OPTIMISING BUILDING ENERGY DEMAND BY PASSIVE-LEVEL BUILDING CODE

Country/region	**Brussels Capital Region, Belgium**
Type of E1st approach	C – Behind / General 3 – Requiring E1st
Energy carrier(s) targeted	Electricity / natural gas / district heating / others
Sector(s) / energy system(s) or end-uses targeted	Residential, public and commercial buildings Energy consumption: heating and cooling, lighting and electricity
Implementing bodies	Regional administration Brussels Environment (legal name IBGE-BIM)
Decision makers involved	Regional government of Brussels Capital Region, construction industry and other representative bodies
Main objective(s)	Compliance with EPBD, reduction of CO2 emissions (reaching 80% savings in 2050), improvement of indoor air quality
Implementation period	Ongoing since 2015

Starting off as the worst region in Europe regarding the energy performance of its building stock, Brussels Capital Region used the obligations of the Energy Performance of Buildings Directive (EPBD) as an opportunity to significantly improve the energy, air and climate performance of its buildings. The regional government adopted its first energy efficiency standards in 2002, followed by a complex set of measures and large-scale stakeholder discussions and pilot projects, until it introduced stringent energy performance requirements for buildings in 2015, and tightened them since. In just a little more than 10 years, the region became an example around the globe for rapid energy transition of the building sector, prioritising efficiency and using the passive house level as the building standard. During this time, the market developed both the requirements and the solutions.

Slashing energy consumption was first motivated by a concern over high unit consumption of energy and low indoor air quality in Brussels, as well as its building stock being amongst the most energy wasteful in Europe. The stringency and coverage of the so called “passive house law” (or Energy Performance of Buildings (PEB) Regulation) in 2015 has been further strengthened and led Brussels to lead by example in building energy regulation.

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1. Background

The Brussels Capital Region, a region of Belgium comprising 19 municipalities, one of which is the City of Brussels, became the first region in the world to adopt and implement mandatory energy efficiency building codes at the level of passive house standards. The introduction of the strict building standards was preceded by a package of voluntary and mandatory policy measures between 2002 and 2014. Key pieces of the policy package were the first thermal requirements in 2002 (K55), which required minimum insulation of new buildings across Belgium from 2002 (IEA, 2017), followed by the competitive Exemplary Buildings programme, or BatEx, from 2007 – 2013, and the Air-Climate-Energy Code (known as COBRACE) in 2013. Other measures were also instrumental in increasing the effectiveness of the building standards. Information instruments, such as the strengthening of the energy performance certificates (EPC), guidelines for home owners, collection of best practice examples, an office of advisors and facilitators, as well as supporting the industry by networking, trainings, the set-up of a one-stop shop, and financial instruments such as green loans have been and are still available today. The package of measures has ensured that the rationalisation of energy demand has been treated equally and even given priority over low-carbon energy source solutions.

In 2006, a few public buildings were renovated to passive house level in order to serve as demonstration sites. One of the critical components of the overall policy package was the Exemplary Buildings programme, BatEx. The BatEx programme targeted public, commercial and residential buildings through providing financial support for very low-energy construction and renovation projects. Leading by example and providing robust technical support and workforce development to the building sector, they won over the concerns of industry and sparked the development of a domestic manufacturing industry creating hundreds of new jobs in the process. The programme ignited market forces to prepare both the demand and the supply sides of the construction and renovation markets.

On 2 May 2013, the Brussels Capital Region adopted its Air-Climate-Energy Code (known as COBRACE 90). It served as a legal basis for its Integrated Air-Climate-Energy Plan, which was adopted on 2 June 2016. The “passive house law” (officially called the PEB Regulation) was agreed on in 2011, requiring this as the standard for all new construction as of 2015 and most renovation from 2017, and was further revised in 2019 (Brussels Environment, 2020a).

2. How has the E1st principle (or similar concept) been implemented?

The Efficiency First principle became embedded in the building code of Brussels through the requirement for passive design. The first thermal regulations (K55) in 2002 already set out insulation requirements. The passive house law foresees the drastic reduction of energy demand, supplying the remaining demand from renewable sources. In an urban setting, the selection and amount of renewable capacity is limited, prioritising energy efficiency.

The competitive BatEx programme resulted in projects which could provide passive solutions at standard costs, while it also catalysed the market and showed that close-to-passive-house energy performance could be achieved with a zero or minor cost premium. The energy performance of subsidised buildings was not predefined, only capped, and the market was allowed to define it on a competitive basis. The programme led to a demand and supply of close-to-passive-house level buildings, and kick-started over 3000 passive houses beyond the subsidised projects as of 2018 (van Daalen and Petersen, 2018).

3. Effects / impacts

The building code and its accompanying policies have contributed to a significant improvement in the energy intensity of Brussels' building sector. Between 2007 and 2013, six calls for proposals within BatEx were announced, resulting in 243 energy performance projects representing more than 621,000 m^2 of passive buildings including homes, offices, schools, hospitals and social housing (EnEffect, 2014). Beyond the subsidised projects, Brussels in 2019 had ca. 3000 passive buildings.

The total energy consumption of the building stock was almost 10,000 GWh with climate correction at the time the first measures were implemented in 2002, of which around 8500 GWh was used for combustible fuels and around 1400 GWh for electricity. With the improvement of the energy performance of new buildings, then also of renovated buildings, as well as the accompanying energy transition of home appliances, total energy consumption was a little over 7400 GWh, around 6000 GWh for combustible fuels and 1350 GWh for electricity respectively in 2017 (Brussels Environment, 2020b).

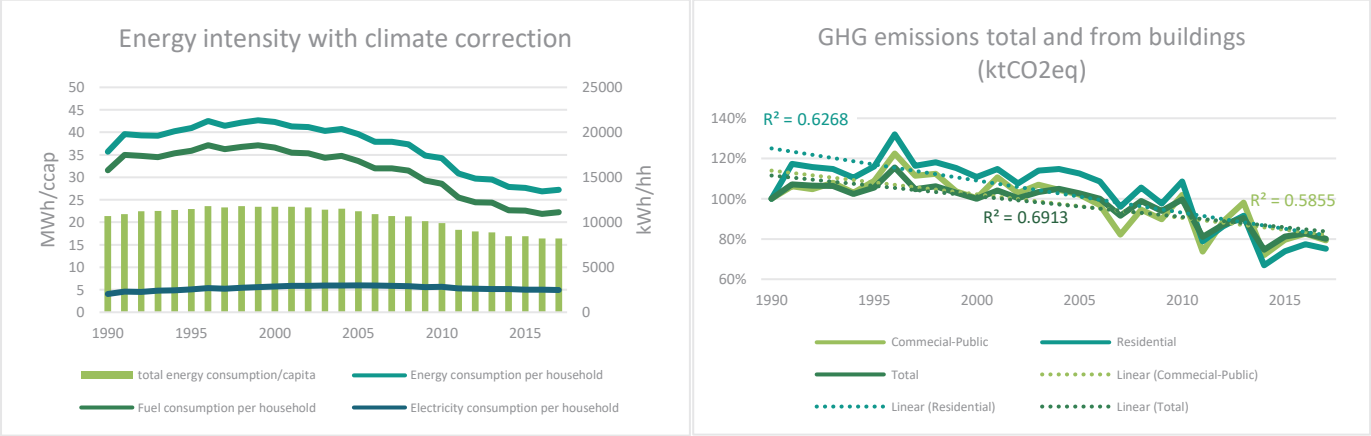

Figure 1 – The energy and climate impact of the PEB Regulation and related policy package

4. Changes over time, if any

The Brussels regional government first adopted energy efficiency standards in 2002, jump-starting policy discussions about climate change, energy and buildings. The standard was drastically strengthened to close-to-passive-level in 2015, based on the experiences of the policy package linked to the BatEx programme. The so-called PEB Regulation was adopted in 2011, and was set as the standard for all new construction as of 2015. The standard was extended to renovations beginning in 2017, and new requirements and calculation methods were introduced in 2017 and again in 2019 (Brussels Environment, 2020a).

5. Barriers and success factors

The "passive house law" (i.e. the PEB Regulation) was adopted in 2011, and introduced from 2015, with regular updates to its stringency and coverage.

Success factors:

- Despite resistance in the beginning, due to the participatory process both the tenants and the industry were well-informed, well-prepared and contributed to the formulation of the law. This has led to a system of world-renowned building policies.
- The preceding BatEx programme was led by market actors and was always at the level of market preparedness. The industry could develop along with the programme in a competitive environment, driven by market forces.
- The financial support of the programme was instrumental in overcoming the preparatory phase costs.
- Piloting passive design in selected public buildings before 2007 was a test phase for the whole set of measures.
- Skill development, trainings and certifications could improve trust and could develop the supply of professionals and professional solutions.

Barriers:

- Compliance levels were criticised in the beginning.
- Since Brussels has special buildings, such as historic buildings and tower buildings, these need specific attention and targeted legal, informational and institutional provisions.
- Participatory regulation requires additional efforts from decision-makers but pays off.

6. Replicability and scalability potential

The example of the stringent building standard is often referred to as exemplary and other cities and regions learn from the successes, as well as from the barriers. In particular, New York City has followed the pathways of Brussels in order to contribute to the overall city target of an 80% reduction of carbon emissions by 2050 (Yancey et al., 2016).

7. Sources and references

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ABOUT ENEFIRST

ENEFIRST is a 3-year project funded under the Horizon2020 programme, which gathers a consortium of partners from across sectors and regions: IEECP, BPIE, Fraunhofer ISI, CEU, RAP, IREES, TU Wien.

From definition to implementation, ENEFIRST aims at making the "Efficiency First" (E1st) principle more concrete and operational, better understand its relevance for decision processes related to energy demand and supply, its broader impacts across sectors and markets, focusing on the building sector and related energy systems in EU Member States.

> ***E1st gives priority to demand-side resources whenever they are more cost-effective from a societal perspective than investments in energy infrastructure in meeting policy objectives. It is a decision principle that is applied systematically at any level to energy-related investment planning and enabled by an "equal opportunity" policy design.***

ENEFIRST combines policy analysis and quantitative assessments of E1st impacts to develop policy guidelines and recommendations, following a process with continuous exchanges with stakeholders.

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