad Antwerpen, Stadsontwikkeling, Ruimtelijke Planning.

The vacant area that could be built on in residential area is 485,8 hectares (data from 2007) representing 8,9%. There are three types of sites:

- sites facing the street that can be immediately be built upon
- sites facing the street that cannot be immediately built upon
- sites that are not immediately accessible and are thus more difficult for development.

The total number of residential buildings (data 2008) is 126.102 whereby the total number of living units is 250.385. This is split between:



	Wooneenheden		Gebouwen	
	N	%	N	%
<b>Totaal woningen</b>	<b>250.385</b>	<b>100,0%</b>	<b>126.102</b>	<b>100,0%</b>
Appartementen	122.948	49,1%	17.500	13,9%
Eengezinswoningen	111.344	44,5%	85.509	67,8%
<i>Gesloten bebouwing</i>	98.556	39,4%	73.436	58,2%
<i>Halfopen bebouwing</i>	9.366	3,7%	8.691	6,9%
<i>Open bebouwing</i>	3.422	1,4%	3.382	2,7%
Handelshuizen	14.040	5,6%	9.001	7,1%
Andere gebouwen	2.053	0,8%	14.092	11,2%

Soure: FOD Economie, Algemene Directie Statistiek en Economische informatie  
Preparation: Stad Antwerpen, Studiedienst Stadsobservatie.

The figure above shows the percentage of:

- apartments,
- single-family houses (row houses, semi-detached and detached),
- houses where the ground floor is a shop, and
- “other” type of houses.

*Almost half of all buildings are apartments, 45% are single-family houses, mostly row houses), and almost 6% have shop on the ground floor. Compared to the overall Flemish level, in the city of Antwerp the number of apartments is significantly higher (49% compared to 20%), also significantly less detached single-family houses (1% compared to 34%).*

Interestingly, the ownership of residential buildings (data 2001), is that on average 53% of residential units are occupied by owners or co-owners. Overall in Flanders 75% of residential units are owner occupied.

The evolution of new built residential buildings showed increase (data 2005-2009), rising from 840 planning applications in 2005 to 1018 in 2009, out of which 905 apartments and 103 single-family houses.

Concerning renovation of residential buildings (taken into account only renovations for which a building permit is required), the evolution (data 2005-2009), is from 685 in 2005 increasing to 844 in 2008, then reducing to 793 in 2009. Most renovations (73%) is with single-family houses and 27% with apartments.

The number of social residential buildings (data 2010) is 24.250 with total of 233.456 households, representing 10.4% of total number of residential buildings.

In the city of Antwerp, the average price for an apartment is 143.252Eur (in 2009), whereby the average price in Flanders is 40.000Eur higher. However, price of a single-family house on average is 201.778Eur and of a villa 458.564Eur, whereby the average for Flanders is lower 183.925Eur and 320.240Eur respectively.

The evolution of prices within Antwerp itself over the years, house and apartment prices have increased over the years, while price for villas is in decrease.

*Non-Residential buildings*

Information for the non residential building stock in Antwerp is less available therefore can not be described with level of detail as for the residential building stock. Further information is required to establish an environmental policy relating to various segments of the non residential building stock. Some information however exists:

In 2006 offices had a total surface of 1.65 million m<sup>2</sup> (source: Ruimtelijk Structuurplan Vlaanderen), with an annual increase 3%.

There were 5366 restaurants, bars and hotels in 2010 in Antwerp. An annual growth of 1%. A very limited growth in retail shops based on 10 building permits per year.

In 2011 there were 12500 beds in the nursing sector. Projected is 165 beds less in the nursing homes, 900 beds more in service flats and 600 beds more in the new to be build hospital (by 2018).

The energy use in the non residential sector in Antwerp for the year 2005 and 2007 is shown in tables below.. The third table shows the emissions for the years 2005, 2007, 2010 and 2012 and in CO<sup>2</sup> as well as for the different sectors.

The information below is the use of electricity and natural gas through the grid operators Eandis and Infrac. The use for heating oil and LPG is estimated, based on the energy balance for Flanders and extrapolated to the Antwerp situation.

**2005**

	<b>Electricity</b>	<b>Natural gas</b>	<b>Heating oil</b>	<b>LPG</b>
<b>Tertiary sector</b>	<b>1.822.443.936</b>	<b>1.608.833.383</b>	<b>521.692.794</b>	<b>14.688.058</b>
hotels, restaurants and bars	159.937.343	146.590.741	98.432.603	11.016.044
Hospitals	109.430.814	186.903.195	26.248.694	0
Schools	101.013.059	238.209.954	75.464.995	0
Offices and administration	669.211.515	505.738.057	150.929.991	3.672.015
Trade	614.496.108	388.465.464	131.243.470	0
Other community, social and personal services	168.355.098	142.925.972	39.373.041	0

*Source is the emissions inventory of the city of Antwerp.*

**2007**

	<b>Electricity</b>	<b>Natural gas</b>	<b>Heating oil</b>	<b>LPG</b>
<b>Tertiary sector</b>	<b>1.749.623.858</b>	<b>1.618.517.452</b>	<b>335.949.485</b>	<b>33.625.745</b>
hotels, restaurants and bars	135.780.122	124.801.346	35.994.588	5.604.291
Hospitals	124.141.826	234.002.523	26.995.941	11.208.582
Schools	93.106.369	304.203.280	38.994.137	0

## IEE PassREg / Passive House Regions with Renewable Energy

Offices and administration	647.865.154	452.404.878	95.985.567	16.812.873
Trade	581.914.809	390.004.205	95.985.567	0
Other community, social and personal services	166.815.578	113.101.220	41.993.686	0

Source is the emissions inventory of the city of Antwerp.

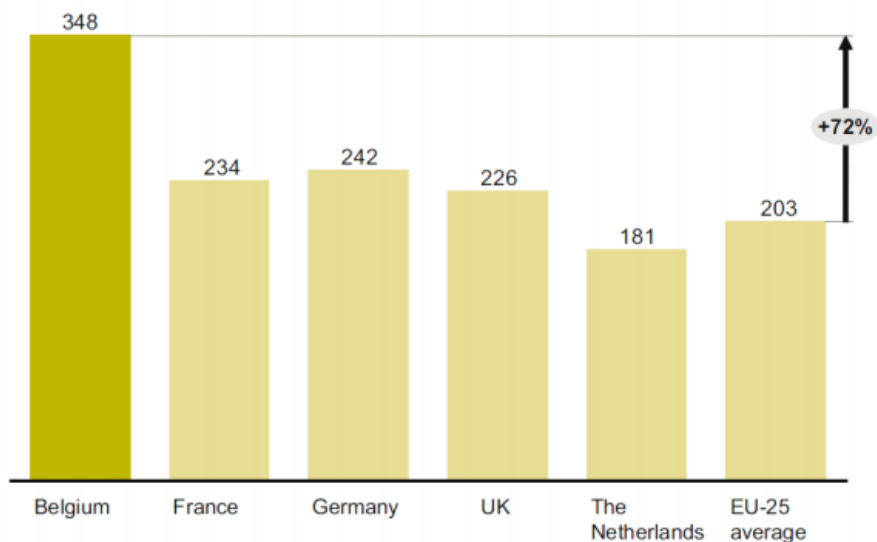
kTon CO2-eq	Residentieel	Handel & diensten	Transport	Industrie			Energieproductie		Natuur & Landbouw	Totaal
				ETS	niet-ETS	Corr. 2 bedrijven	niet-ETS	ETS		
2005	1.044	748	1.255	13.170			906		7	17.130
				9.211	260	3.709	268	648		
2007	952	895	1.265	11.298			1.558		6	15.975
				7.892	176	3.231	277	1.281		
2010	910	718	1.226	11.977			1.538		16	16.384
				11.683	294	0	223	1.314		
2012	808	651	1.226	11.257			1.467		12	15.420
				11.000	257	0	234	1.233		
Vershil tov 2005 %	-23%	-13%	-2%	-15%			62%		71%	-10,0%

[http://ecohuis.antwerpen.be/docs/Stad/Bedrijven/Stadsontwikkeling/SW\\_Ecohuis/plannen\\_presentaties/Emissieinventaris\\_rapport2012.pdf](http://ecohuis.antwerpen.be/docs/Stad/Bedrijven/Stadsontwikkeling/SW_Ecohuis/plannen_presentaties/Emissieinventaris_rapport2012.pdf)

To give an indication of energy use of existing houses, the following table shows the typology of houses and related net energy use for heating and primary energy in kWh/yr.m<sup>2</sup>.

	< 1946		1946-1970		1971-1990		1991-2005		> 2005	
	NEBV	PE	NEBV	PE	NEBV	PE	NEBV	PE	NEBV	PE
Vrijstaande woning	334	603	343	603	238	499	165	311	103	157
Halfopen bebouwing	295	477	300	486	221	463	145	278	92	144
Rijwoning	231	385	234	384	167	368	119	232	77	125
Ingesloten appartement	140	252	134	243	99	264	93	197	60	112
Blootgesteld appartement	341	560	333	549	204	488	163	319	99	159

As seen from figure below Belgian average residential energy use is significantly higher than compared to several other countries. (data from 2005 in kWh/yr.m<sup>2</sup>).



Source: *Build Up Skills Belgium, Status Quo Analysis report.*

#### **Average specific energy consumption (in kWh/m<sup>2</sup>.a)**

- *in the existing building stock*
  - o poor (figures shown on previous page)
- *in buildings after energy efficiency retrofit*
  - o there are very different practices in renovation (e.g. different ambition). Very ambitious renovations are emerging and they can be at level of passive house standard and integration of renewable technology, however, this at present is only where significant renovation works take place.
- *in new buildings*
  - o following the building regulations, typically round 70kWh/m<sup>2</sup> per year for new built. Regulations will be tightened further in the coming years.
- *additional specific costs*
  - o for new builds,
  - o for retrofits and
  - o for RES in buildings.

The additional specific costs are different for every project.

Typically, an additional cost for passive house buildings is 5 to 10% compared to current building regulations. However, on the one hand there are cases where this costs have been higher (for different reasons: un-compact building volume, type of the building, mistakes in construction not reaching air tightness level and needs for adjustments, inadequate installation of ventilation system, ...).

On the other hand, there are examples where cost optimization is done very well (school building with good compactness, use of high performance double glazing instead of triple, well designed simple ventilation system), thus it is possible to built with no excessive costs.

To this the experience of the design and building team is an influencing factor.

### Success Model

Due to local policy decisions of the city the number of passive house buildings is increasing. Also, due to the new Flemish policy on mandatory use of renewable energy in new buildings, it is expected that this will also increase.

- all new school buildings must be passive house standard
- Nieuw Zuid development 40.000m<sup>2</sup> (PassReg Beacon project) as an ambition to build to the passive house with renewable technologies and biomass based district heating system
- Cadix development, is another large mainly residential development (private developer) in the City of Antwerp where passive house standard and use of renewables is required.
- the city is also building to passive house level several individual building developments such as kinder gardens, fire station, residential blocks, etc.
- It should be noted that the City of Antwerp has mandatory regulation for green roof construction by all new flat roof constructions (or by major renovations).

In contrast to the newly built, the renovation sector is lagging behind since there are very few building renovations certified to reach E30, passive or zero energy level, and there is no supporting policy, programme for demonstration buildings nor financial models to strongly (at present) stimulate renovation of the existing buildings towards “deep renovation”.

Some first initiatives and examples<sup>4</sup> are available, but their number compared to the overall renovation activity is small.

#### Rate of PH refurbishments

Only very few documented cases exist in Antwerp of house renovations to reach the Passive House Standard with use of renewables and receive a certificate.. So, this is in its initial stage of market introduction.

To stimulate the market for ambitious house renovation, an event is organized on the 14<sup>th</sup> of January 2015 in Antwerp specific for Business Collaboration PHP called the ‘Business Zoo’ <http://www.b2match.eu/Cohereno> .

Building renovation actors will come together to discuss and create new business models for deep renovation of single-family houses.. This Business event is organized in the context of the project COHERENO, with PHP as one of its partners. The event aims to strengthen the supplier’s side in energy conscious renovations.

In addition, another event to stimulate the renovation market now focusing on the house owners takes place each Autumn. In the context of the “ecobouwers opendeur” event <http://www.ecobouwers.be/opendeur>, where house owners across Flanders as well as in the city of Antwerp open their house doors for organized visits. Interestingly, On the 8<sup>th</sup> of November 2015 a tour takes place organised by PHP where passive and low energy houses, including renovation will be visited.

#### Share of renewables in new Passive Houses

The passive houses built in Antwerp are predominantly without integrating renewable technologies, however there are initial building examples where some of the renewable

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<sup>4</sup> Two demonstration projects in Antwerp were documented in the framework of the federal research project ‘Low Energy Housing Retrofit – LEHR’ ([www.lehr.be](http://www.lehr.be))

technologies (PV, heat pump and solar thermal typically) is included. This is where the building owner is striving to a zero energy building. With the new Flemish mandatory regulation on renewables, it is expected that the share of renewables in new passive house buildings will increase. Also, in accordance with the European Directive for Renewable Energy, Flanders has developed programme for certification of installers of solar thermal, PV and heat pumps.

The largest urban development so far in the city of Antwerp whereby renewable technologies (PV, biomass based district heating,...) is applied to the buildings is the Nieuw Zuid (beacon in PassREg).

A new legislation came in force from 2014 whereby all new houses, schools and offices built in Flanders must include minimum share of renewable energy (solar thermal, solar PV and/or heat pump technology.) *The obligation is expressed in yield per m<sup>2</sup> floor area and not related to the energy demand of that building. (Therefore, if someone built a passive house or less energy efficient building, the required obligation to install renewable technology is same).*

The tables below give an indication of the status of the renewable energy share in Belgium.

Gross primary energy by source(Mtoe) <sup>[3][4]</sup>							
	Coal	Oil	Natural gas	Nuclear	Renewable & waste-to-energy	Other (electricity import/export)	Total
2006	5.165	23.782	15.044	12.154	2.293	+0.960	59.398
2007	4.612	23.073	14.969	12.566	2.917	+0.682	58.819
2008	4.713	24.882	14.879	11.873	2.347	+1.027	59.721
2009	3.257	24.615	15.153	12.304	2.706	-0.021	58.014
2010	3.394	25.880	17.006	12.492	2.872	+0.260	61.940
share in 2010	5.48%	41.8%	27.5%	20.2%	4.64%	0.42%	

"Energie Observatorium Kerncijfers 2010" (in Dutch). FOD Economie. Retrieved 10 November 2012.

"De energiemarkt in 2009". FOD Economie, K.M.O, Middenstand en Energie. Retrieved 12 November 2012.

	Renewable energy total	Biomass & renewable wastes	Hydropower	Geothermal	Wind	Solar
EU-28	11.0	7.3	1.7	0.3	1.1	0.5
Euro area (EA-18)	11.1	7.1	1.6	0.5	1.2	0.7
Belgium	5.9	5.1	0.1	0.0	0.4	0.4
Bulgaria	8.9	6.2	1.5	0.2	0.6	0.5
Czech Republic	7.5	6.5	0.4	0.0	0.1	0.5
Denmark	23.3	18.2	0.0	0.0	4.9	0.2
Germany	10.4	7.5	0.6	0.0	1.4	0.9
Estonia	14.1	13.4	0.1	0.0	0.6	0.0
Ireland	5.9	2.9	0.5	0.0	2.5	0.1
Greece	9.6	5.6	1.4	0.1	1.2	1.2
Spain	12.6	5.9	1.4	0.0	3.3	1.9
France	8.2	5.5	2.0	0.1	0.5	0.2
Croatia	12.1	6.7	4.9	0.1	0.3	0.1
Italy	12.7	5.7	2.1	3.0	0.7	1.1
Cyprus	5.1	1.8	0.0	0.1	0.6	2.6
Latvia	36.4	29.2	7.0	0.0	0.2	0.0
Lithuania	16.4	15.2	0.5	0.1	0.7	0.0
Luxembourg	3.1	2.7	0.2	0.0	0.1	0.1
Hungary	7.5	6.7	0.1	0.5	0.3	0.0
Malta	1.1	0.8	0.0	0.0	0.0	0.2
Netherlands	4.3	3.7	0.0	0.0	0.5	0.1
Austria	30.1	17.5	11.2	0.1	0.6	0.6
Poland	8.8	8.2	0.2	0.0	0.4	0.0
Portugal	19.8	12.6	2.2	0.6	4.0	0.5
Romania	14.7	11.0	2.9	0.1	0.6	0.0
Slovenia	14.8	9.3	4.8	0.5	0.0	0.3
Slovakia	8.1	5.7	2.1	0.0	0.0	0.3
Finland	29.2	24.8	4.3	0.0	0.1	0.0
Sweden	37.2	22.3	13.6	0.0	1.2	0.0
United Kingdom	4.1	3.0	0.2	0.0	0.8	0.1

Source: Eurostat (online data codes: nrg\_100a and nrg\_107a)

	Primary production (1 000 toe)		Share of total, 2012 (%)				
	2002	2012	Solar energy	Biomass & waste	Geothermal energy	Hydropower	Wind energy
EU-28	97 755	177 269	5.1	65.5	3.2	16.2	10.0
Euro area (EA-18)	67 353	125 603	6.8	62.7	4.4	15.4	10.8
Belgium	576	2 816	7.1	83.3	0.2	1.1	8.4
Bulgaria	832	1 638	5.2	69.4	2.0	16.9	6.4
Czech Republic	1 594	3 247	6.1	87.2	0.0	5.6	1.1
Denmark	1 991	3 114	1.2	70.1	0.2	0.0	28.4
Germany	10 783	32 913	8.6	72.3	0.3	5.5	13.2
Estonia	568	1 056	0.0	96.1	0.0	0.3	3.5
Ireland	261	744	1.4	43.0	0.0	9.3	46.3
Greece	1 393	2 275	14.5	53.3	1.0	16.6	14.6
Spain	6 894	14 488	16.6	41.7	0.1	12.2	29.4
France	15 025	20 766	2.0	66.4	0.9	24.3	6.2
Croatia	757	1 181	0.6	62.6	0.6	33.8	2.4
Italy	9 249	17 894	9.9	36.7	27.7	19.2	6.4
Cyprus	45	106	62.5	21.2	1.4	0.0	15.0
Latvia	1 575	2 331	0.0	85.9	0.0	13.7	0.4
Lithuania	773	1 198	0.0	92.8	0.3	3.0	3.9
Luxembourg	38	94	5.3	78.9	0.0	8.9	6.8
Hungary	877	1 965	0.3	89.9	5.5	0.9	3.4
Malta	1	6	36.1	63.9	0.0	0.0	0.0
Netherlands	1 618	3 779	1.3	86.9	0.3	0.2	11.3
Austria	6 491	9 623	2.1	56.2	0.4	39.1	2.2
Poland	4 141	8 478	0.2	92.8	0.2	2.1	4.8
Portugal	3 552	4 358	2.3	63.3	3.1	11.1	20.2
Romania	3 749	5 242	0.0	75.4	0.4	19.8	4.3
Slovenia	715	990	2.4	60.5	3.3	33.8	0.0
Slovakia	744	1 434	2.9	72.0	0.4	24.6	0.0
Finland	7 826	9 931	0.0	85.0	0.0	14.6	0.4
Sweden	13 123	18 508	0.1	59.9	0.0	36.7	3.3
United Kingdom	2 566	7 095	3.6	66.2	0.0	6.4	23.7

Source: Eurostat (online data codes: ten00081 and nrg\_107a)

## Funding

### Baseline

There are a number of subsidies and tax reductions that are applicable on new built and renovation of buildings. They refer to particular building elements, installations systems or renewable technology.

Some are administered/given on a Federal level, some on regional and some on municipality level (e.g. applicable for buildings located in Antwerp).

There are also subsidies that are provided by the utility company operating on the location of the building (e.g. Infrax or Eandis).

Typically a building owner can get all information from a website of the Flemish Energy Agency, VEA ([www.energiesparen.be](http://www.energiesparen.be))

The City of Antwerp also provides additional financial stimulus for “green technology” (green roofs, water savings), solar boilers, low E-level for new-built constructions, roof insulation in existing buildings and a cheap loan for energy saving measures (in some low-income cases even without interest rate).

### Success Model

Although financial support is welcomed to stimulate investments in efficiency of buildings, what may seems as large number of financial incentives available in Flanders/Antwerp, the subsidies are fragmented, supporting individual measures, divided at different levels thus requiring different application procedures and time when granted, and the amounts have



recently been (in some cases) reduced. Also, for renovations the initial investment that is needed for a refurbishment might be a barrier in itself.

Specific tools might be needed to develop funding scenario's. For example, the Life Cycle Costs based calculations in investments is not often done due to complexity of procedure and uncertainties with assumptions taken into the calculation, so it is still on level of some research activities but not typically implemented in practice when decisions are made.

Also, homeowners are often not aware how much they could reduce their living expenditures on energy in their specific situation and how this budget could be transferred to possible investment, for example in energy-saving measures.

There are subsidies (although recently adjusted) for investment in renewable technology in buildings and some local subsidies for "green" technologies. There is ESCO practice for financing renewable installations (for example by utilities) for the non residential buildings in Antwerp, but not for the residential market.

The City could explore if agreements could be made with local financial providers in order to stimulate PHs, especially deep renovations. The revolving fund that was created for cheap loans might be more promoted and group actions might be developed to reduce the needed investment for energy saving measures.

Novel business models where ESCO formulas are applied to residential sector (new built or renovation) might unburden house owners for the higher initial investment needed. Also, innovative financing models may need to be created to finance ambitious deep renovations, especially at a group/neighbourhood level.

## KEY ACTORS

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### Local administration

#### Baseline

The City of Antwerp is promoting systemic reinforcement of energy requirements throughout city building developments residential and non residential. To this, specific actors are involved:

The "Ecohuis (EHA)" in Antwerp (<http://eha.be>) is owned by the City and provides house owners, schools and other building professionals a variety of activities in support to sustainability and has specific activities concerning energy efficiency of buildings (advise, training..). Promoting the PH is also included within. For various issues EHA works closely together with locally based non-profit organisations such as Passiefhuis-Platform vzw and VIBE vzw.

The AG VESPA (<http://www.agvespa.be/>) is the autonomous municipal company for properties and city projects of the city of Antwerp founded in 2003. AG VESPA builds for the city residential buildings and public buildings and also maintains a large portfolio of existing buildings. Together with private and public partners they realize new property and district developments in the city.

### S u c c e s s M o d e l

The City of Antwerp is pro-active with developing schools, offices, kindergartens, fire stations, mixed developments of nurseries and houses, clusters of houses, residential apartment blocks, sport and youth centres in the Passive House Standard and using renewable energy where feasible.

Within AG VESPA there is an on-going process with developing passive buildings and renewable technology. The architects and builders are challenged with new and different developments whereby new specific design knowledge is sought after. City planners are also gaining more and more awareness on the impact the city planning has on the energy performance of the buildings (e.g. orientation, overshadowing, compactness..).

EHA increases its assistance to home owners on neighbourhood level to engage in ambitious energy renovation measures activities and in collective buying of energy saving measures.

### Other stakeholders

#### B a s e l i n e

The introduction of the Passive House Standard started in 2002 by the activities of the Passiefhuis-Platform, so there is over 10 year since the PH concept is being introduced in Flanders.

Main driving forces at the start were pioneer-private house owners and pioneer-companies who were interested in environmental issues, global warming, and energy. They were the front runners. The subsidies for passive houses linked to certification that the Passiefhuis-Platform vzw offer and some other tax reduction measures also helped in introduction of the PH concept onto the residential new built market.

Gradually, from the residential buildings, the passive house standard was applied to non-residential buildings, starting in offices and schools and gradually including other kinds such as mixed buildings, kinder gardens, sport buildings, fire stations.

The use of renewable energy, since it is not part of the passive house standard requirements, was sporadic, upon either specific demand by the client or where feasible financial stimulus exists (e.g. the subsidies / tax reductions).

PHP is a non-for-profit organization, with members from across the construction professionals : architects, engineering offices, builders, product manufacturers and suppliers, installers, knowledge centres, banks. They are all supporting passive house buildings.

VIBE vzw is another non-for-profit organization with whom the EcoHuis collaborates on the topic of bio-ecological building materials and their use in construction.

Both of these local stakeholders organizations provide advise and training activities to EcoHuis.

### S u c c e s s M o d e l

A better embedding of promotion through other stakeholders who have direct contact with homeowners might be useful (e.g. homeowner's associations, syndic).

An emerging market has begun for renovation of houses using principles of the PH, but this is developing too slowly in order to reach policy goals.

In late 2013 a Flemish funding opportunity for large scale ambitious house renovation ("proeftuin") was released. There are 10 demonstration projects taking place across Flanders (including city of Antwerp), as well as a Knowledge Platform consisting of research organizations (amongst which PHP) and the sector federations, will support and promote these renovation 'proeftuin'. The experience and knowledge is expected to create a climate for growth in the domestic sector renovation market.

## CAPACITY FOR PLANNING, DESIGN AND CONSTRUCTION

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### Training of local authorities

#### B a s e l i n e

The employees of city of Antwerp including AG VESPA and Ecohuis have attended several training sessions on passive buildings provided by PHP.

#### S u c c e s s M o d e l

Specific training for the employees of the city administration according to their needs (focus on single family houses, multi family houses and non residential buildings). To this end, 'custom made' training was offered as part of PHP activities in PassREg. Systematically offered trainings by PHP to continuously update their knowledge on passive house and renewable energy constructions is part of the foreseen activities of PHP.

### Training of designers, companies and builders

#### B a s e l i n e

The Passiefhuis-Platform is providing training and advise to the City of Antwerp and AG Vespa on their building developments. The Ecohuis Antwerp is also engaged in providing training, to which PHP provides training support. There are also frontrunner energy consulting agencies (engineering offices) active in the region.

PHP is providing regular training courses in different modules, for aspects of basic knowledge, design, practice, calculation tools and also on integration of renewables in passive house buildings. These training modules are voluntary for the building practitioners of different target groups (architects, engineers, contractors, facility managers, municipality employees). In addition, PHP offers training that can be specifically made 'customised' to the needs of companies. Courses on nZEB is available from commercial training provides in Antwerp.

Architects federation also gives courses to its members.

Some building companies and product manufacturers organize on occasions courses, or participate in courses of third parties.

### S u c c e s s M o d e l

As part of the Renewable Directive, the certification of installers for renewable technologies has recently become available in Flanders (installers of PV, solar thermal and heat pumps), whereby the number of certified installers needs to be increased and available.

PHP is continuously improving its training offer for energy and comfort in new buildings, integration of renewable energy technologies in existing buildings, building skin (insulation, windows, doors and shading, air tightness, building details in practice); building systems (ventilation and indoor climate, heating, cooling, lighting and appliances). In addition, is further developing hands on interactive workshops for building details and ventilation solutions.

The training offer is also prepared in cases to suit a particular organization (e.g. large development company, employees of the above mentioned AG VESPA, etc). In this way, the training is provided to suit the needs of local employees.

the Ecohuis Antwerp (EHA!) also engages in providing 'ecohuis dokters', consultants (from PHP, VIBE,..) who guide homeowners in their decision-making about implementing energy saving measures. These are existing activities which are foreseen to continue.

Although PHP, VIBE and EHA! reach homeowners on a regular basis, their capacity only reaches frontrunners and early adopters. A pool of 'trusted' first-line contacts such as architects, financial consultants and energy advisers could be trained to instruct clients about PH and deep renovation. This is part of moving towards a more mature market in Flanders and city of Antwerp on passive house buildings with renewable energy, therefore a large number of well trained construction professionals must be achieved to respond to this goal. In addition, product suppliers are in cases offering specific training for quality installing their products may also help towards this goal.

## MARKET FOR PASSIVE HOUSE BUILDINGS WITH RENEWABLES

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### B a s e l i n e

At present, there are many companies and product manufacturers and suppliers who offer products suitable for Passive house buildings as well as products for integration of renewable energy in these buildings onto the market.

Products and materials are available in the Flemish region, including city of Antwerp by various suppliers. There are also those (niche) who offer only ecological materials that can be used in passive house buildings. Typically, the technical support is provided by these companies.

Some local building fairs like 'Hout & Groen Wonen' and 'Bouw & Reno' can effectively reach homeowners with interest in ecological issues, respectively renovation.

An annual professional day and construction fair specific for passive house buildings takes place in Brussels and it is organized by the PHP and PMP (both as partners in this PassREg project). The event shows the latest practical knowledge for the construction practitioners through a day of presentations, networking events and workshops, with three days of construction fair where the general public can meet different companies who can offer them their products and services specific for passive house projects. At the fair, companies offering renewable energy solutions are also present.

### S u c c e s s M o d e l

Companies and product manufacturers and suppliers continue to offer products suitable for PH and integration of renewables onto the market.

As it is expected that the nZEB market for new built and energy efficient ambitious renovation grows, city of Antwerp takes an exemplary role through its implementation on its owned municipal buildings as well as in the urban development projects.

The City could consider engaging in strong topical information points on local building fairs.

More collaboration could be created by organizing events that bring together building actors who could benefit from the exchanging knowledge.

More examples like the large developments of the Nieuw Zuid and Cadix could be stimulated so the passive house and renewables would be more integrated in future large urban developments.

## SUCCESSFUL PRACTICES

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### B a s e l i n e

The city of Antwerp and its autonomous building company AG VESPA have on going a number of projects that are based on passive house and in cases with renewable energy technologies (where feasible). These are residential (cluster of houses or apartment blocks), and a variety of non residential buildings (offices, schools, sport centres, youth centres, nurseries, police office..)

These developments are at different stages of the building process.

### S u c c e s s M o d e l

The Nieuw Zuid (beacon) development receives support for knowledge on financing and cost efficiency specifically to social housing buildings, use and maintenance aspects, limited PHPP calculation on impact of design solution to the energy performance of apartment buildings, training as suitable to needs of city employees.

Another city development is the Cadix neighbourhood in the north of Antwerp. The development of this neighbourhood is deliberately slow, to allow for learning and gradual

reinforcement of energy and environmental requirements in public offers so that property developers can gradually adjust to stricter requirements.

The Cadix project developer wanted to have this building certified by Passiefhuis-platform because of the added value. The certification will be done on the whole building scale. There will also be a portion of renewable energy in this project by means of PV panels.

The renovation market in Antwerp is increased, whereby barriers such as financial and lack of knowledge amongst architects, builders as well as clients demanding deep renovations are reduced or eliminated. To this end, demonstration projects could play an important role in further establishing successful practices in the renovation market in the city of Antwerp.

## PUBLICITY AND PUBLIC SUPPORT

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### Communication Strategy

#### Baseline

The City of Antwerp has its own city magazine that is spread to all citizens. It regularly includes information about activities in the city, e.g. those organized by EHA.

Each year Bond Beter Leefmilieu organizes – together with PHP and VIBE - open house days, where homeowners of PHs and deep renovations open their doors for other homeowners. In each edition homeowners from Antwerp participate. As such they exchange information peer-to-peer, which proves to be a valuable communication strategy to promote PHs, use of renewables, use of ecological materials and deep renovation.

There is also the communication that ecohuis does in the context of its activities, for examples workshops, info sessions and other.

The Passiefhuis-Platform has a database of projects accessible from its website. Activities such as Passive House Days and Ecobouwers as well as “my house, my architect” in which realized buildings to PH standard or somewhat less ambitious, however with efficiency, architectural, environmental qualities, are being open for the public for visit is already going on for years.

There is also a demonstration programme in Flanders which has new built schools in its centre. PHP communicates on these projects through communication channels of website and newsletters spread to various construction professionals and building owners across city of Antwerp.

#### Success Model

Activities of the “Ecohuis” in Antwerpen, of the Passiefhuis-Platform and initiatives such as the open house days, tour ecobouwers and Bouw & renovatie as main public awareness initiatives continue, with growing numbers of visitors each year.

More variety and target oriented actions to reach specific home owner segments should be further developed, also for the city magazine.

Certain target groups should be addressed with tailored communication, such as building stock owners, property developers, home sales agents and syndics

Initiation of a study project on the communication to users ('how to live, work, ... in a sustainable district') funded by the 'concept subsidie' of the Flemish government provides useful knowledge

### Communication activities within the PassREg project

#### Baseline

Info sessions were done on typologies, feasibility (including energy impact of design scenarios) for the Nieuw Zuid development, on financing and cost efficiency of passive social housing and on sustainable technologies (heating network with renewable energy source, ventilation systems, use and maintenance, etc.), followed with communication to current and future house owners.

Continuous update on status with the PassREg results on the PHP website and newsletter.

The PassREg project leaflet and poster presented each year at the nZEB Symposium, professional day and construction fair in Brussels. Also, leaflets produced for the five target groups of PassREg is given to the public at various national events, including those in city of Antwerp.

The Passive House Award posters presented at the passive house professional days and fair and nZEB symposium 2014. In addition, communication and press releases on the award as well as other passive house specific events is done by PHP.

Presentation of major Antwerp projects "Voorbij Antwerpen Nieuw Zuid" and Cadix at the nZEB Symposium in Brussels. "Passive and Beyond"

Article published in 2014 issue of Be.Passive magazine based on the info session on the impact of "Bigger and cheaper" on the energy balance.

Article and lecture at Passi'Bat in Paris, 4th of December 2013.

#### Success Model

Communication activities on sustainable aspects of the Nieuw Zuid development (PassREg beacon) and Cadix continues.

Continuous update on status with the PassREg results on the PHP website and newsletter. PassREg newsletters spread to number of target groups in Antwerp and wider in Flanders.

Press releases done before and after each PassREg national event.

Articles are referencing PassREg where possible, spreading the news of the latest results of PassREg.

## QUALITY CONTROL

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### Baseline

Passiefhuis-Platform provides certification (design level with air tightness test) for new built buildings (experience with houses, schools mostly). There are also recent certification examples of houses being renovated to the PH Standard and to zero energy.

PHP is engaged in several building developments for AG VESPA providing trajectory-advise and certification for schools, nurseries, residential buildings, provincial administrative building, police office building, cluster of houses, etc. In cases, this also includes private building owners/developers.

### Success Model

There is need for improvement of quality aspects of projects (on building level) throughout all phases of development (design, construction, operation, follow up), and for specific schemes for quality in renovation of various building types.

In progress is collective Flemish research project of 4 years (PHP is one of the partners) called RenoFase ([www.renofase.be](http://www.renofase.be)), with focus on “qualitative energy renovation of houses”. Amongst other, in this framework a guide for phased renovation will be developed for architects.

Policy development for renovations is being developed by VEA.

The use of thermal camera’s and other methods to check if the desired parameter has been reached can be very useful in quality control.