



CONCERTED ACTION

ENERGY PERFORMANCE OF BUILDINGS

(CT4) Renovation Strategies Status in 2021

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1. Introduction

Article 4 of the Energy Efficiency Directive (EED, Directive 2012/27/EU) on long-term strategies for building renovation has been transferred to the Energy Performance of Buildings Directive (EPBD), Article 2a, as part of its amendment, Directive (EU) 844/2018. EPBD Article 2a, related to long-term renovation strategies (LTRS), shall accelerate a cost-effective renovation of existing buildings towards a highly energy efficient and decarbonised building stock by 2050. The article is complemented with new paragraphs, inter alia, regarding a roadmap for a decarbonised building stock with indicative milestones for 2030, 2040 and 2050, measurable progress indicators, requirements for the mobilisation of investment into renovation, and public consultation on the long-term renovation strategy. Beyond that, the EPBD requires that the long-term renovation strategies address energy poverty and wider benefits such as health, safety and air quality.

All Member States were obliged to submit their 3rd long-term renovation strategy in line with EPBD Article 2a by 10 March 2020. Therefore, the CA EPBD central team 'Renovation Strategies' accompanies the implementation of the long-term renovation strategies through improved and increased exchange of information and experience on national implementation processes between the individual Member States, with strong links to the central teams 'Existing buildings' and 'Smart finance'. An overview of Article 2a's components is visualised in Figure 1.

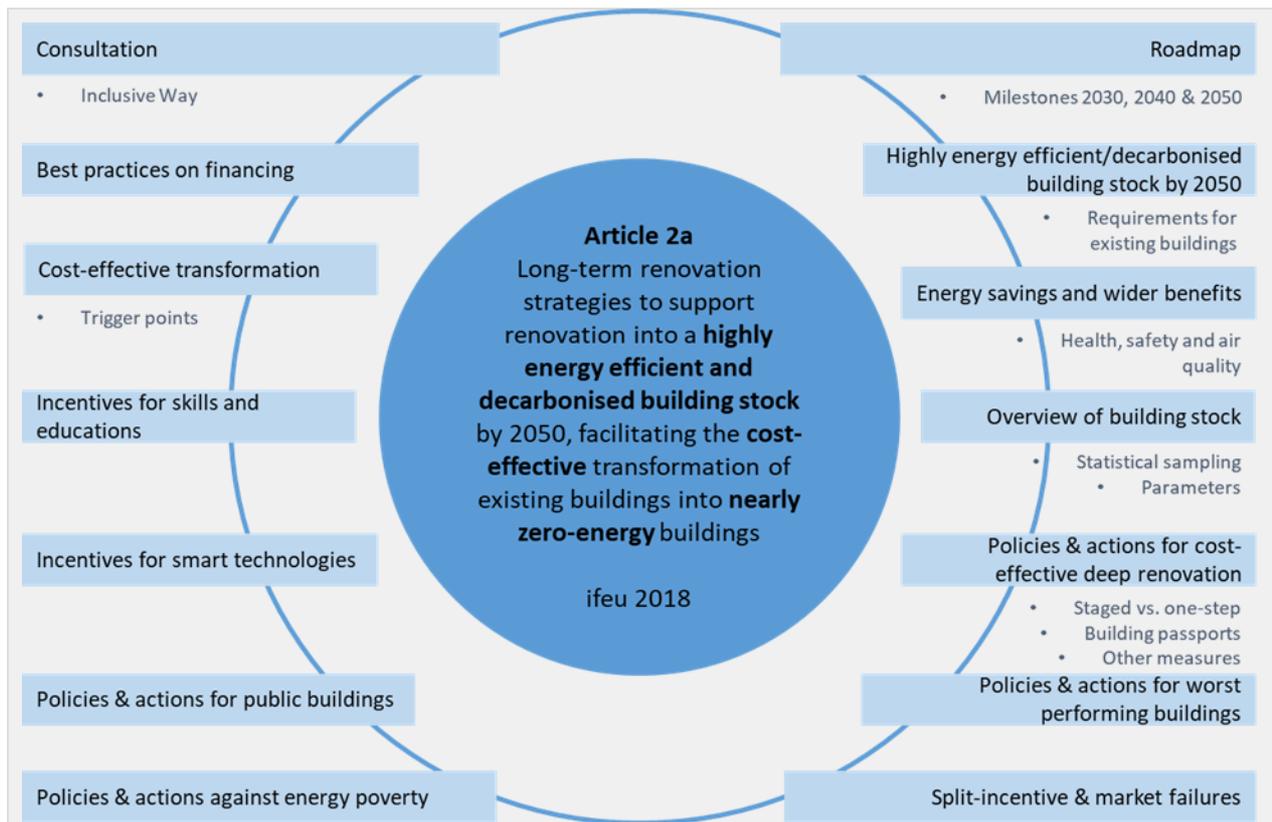


Figure 1: Overview of EPBD Article 2a components (source: ifeu according to EPBD).

The Commission published recommendation (EU) 2019/786 of 8 May 2019 on building renovation, where guidelines and good practices are presented to support Member States in transposing and implementing EPBD Article 2a¹.

2. Objectives

The aim of this central team's work is to support Member States in the preparation and implementation of their long-term renovation strategies as defined in the newly introduced EPBD Article 2a. Although all Member States already submitted two long-term renovation strategies – one in 2014 and one in 2017 – the new paragraphs and the adaption and update of the previous versions are challenging for many Member States.

Thus, the main concern of the Member States is on improving the already existing LTRS, filling the (data) gaps and adequately addressing the new elements and components of the Directive.

In addition to the requirements in place for the previous LTRS, the evolution of future policies and measures is encouraged by the introduction of the new paragraph (EPBD Art. 2a), by which Member States are obliged to set up roadmaps until 2050. This also intends to enhance renovation targets, with indicative milestones for 2030, 2040 and 2050. Wider benefits, such as benefits related to health, safety and air quality are also mentioned explicitly in paragraph 1 (g).

Major components of the new Article 2a concern:

- Expectations regarding the **share of renovated buildings in 2020**;
- The additional consideration of **trigger points** in the life cycle of the building to support the identification of cost-effective approaches for renovation;

- The enrichment of policies and actions to stimulate cost-effective deep renovation;
- Measures for renovation – for example by introducing an optional scheme for **building renovation passports**;
- The **alleviation of energy poverty** by outlining relevant national actions and summarising policies and actions to target the worst performing segments of the national building stock;
- The introduction of policies and actions targeting all **public buildings**;
- The promotion of **smart technologies** and **well-connected buildings and communities**, as well as **skills** and **education** in the construction and energy efficiency sectors;
- The focus on **wider benefits**, such as those related to health, safety and air quality;
- A **roadmap**, including measures and progress indicators up to **2050**, to contribute to a **highly energy efficient and decarbonised building stock** (i.e., reducing greenhouse gas emissions in the EU by 80-95 % compared to 1990). This requires the consideration of indicative milestones for 2030, 2040 and 2050 and the specification on how Member States will contribute to achieving the energy efficiency targets in accordance with Directive 2012/27/EU;
- The mobilisation of investments into renovation according to Article 2a Paragraph 3;
- The inclusive **public consultation** of the long-term renovation strategy prior to submission to the Commission, as well as during implementation;
- The documentation in an annex, of details on the implementation of the most recent long-term renovation strategy;
- The use of the long-term renovation strategy to address **fire safety** and risks related to intense **seismic activity** affecting energy efficiency renovations and the lifetime of buildings.

The above-mentioned components are discussed within the CA EPBD sessions of the central team ‘Renovation Strategies’. This report reflects the discussions in the respective sessions and reports ideas and interpretations brought forward by the Member States and the experts invited to the sessions.

3. Analysis of Insights

Until April 2020, eight sessions were organised by the team and centered around procedural, methodological, strategic and policy questions of EPBD Article 2a. The following paragraphs summarise the main outcomes of these sessions.

3.1 Public participation

Public participation describing the interaction between government and the public is considered to result in **better outcomes and better governance**. The main benefits are a higher acceptance of decisions and implementation as public interests are better reflected, but also the creation of new ideas and approaches.

Thus, Article 2a Paragraph 5 requires, as part of the preparation of the long-term renovation strategy (LTRS), ‘**a public consultation on their long-term renovation strategy prior to submission to the Commission.**’

3.1.1 Possible methodologies for public participations

Possible methods for public participation are widespread, ranging, for example, from face-to-face settings to electronic and internet technology-based approaches². The level of interaction can reach from informing and listening over dialogue, debate and analysis to implementing jointly agreed solutions.

Concrete methodologies include very different formats, including:

- Citizens' juries, summits or panels
- User panels
- Open space
- Neighbourhood forums
- Focus groups
- Participatory appraisal or budgeting
- E-Petitions
- Wikis
- World cafés
- Online forums
- Opinion polls
- Interviews
- Study groups
- Comply or explain principle
- Questionnaires and surveys
- Public meetings, information centers or open houses
- Electronic democracy
- Roundtables

3.1.2 Public Participation in the Member States as presented in the 2018 meeting

Ireland

To enable the implementation of the Long-Term Renovation Strategy in Ireland, updates were required to the Irish Building Regulations, covered by two 'Part L' documents – one for residential buildings and the other for non-residential. It transpired that NZEB was a term well known throughout the construction industry. To deliver the public consultation, the Department of Housing worked closely with the Ministry for Energy and the Ireland Energy Authority.

The process was three-fold. Firstly, face-to-face meetings and presentations were arranged with relevant stakeholders, including members of the construction industry, NGOs and professional bodies. This was followed by a draft legislation publication with a request for online written feedback. There was then further consultation with stakeholders prior to publication.

The website that facilitated the online consultation included a template for comments to enable easy collation. It was found that most of the comments came in on the closing days. The further processing of the comments took a lot of time – 2-3 months – including responses and explanations provided for each comment.

The second round of stakeholder meetings and presentations was to document to the stakeholders that their concerns had been addressed and to ensure there were no surprises once the final legislation was published.

Advice would be to highlight the key changes to regulation and present the intention rather than give too many choices. Feedback can be incorporated where relevant. The main challenge met was how to reach the right audience, including members of the general public.

Denmark

In 2013, the Danish LTRS Network was formed as part of the consultation process for the first LTRS. The Minister in charge wanted strategies to be based on knowledge and therefore wished to involve the whole sector. Acceptance of the strategy by stakeholders was seen as important, which is easier if the relevant stakeholders are involved at the consultation stage. The consultation was an open process, which relied on knowledgeable individuals, not necessarily members of specific organisations. Forty chosen stakeholders were invited to select four individuals each from the industry, allowing for a network of approximately two-hundred people. Six work groups were formed to focus on each building type (single-family houses, flats, public buildings, businesses), with two cross-cutting themes (financing and economic security, innovation and green businesses).

The consultation was a collaborative exercise with a common agenda, trying to focus on the common interest of all stakeholders. Each working group set their own rules for their decision-making process. Twenty-one initiatives were handed over to the Ministry, with the resulting government strategy including a large number of these.

Stakeholders were happy to be part of the process and felt that they had influenced the political process. The conference also triggered new partnerships within the construction sector. It was important for the government that the sector took ownership of the strategy.

The major challenge faced was finding the time and resources. Success factors included the co-creation of a common agenda and the commitment to joint decision-making whilst allowing for disagreement amongst participants, and new networks and partnerships formed in the sector.

Germany

Germany has launched several processes in the last four years to intensively discuss the strategy for buildings: the '*Energiewende-Plattform Gebäude*' was launched in 2014 to prepare the grounds for the '*Effizienzstrategie Gebäude*', the efficiency strategy for buildings, which forms an essential part of the LTRS as well. This platform has since then continued to meet. In parallel, the '*Baukostensenkungskommission*' has been formed to discuss the potential to reduce the cost of renovation while maximising the benefits,

and the stakeholder process in the context of the '*Klimaschutzaktionsplan*' also discussed building measures.

Other Examples

The Buildings Performance Institute Europe (BPIE) reviewed the strategies of selected countries (Croatia, Czech Republic, France, Greece, Hungary, Ireland, Italy, Poland, Spain) and also pointed out good examples of consultation with the *Plan Bâtiment Durable* in France and the **Rehabilitation working Group (GTR)** in Spain. The first was launched in 2009 and consists of a permanent team, the office and the assembly including in total between 200 and 300 persons from the building, energy or environment sector as well as from assurance companies, engineering and banks³. The Spanish GTR, a group of industry and technical experts, released a report in 2012 with an action plan for a new housing sector⁴.

3.1.3 Critical Success Factors for public participation

Based on group discussion, the following would be considered useful suggestions:

- Discussion on rules and a clear understanding of the organisation of the process
- Keep on track and avoid getting stuck on one issue, despite disturbances from lobbyists
- A nominated lead to facilitate and move conversation along
- Professional facilitation from experts in the field
- Single communication for complex issues
- Promotion of thinking outside the box
- Continuity of the dialogue and process
- Focus on co-creation and acceptance
- Sufficient education and training
- Ensuring that results of discussions are gathered and summarised
- Limit responses by offering options
- Structured and controlled process with a stepped approach
- Strike a balance amongst the stakeholders included
- Hold a transparent discussion, with no hidden agenda
- Responding to comments is rather time-consuming.

Some barriers to successful public consultation were also raised in discussion. These included cost and administrative issues, language barriers, pressure from lobbying groups, large group sizes and a lack of interest of key stakeholders. The question was also raised about how to engage with less organised groups of stakeholders. It was suggested that running more targeted events may help solve this.

Highlights of 3.1	Broad selection of methodologies for public participation, allowing for co-creation and creativity.
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Main Outcomes of 3.1
<p>Public participation describing the interaction between government and the public is considered to result in better outcomes and better governance. The main benefits are a higher acceptance of decisions and implementation as public interests are better reflected, but also the creation of new ideas and approaches. A number of different methodologies were discussed, from world cafes and focus groups to opinion polls and roundtables.</p> <p>Participation approaches differ according to particularities of the countries. While in Denmark 40 stakeholders were invited, who in turn were allowed to invite four others, a combination of invited web-based feedback and two stakeholder meetings were carried out in Ireland. In Croatia, the public consultation took place as side-event to a conference and thus synergies are used. The individual approaches in the Member States can also be differentiated with regard to the outcomes: Since the public consultation in Denmark started with the discussion of potential measures, the outcome was a set of 21 proposals and measures. In Ireland, the comments and feedback on official documents were sought and in Croatia, the outcome was a signed joint charter.</p> <p>The three presented public consultation processes all show different characteristics: One major advantage in the Danish process was that the minister gave positive impetus on the kick-off of the PC process. In addition, the formation of subgroups defining their own rules allowed target-group oriented discussion. In Ireland, the public consultation was well structured with a clear timeline. Due to the open web-based feedback format, one of the major challenges was to reach the right audience. Due to the organization of the public consultation as side-event to a conference in Croatia, the cooperation of a broad range of stakeholders was enabled.</p> <p>Success factors include clear rules, professional moderation and appropriate structures for lobby groups. Challenges are, amongst others, cost and administrative issues, language barriers, pressure from stakeholder groups, large group sizes and a lack of interest of key stakeholders.</p>

3.2 Indicators, milestones, scenarios and NECP

As part of the long-term renovation strategies (LTRS) required under Article 2a of the revised EPBD, Member States are requested to develop a roadmap with measures, progress indicators, and indicative milestones to ensure compatibility with the long-term targets.

'In its long-term renovation strategy, each Member State shall set out a roadmap with measures and domestically established measurable progress indicators, with a view to the long-term 2050 goal of reducing greenhouse gas emissions in the Union by 80-95% compared to 1990, in order to ensure a highly energy efficient and decarbonised national building stock and in order to facilitate the cost-effective transformation of existing buildings into nearly-zero-energy buildings. The roadmap shall include indicative milestones for 2030, 2040 and 2050, and specify how they contribute to achieving the Union's energy efficiency targets in accordance with Directive 2012/27/EU.'

In the context of the CA EPBD, different elements of the LTRS were discussed, including strategic approaches (chapter 3.2.1), links to NECPs (chapter 3.2.2), indicators and milestones (chapter 3.2.3) as well as trigger points (chapter 3.2.4).

3.2.1 Strategic routes towards decarbonisation in the LTRS

The inherent goals of the LTRS, i.e., the highly energy-efficient and decarbonised building stock, pose strategic challenges, but also methodological questions regarding the definition and quantification of milestones and indicators⁵.

Each Member State has different strategic approaches and challenges to decarbonise its building stock, given the different points of departure with respect to the energy mix, the climate conditions, the traditions and preferences as well as the building stock characteristics. These strategic aspects were collected in country posters.

The balance between heating and cooling with renewables and energy efficiency. One example for an energy-strategic decision is the contribution of renewables and energy efficiency to the overall decarbonisation target. The balance between the two approaches depends on, amongst other things, available RES potentials, the characteristics of the building stock, energy price levels and implemented policies.

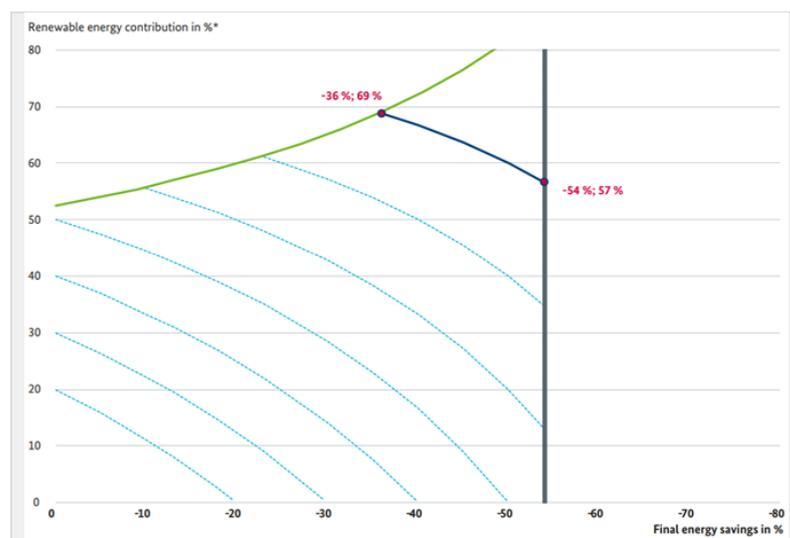


Figure 2: Contribution of RES and final energy demand reduction to the overall targets in selected countries (Status 2020).

The figure shows how Member States' approaches vary with respect to the contribution of renewable energy versus efficiency to the overall savings targets. It should be noted that different Member States have different system boundaries, base years and methodologies, so the results presented are not directly comparable.

As an example of how to deal with the ratio between efficiency and renewables, the **German** Energy Efficiency Strategy for Buildings of the German Government (BMWi 2016), based on a detailed investigation of insulation restrictions (e. g., protected houses and facades), RES potentials (GIS based calculations of geothermal, solar thermal, PV, biomass, and heat pump availability), and available district and waste heat potentials, derives a roadmap for an optimal strategy to achieve the 2050 target of reducing non-renewable primary energy demand of buildings by 80% until 2050. The strategy recommends final energy savings between at least 36% (coupled with very high shares of RES of 69%) to energy savings

of 54% (in combination with 57% RES share). Energy savings in the total building stock of more than 54% yield proportionally higher system costs. Based on this roadmap, two detailed scenarios were calculated (Prognos, ifeu, IWU 2016) and form the foundation for the NECP calculation. On top of that, a macroeconomic analysis determines the employment effects and wider benefits of these scenarios (Prognos 2017). An on-going debate concerns the degree to which heat pumps will be employed for heating. Different scenarios quantify up to 6 million heat pumps in the year 2030. Studies analyse optimal expansion paths for heat pumps, in interaction and competition with continued installations of gas boilers which would then increasingly employ green gas (power to gas, biomethane).

Country	Share of RES In total heating and cooling demand			Savings In final energy demand for building stock			Base year	Scale	not yet decided
	2018	2030	2050	2018	2030	2050			
Austria							1990	quantitative scale	
Belgium / Flanders							2007	quantitative scale	yes
Bulgaria								quantitative scale	yes
Croatia							2017	quantitative scale	
Cyprus							2010	quantitative scale	
Denmark							2005	quantitative scale	yes
Estonia								quantitative scale	yes
Finland							2012	quantitative scale	
France							2012	quantitative scale	
Italy							baseline	quantitative scale	
Luxemburg							1995	quantitative scale	
Slovakia							average of 2001-2005	quantitative scale	
Spain							2015	quantitative scale	yes

Figure 3: Corridor to achieve the -80 primary energy target: combining energy efficiency and RES (BMWi 2016).

As a way to determine cost-effective pathways towards decarbonisation, **Flanders** investigated the cost-optimal energy performance levels for the renovation of residential buildings in a 2015 study. The energy performance requirement was set at E90, which expresses the ratio of annual primary energy consumption divided by a reference consumption. The study showed that the macro-economic optimum, depending on the building type, was between E43 and E80.

These insights formed the basis for the long-term objective for 2050 for residential buildings, which was established in 2016 in consensus with 34 stakeholders. It consists of two equivalent tracks the owner can choose: a package of measures (U-values of building shell and heating system) and an energy performance indicator, offering more flexibility to reach the goal and aiming for an energy level equivalent to an energy score (EPC) of 100 kWh/m², or E60. With this scenario, a reduction of energy use of 76% compared to 2012 can be achieved in 2050.

In this approach, it was assumed that the long-term objective is achieved without the application of renewable energy sources: heating and production of domestic hot water are provided in the scenario through a condensing gas boiler. The Flemish Energy vision, however, states that the energy sources for heat and refrigeration will be various and increasingly renewable (ambient heat, geothermal, solar heat and so on) in the future. By 2050, no fossil fuels will be used in any building. A follow-up study on cost-optimal renovation, taking into account the costs of the replacement of fossil-fuel-driven installations by renewables, is essential. Meanwhile, a decarbonisation plan is being prepared. To promote the use of heat pumps, the price for (renewable) electricity, which is very high due to various taxes and the incorporation of the cost of energy efficiency-grant schemes, should decrease. This could be obtained by shifting these extra costs to the tariff for gas.

Non-cost-effective renovations. Cost-effective renovations have been determined in the 2014 and 2017 LTRS, but there is still a certain part of the building stock where the renovation actions are not cost-

effective or hard to implement. This is another strategic challenge in the LTRS and is the case in many residential buildings in Mediterranean countries, where energy savings are less significant, meaning that payback periods would be so long that renovations would never take place. Also, in some energy-poor households, where heating is limited due to energy cost constraints, renovations are not cost-effective. The LTRS roadmap can also provide answers for this building segment.

Spain, for example, has a range of very different climatic zones: Atlantic, Continental, Mediterranean and the Canary Islands. In some of them, energy savings would be less significant, making payback periods so long that renovations would never take place if they had to be cost-effective. The 2017 LTRS started to explore this problem, which would probably mean that there is no need to renovate the building envelope of the whole Spanish housing stock, but only to define partial refurbishments (double glazing, bioclimatic and shading mechanisms, etc.) for Mediterranean areas. On the other hand, there are excellent opportunities for solar energy. Solar energy self-consumption has recently been regulated and it is expected that it will play an important role in the future. Energy poverty is also another example of non-cost-effective renovation, but in this case, there are other wider benefits that can be considered in macro-economic terms.

Role of heat supply options and energy carriers for heating. The role of the various fossil and renewable heating and cooling options vary significantly from country to country. For example, the role of capital cost-intensive and long-term infrastructures, such as gas and district heat pipelines, are discussed in the Member States, as well as the future share of power to gas, power to liquid and electrification of the heating sector.

3.2.2 Links between LTRS and NECPs

The milestones to be reported in the LTRS, together with the indicators and the expected energy savings and wider benefits, will be based on the integrated National Energy and Climate Plan (NECP). In these NECPs, Member States must also describe the LTRS, including the policies, measures and actions required under Article 2a of the revised EPBD.

Some points and issues that were raised through the questionnaire included:

- Member States generally have a close link between NECP and LTRS;
- A problem can arise when the two are carried out by different ministries, which is the case in some Member States. In other Member States, there is a division between state and federal responsibility which can worsen the problems.

For example, in **Belgium** (Flanders Region), in order to prepare the energy transition and draw the path towards a new energy model, starting in 2016 the Flemish government worked on a long-term vision in consultation with citizens, the building sector and civil society. On the basis of five pillars (energy efficiency, renewable energy, flexibility, financing and governance), the vision of the energy system was designed and concrete proposals were made for policy and action on the ground. The LTRS became part of this and the NECP builds further upon this basis. In order to achieve the EU 2030 objective for energy efficiency of 32.5%, the existing policy from the LTRS (grants for energy efficiency measures, solar boilers and heat pumps, and energy performance standards for deep renovation) proved to be insufficient, and additional policy measures were formulated in the NECP. As a result, they will be incorporated in the LTRS.

For the LTRS in **Croatia**, the country has established an 'Open partner dialogue' and 'Signing a Charter on cooperation aimed at decarbonisation of buildings by 2050'. The dialogue gathered representatives of state

administration and local self-government units, the academic community and public experts, the construction and energy sector and their supporting industries. The aim is to foster through common dialogue the successful implementation of the nearly zero-energy buildings standard as well as the national long-term strategy of the energy renovation of buildings; this is to support the transformation, by 2050, of the existing building stock into a decarbonised and highly energy-efficient building stock. By signing the charter, the efforts for constructive, active and continuous action by all stakeholders will be reaffirmed. NECPs are organised in workshops and panel discussions with specialists and representatives of the state administration. The link between them is organised so that representatives from the energy and climate sector are participating in all workshops, discussions and consultations. The current version of NECPs include data from the LTRS 2014-2017 which will be updated this year when the new LTRS will be finished. Also, the current version of NECPs refer to scenarios for building and energy strategy from previous years. Those scenarios will be reviewed in the new LTRS and aligned with all the strategic documents in the Republic of Croatia.

3.2.3 Indicators and milestones

EPBD Article 2a leaves a great degree of freedom to the Member States with respect to defining indicators and milestones. **Indicators** describe – quantitatively or qualitatively – the state and progress with respect to the decarbonised building stock and comprise, for instance, the number of buildings (per type, age, etc.), their energy demand, the annual share of renovated buildings, or the renovated area, etc. The indicators can also describe the various policies and measures as required in Article 2a, i.e., public incentives for deep renovation, public investments addressing energy poverty and split-incentives, the number of buildings equipped with building energy management systems, the number of skilled workers, etc.

The **milestones** describe set goals which contribute to the overall Union's energy efficiency targets under the EED. This could, for instance, be the energy and CO₂ emission savings in the building sector, but also the percentage reduction of people affected by energy poverty, etc.

In 2019, the Commission published a Recommendations document⁶ aimed at helping Member States apply the new and revised parts of the EPBD. This document is for guidance and does not alter the legal effects of the Directive. In terms of milestones and indicators, the document provides these as a way of measuring progress towards achieving goals and specifying how measures will contribute to the EU's targets. They are intended to provide useful information for Member States and are provided in a table alongside the paragraphs in Article 2a to which they relate. It is recommended that Member States use these early in the definition of LTRS – perhaps with some adjustments for local requirements – so that stakeholders have a clear understanding of the roadmap. A section in the recommendations provides examples of good practices. Some of these are the 'Build Upon' project which brought together government, businesses, NGOs and householders.

Member States databases can provide useful background information but are not always up to date. For example, renovation works that are carried out privately are usually not recorded into any database until their next EPC assessment is carried out. Other Member States found that it is difficult to define assumptions over the long-term, which means that targets can shift over time. Also, due to different climatic conditions, there can be differences in targets across a country.

Figure 4 summarises the results from the questionnaire.

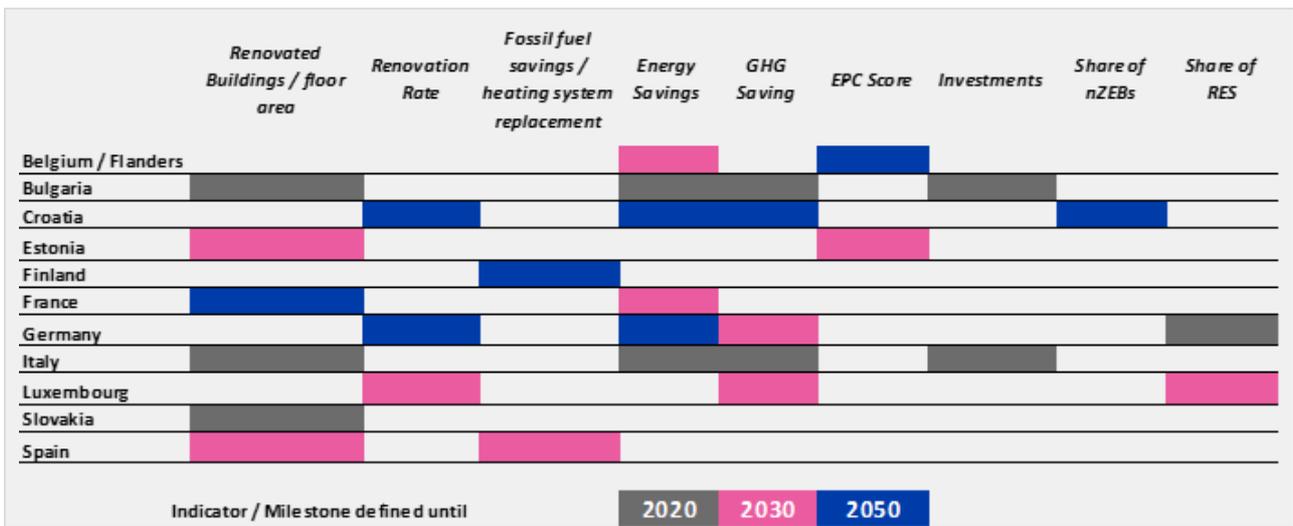


Figure 4. Indicators used in the respective LTRS of the countries⁷.

In Flanders in December 2018, a free building passport tool was launched, offering the residential building owner insight into all information that is publicly available on the building as well as the energy performance, solar potential, soil contamination, building quality and so on. The Energy Performance Certificate (EPC) with the long-term renovation advice is also included. Additional functions will be added, e.g., the possible upload of renovation evidence, the automated grant application and the possibility of third parties (architects, contractors, potential buyers and so on) to add insight into all of this information. Eventually, it will be possible to use this tool to more effectively progress towards the 2050 long-term goal. In the meantime, the following set of indicators is used:

- Average energy use per dwelling since 2012, both fossil and total;
- Insulation rate (% of building stock) since 2011 and for each year relative speed in relation to 2011, enabling the extrapolation for which year that 100% will be reached at a given rate;
- Heating: number of installations replaced by condensing boilers or heat pumps, replacement rate and distance to target;
- Renovation activity: energy-efficiency grants, renovation loans, renovation permits.

This set of indicators is a work in progress, both for the content as well as the methodology. Flanders considers to document the indicators as a 'Dashboard of indicators'.

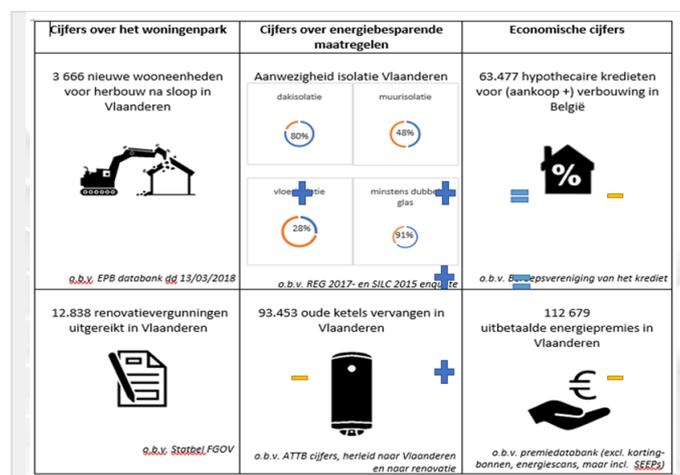


Figure 5: Flanders renovation dashboard.

3.2.4 Trigger points

Trigger points are a new element of EPBD Article 2a. These could include a change in ownership, damage or aesthetic work, children moving out, a need to change components or the recognition of poor indoor quality. In the case of multi-family houses, it is required to involve the owner, e.g., with an obligation. Trigger points can be instigated by policy instruments such as a change in regulation, the need for obligatory auditing or incentives from the state (promotional programmes, bonus systems). To identify trigger points and to trigger renovations, it is important to share best practices and promote communication and public consultation. In Table 1, possible trigger points and associated policy responses based on the discussion and on further analysis performed by ifeu are summarised.

Table 1: Possible trigger points and associated policy responses (examples)

Trigger point	Policy response	Examples
Change of ownership (sale or inheritance)	Mandatory requirements	Germany: Retrofit obligations to replace old boilers in single-family houses
	Obligation to carry out energy audit when building is sold	
Change of tenants	see above	Flanders: minimum requirements for roof insulation when building is rented
Age of components transcended (e.g. boilers > 30 years)	Mandatory requirements	Germany: Retrofit obligations to replace old boilers in single-family houses
Technical building components are upgraded or replaced	Mandatory requirements	Germany: When a wall is upgraded or windows are replaced, new components have to fulfil efficiency requirements
Aesthetic building renovation and larger maintenance work	Mandatory requirements	see above
Conversion of building for accessibility, acoustic insulation, etc.	Coupled support schemes	Germany: Joint KfW support for barrier free and efficient buildings
Extension of the building, conversion of roof space	Mandatory requirements	
Chimney sweeping and control	Energy advice, control of top floor ceiling insulation	
Buildings with low energy performance	Renovation obligation	France: Obligation to renovate buildings >330 kWh/m ² .year primary energy
Personal circumstances changing (new children, children moving out,)	Support scheme for optimising building layout and energy performance	
Retirement	Support scheme for optimising building layout and energy performance	
Energy audits carried out	Improved financial support for subsequent implementation of recommended renovations	
Comprehensive thermography in village/city	Mailing with offer for free advice	
'Energy caravan'	Door-to-door campaign for energy advice	Germany: 'Energiekarawane'
Taxes and change in regulation	Mandatory requirements	

Source: ifeu based on discussion during the CA EPBD London meeting.

Highlights of 3.2	<ul style="list-style-type: none"> • Flanders developed a “renovation dashboard” to demonstrate indicators, milestones and the respective progress to achieve that, as well as an individual “Woningpass”, offering the residential building owner insight into all information that is publicly available on the building as well as the energy performance, solar potential, soil contamination, building quality and so on. • Spain developed a renovation strategy adapted to the climate, resulting in partial refurbishment requirements in Mediterranean countries.
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Main Outcomes of 3.2
<p>On a procedural level, CT 4 discussed, amongst others, indicators and milestones, the links between LTRS and NECPs, and data and modelling. Different timing and responsible ministries can present a challenge for establishing the LTRS. For many useful indicators, such as renovation works that are carried out privately the activities are not usually recorded into any database until their next EPC assessment is carried out. Trigger points could include a change in ownership, damage or cosmetic work, children moving out, a need to change components, or recognition of poor indoor quality. In the case of multi-family houses, it's required to involve the owner, e.g. with an obligation for the owner. Trigger points can be instigated by policy instruments such as a change in regulation, the need for obligatory auditing or incentives from the state (promotion programmes, bonus systems).</p>

3.3 Wider benefits

Wider benefits are benefits related to energy efficiency measures and deep renovations that go beyond energy savings and cost reductions. Wider benefits range from an increase in property value to growth of employment and exports to reduced fuel poverty or improved quality of life. Article 4 of the EED on building renovation already included requirements regarding wider benefits. With the revision of the Energy Performance in Buildings Directive in 2018 (Directive (EU) 2018/844) the request has been specified and the long-term renovation strategy shall encompass 'an evidence-based estimate of expected energy savings and wider benefits, **such as those related to health, safety and air quality**'. Within the CA EPBD, three major parts of the topic were discussed:

- General advantages and figures on wider benefits;
- Specific examples from the health and construction sector;
- Communication of wider benefits.

3.3.1 General figures

In addition to GHG savings being a major benefit, Europe-wide studies point out additional co-benefits of the energy efficiency in the building stock, e.g.:

- For every 1 € invested, at least 0.42 € is saved in health care costs (EuroAce 2018)⁸: Holistic renovation works, where the right combination of materials, equipment and controls are installed together and can boost the comfort, health and well-being of occupants;
- Each 1 million € invested in energy efficiency creates eight to 27 job positions per year in the EU⁹; the IEA indicates 12 to 18 job positions per million;

- GDP growth rates ranging from 0.25% to 1.1% induced by energy efficiency (EmBuild 2017), tax income from the new jobs created and the VAT revenues on materials and equipment increase, social welfare payments decrease as unemployment is reduced, and overall healthcare costs fall as the well-being among occupants increases (EuroAce 2018)⁸.
- Looking at EU-wide residential refurbishments, an annual investment of 23.5 billion € per year was modelled within the COMBI-Project to deliver 23.5 TWh of energy savings per year. In addition to this, it was found that several other benefits could be achieved, including over 2,300 avoided premature deaths due to particulate matter, 139 Mt of material resource savings, 39 million additional workdays and 29 TWh of power generation from combustibles avoided. It was found that although the energy savings alone would payback the costs of refurbishment, the wider benefits make the work even more attractive. These wider benefit impacts have a value of around two-thirds of the energy savings based on lower bound estimates (COMBI 2018)¹⁰.

Due to individual characteristics of each country regarding climate condition, composition of the building stock, or current economic situation, a generalisation of wider benefits is not possible. In addition, wider benefits are very context-specific and not linear. Thus, the above-mentioned figures should be interpreted as examples and a rough order of magnitude and vary throughout the Member States.

3.3.2 Wider benefits in the health sector

Ian Hamilton from University College London pointed out the impacts of energy efficiency measures in the health sector. He aimed to design strategies based on the effects of energy efficiency and health on each other. In the UK, fuel poverty is an issue in 11% of households and affects households in the worst performing buildings the most. It has been found that poor indoor environments can have a negative effect on health, which can increase the chances of developing cardiovascular diseases and cancer. Although energy efficiency measures may not be cost-effective in all cases when looking at only energy savings as the payback metric, if the savings to the health service are also included, then the measures taken become much more appealing.

There are three main ways in which energy efficiency measures improve health. These are improved ventilation rates, improved heat loss characteristics, and reducing the cost to heat buildings. It is important to ensure that whilst these works are carried out to gain desired outcomes, unintended consequences can be introduced, and these should be avoided through good design and workmanship. Through modelling improvements that achieve these aims, policies have been designed to ensure the most cost-effective solutions are carried out. An example of the work is that the cost of installing 1 million retrofits in fuel-poor households would cost around £2 billion. Energy savings in this case would be £1 billion. Personal health gain plus health service savings would total £220 million. Including other values such as air quality, carbon emissions, comfort taking value and utility to households, the total net present value could be £2.8 billion¹¹.

3.3.3 Wider benefits from the construction sector

Martin Bo Westh Hansen from Copenhagen Economics focused on the economic benefits of renovation with a focus on how the cost of energy efficiency measures are reflected in the increased value of houses. One of the key reasons a householder may pay more for a house with a higher energy rating is that the energy bills will be lower. However, this is just one of the benefits; others include aspects such as improved thermal comfort. Some of the problems identified are: buyers may be unsure of the quality of energy efficiency measures; they may be unsure of future fuel costs; and they may be unable to secure the larger

finances needed for the typically more expensive homes that have higher energy efficiency ratings. Overall, it was found that energy ratings have an influence on selling prices and in a typical Danish house, moving up one rating band adds 7,000 € to the selling price. However, this is not as big as the 10,000 € that would be expected due to the problems mentioned earlier. One of the key solutions identified is to ensure buyers are given enough information on both the energy saving issues as well as the wider benefits such as health¹².

3.3.4 Communication of wider benefits

Based on group discussions, communication channels for wider benefits were collected in Table 2.

Table 2: Possible communication channels for wider benefits.

Wider benefit	Communication channel
Health	Health/social officer
Productivity	Employment reports
Property value increase	Real estate market
Fire protection	Fire protection authorities
Asbestos removal	Ministry of environment
Increased comfort	Surveys to ask people how they feel
Outdoor air quality	Air pollution reports

Highlights of 3.3	<ul style="list-style-type: none"> • In a British study, the interrelation between health and energy efficiency was investigated. It was found that the cost of installing 1 million retrofits in fuel poor households would cost around £2 billion. Energy savings in this case would be £1 billion. Personal health gain plus health service savings would total £220 million. Including other values such as air quality, carbon emissions, comfort taking value and utility to households, the total net present value could be £2.8 billion. • In a Danish study it was shown that energy ratings have an influence on selling prices and in a typical Danish house, moving up one rating band adds €7,000 to the selling price.
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Main Outcomes of 3.3	<p>Wider benefits are discussed in the Member States, especially benefits related to health and employment. In most of the member states the final figures are still missing. It has been found that building improvements, such as improving insulation or ventilation, can enhance air quality and thermal comfort, which in turn can lead to better health for occupants with associated knock-on effects to national health services. By quantifying these benefits, payback periods for energy efficiency measures can be shortened, thus more work is likely to be financed and carried out.</p> <p>In the Combi project, the effects of multiple impacts of energy efficiency measures were analysed. Looking at EU wide residential refurbishments, an annual investment of €23.5bn per year was modelled to deliver 23.5TWh of energy savings per year. In addition to this, it was found that several other benefits could be achieved including over 2,300 avoided premature deaths due to particulate matter, 139Mt of material resource savings, 39 million additional workdays and 29TWh of generation of power from combustibles avoided. These wider benefit impacts have a value of around two thirds of the energy savings based on lower bound estimates.</p> <p>One key aspects is ensuring people understand these benefits and how it will affect them so that they are more engaged. Wider benefits can be used in various communication channels to raise awareness of energy efficiency and deep renovation, e.g., between various ministries.</p>
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3.4 Capacity and skills of professionals in the building value chain

In many countries, a shortage of skilled workers in the construction and energy efficiency sectors presents a severe bottleneck for renovation activities and leads to rising renovation costs and quality issues. EPBD Article 2a (1) f) requires Member States to report on initiatives regarding 'skills and education in the construction and energy efficiency sectors'.

The capacity and skills of professionals in the building value chain were addressed in one of central team's 'Renovation Strategies' sessions. Due to the COVID-19 pandemic, this session was prepared and then postponed to a later plenary meeting.

3.4.1 Current situation

In the EU, the technological revolution is causing significant changes in the working environment – some jobs are at risk of being lost to machines, others are being transformed and new ones are being created (Vazquez et al. 2019). Technological developments related to energy efficiency and digitalisation are pushing the current work force to obtain new skills.

The crisis in Europe in the last decade also affected the construction sector by labour shortages. This is particularly the case in Germany and Luxembourg, where shortages are reported mainly for low- and medium-skilled jobs. Skill shortages are often affected by skill mismatch – the difference between the qualification level of jobseekers and the job requirements, and both over and under qualification can occur (European Construction Sector Observatory - Analytical Report, 2017).

According to the conclusions of the BUILD UP Skills projects (Pillar I), more than 3 million workers in Europe require up-skilling on energy efficiency or renewable energy sources by 2020 (Build Up Skills Pillar I, 2019).

Professionals in need of training on these topics range from on-site workers, craftspeople and technicians to architects, engineers and building managers. In addition, new digital related skills are required, e.g., due to the usage of Building Information Modeling (BIM).

To address this situation, different approaches have been developed, notably in the framework of EU-funded projects, e.g., upgrading qualification schemes for blue collar workers to construct nearly zero-energy buildings ([NEWCOM](#)) and BIM on-site trainings for better airtightness and ventilation performance ([BIMplement](#)). The *Energiesprong*-approach developed in the Netherlands allows workers to work indoor during regular working time and independent of weather conditions thanks to the prefabrication of components.

Barriers

In Europe, several structural barriers exist that lead to skill shortages and mismatches in the construction sector. In the European Construction Sector Observatory - Analytical Report, (2017), the authors point out some elementary barriers in the construction sector that can also be transferred to other skill categories. One problem is the decrease in the number of young skilled workers in the sector due to the **bad image** of the construction sector, which has **low(er) wages** compared to other sectors. **Safety risks** and **unattractive working conditions** are also named as a hurdle. In Europe, the **migration** of highly skilled workers from countries with lower wages to countries with higher wages also causes problems, since it can create a shortage of highly skilled workers in the former.

As only few young skilled workers are attracted by the sector, the **ageing** of the construction sector is a second relevant obstacle: In Germany, the majority of construction workers are 35 to 50 years old. This also

provides additional barriers for the integration for new skills in industry and needs to be addressed by suitable training and education programmes. On top, a **misalignment** between trainings and the demand for skills on the construction labour market slows down the upgrade and the development of the sector, often leaving workers with outdated skills.

Training

Thus, the uptake and development of new qualifications and training programmes as well as the upgrade and the renewal of existing schemes is one of the main challenges to overcome the barriers and prevent or counteract a shortage of skilled workers.

However, the development of training programmes for building workers is also facing some challenges: rapidly evolving regulations and also a lack of policy coordination makes target-oriented training more difficult. In addition, the lack of funds for training, especially for smaller companies, the lack of interest and time to enroll as well as uncertainties regarding training results are relevant economic and financial obstacles. As well, language barriers – especially for foreign workers due to migration – have to be addressed by the training programmes (Build Up Skills Pillar I, 2019).

BUILD UP Skills – a European initiative running since 2011 – addresses this gap by training building professionals and preparing them to meet the challenges posed by new energy efficiency regulations and a constantly evolving setting. The initiative aims to increase the number of qualified building professionals across Europe to deliver building renovations offering high-energy performance as well as new nearly zero energy buildings. Based on an analysis of 22 projects, the following conclusions regarding the training and education of skilled workers are drawn (Trinomics and Visionary Analytics, 2018):

1. Filling a market gap:

It is important that new courses cover new content and truly complement existing programmes, including existing in-company trainings or trainings developed by technology providers. Practical trainings and demonstrations should be given priority, as they provide the possibility of discussion and communication amongst craftsmen from different professions, thus offering interdisciplinary learning. Although classroom work is needed, the practical component of training needs to represent at least half of the total hours taught.

2. Providing flexibility in the training design

Since every professional has different needs, flexibility is key to the design of training offers. This includes the offer of local training facilities to minimise long travel distances, the possibility to attend either daytime or evening classes as well as the wide variety of material in different formats, to ensure a wider adoption and acceptance for use.

3. Securing stakeholder involvement

The involvement of the relevant stakeholders, from industries, training providers or governmental institutions is key to creating synergies and facilitating a customer-orientated approach to the trainings provided.

4. Budgeting with care and securing long-term financing

Developing new curricula and high-quality training materials is time- and resource-intensive. In addition, to avoid one-off actions, projects need to secure long-term support from other available funding streams.

5. Providing recognition

Providing certification for trainees or the trainers is important for providing the necessary visibility on the market and increasing the demand for skilled professionals

In this upcoming CA EPBD session, focus is on how to overcome the above-mentioned barriers and exchange ideas on policy instruments to tackle the challenge of continuously upskilling building professionals towards energy efficiency and sustainability.

Based on a questionnaire, Member States status will be highlighted in order to get some deeper insights into the BUILD UP Skills initiative. The project pitches will serve as input for the interactive part, where the collection of measures for a better workforce is foreseen.

Highlights of 3.4

- The NEWCOM project develops a database for the transparency of qualifications for the mutual recognition of training schemes.
- BIMplement aims to improve the quality of nZEB construction and renovation by training the value chain in a cross trade and cross level approach, strengthened with BIM enhanced workplace learning tools.

Main Outcomes of 3.4

CT 4 also addressed the issue of workforce and skills. In the EU, the technological revolution is causing significant changes in the working environment – some jobs are at risk of being lost to machines, others are being transformed and new ones are being created. Technological developments related to energy efficiency and digitalisation are pushing the current work force to obtain new skills. The crisis in Europe in the last decade also affected the construction sector by labour shortages. This is particularly the case in Germany and Luxembourg, where shortages are reported mainly for low- and medium-skilled jobs. Skill shortages are often affected by skill mismatch – the difference between the qualification level of jobseekers and the job requirements, and both over and under qualification can occur. More than 3 million workers in Europe require up-skilling on energy efficiency or renewable energy sources by 2020. Required skills in the building sector range from on-site workers, craftspeople, technicians, architects, engineers and building managers. Member States use different policy instruments to improve the skills situation, including certification schemes and registers of skilled professionals in more than 10 Member States, skills passports or professional skills cards, legislation on education, training, financial instruments and changes in migration law, for instance, for asylum seekers to receive training in craft/renovation.

3.5 Mandatory measures in Member States to trigger energy efficiency in existing buildings

A number of Member States have introduced or plan to introduce mandatory measures or obligations for existing buildings to increase the renovation rate, create additional trigger points for renovation, target the worst-performing buildings or address split incentives.

One session in the CA EPBD investigates mandatory requirements for existing buildings. For selected examples, the process of introduction, the technical details, implementation issues, monitoring and verification, evaluated impacts as well as stakeholder acceptance of the measures are analysed.

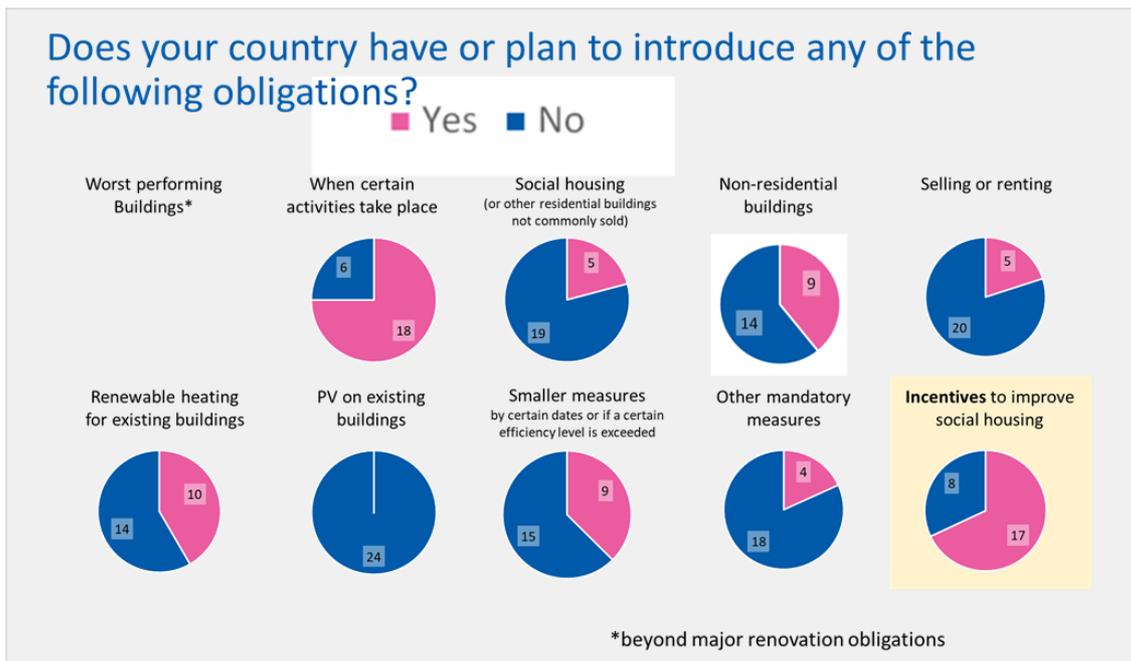


Figure 6: Use of mandatory measures based on a questionnaire of the Member States (source: ifeu).

3.5.1 Situation in 2020

EPBD Article 7 requires Member States to take the necessary measures to 'ensure that when buildings undergo major renovations, the energy performance of the building or the renovated part thereof is upgraded in order to meet minimum energy performance requirements'. In addition, the paragraph requires necessary measures to ensure minimum energy performance in the case of the renovation of certain building elements.

Here, the focus is on requirements that go beyond these compulsory requirements for major renovations. In a first attempt, the requirements could be categorised as follows.

Requirements to renovate worst performing buildings

In this category, Member States require certain renovation activities if the buildings exceed a defined energy consumption, which can either be defined by the efficiency class, the value, or other similar building indicators.

Example: **England and Wales:** The Minimum Energy Efficiency Standards (MEES) came into effect in 2018 with the aim of improving privately rented housing to at least an E rating wherever possible. As included in the MEES for England and Wales¹³:

- From 1 April 2018, a landlord of a privately rented property with an EPC rating of F or G must not grant a new lease or renew an existing lease of that property until works have been carried out to improve the energy efficiency to a rating of E or above;
- From 1 April 2020, a landlord of a domestic privately rented property with an EPC rating of F or G must not continue to let the property until works have been carried out to improve the energy efficiency rating to an E or above;
- **From 1 April 2023**, a landlord of a **non-domestic** privately rented property with an EPC rating of F or G must not continue to let the property until works have been carried out to improve the energy efficiency rating to an E or above^{14, 15}.

Example: **Scotland**. In Scotland, the draft guidance for Energy Efficiency (Private Rented Property - PRS) (Scotland) Regulations 2019, published on 10 June 2019¹⁶, is under the consultation process, due to be laid by the Scottish Parliament later this year. It requires:

- From 1 April 2018, a landlord of a privately rented property with an EPC rating of F or G must not grant a new lease or renew an existing lease of that property until works have been carried out to improve the energy efficiency to a rating of E or above;
- **From 1 April 2020, landlords of PRS properties may not grant a new tenancy for a property rated EPC F or G (unless an exemption applies). The landlord must improve the rating to minimum of EPC E (or register an exemption if one applies) before letting;**
- **By 31 March 2022, the minimum level of energy efficiency will apply to all domestic private rented properties, even if there has been no change in tenancy. From that date, landlords may not continue to let properties with an EPC rating of F or G, even to an existing tenant (unless an exemption applies). Landlords are encouraged to take action as soon as possible, bearing in mind that there is an additional target of EPC rating D, which will apply in a similar way, and may wish to ensure their properties meet or exceed EPC rating D by 31 March 2025, or indeed meet or exceed EPC rating C;**
- **From 1 April 2022, the landlord must not let the property unless the EPC is rated a minimum of D. By 31 March 2025, all PRS properties will need to have an EPC rating D.**

Requirements for non-residential buildings

Certain Member States have specific renovation obligations for non-residential buildings.

Example: **Netherlands**: In November 2018, the Dutch government adopted a new decree about the energy performance of office buildings in the Netherlands (*Besluit inhoudende wijziging van het Bouwbesluit 2012*, dated 2 November 2018). This decree specifically requires that each office building should have an energy performance label of C or higher as of 1 January 2023 (this is equal to an Energy Efficiency Index of at least 1.3) and a performance label A as of 1 January 2030¹⁷.

Example: **France**. In the *décret tertiaire*, which became effective in October 2019, renovation measures for existing non-residential buildings greater than 1,000 m² are required. These buildings must reduce their final energy consumption until 2030 by 40%, 2040 by 50% and 2050 by 60% compared to 2010, with few exceptions. The technical details will be regulated in a separate delegated act. Owners have to report their annual consumption data on an online platform. Fines up to 7,500 € are foreseen if no action plan is submitted.

Requirements for social housing

Some Member States introduced obligations specifically for social housing.

Example: **France**. Since 2016, selling collective social housing apartments is only allowed for apartments better than efficiency class F.

Requirements regarding renewable heating

The introduction of specific requirements regarding renewable heating is not very widespread. To our knowledge, on a national or state level, only the State of Baden-Württemberg in Germany introduced a renewable heating obligation for existing buildings.

Example: **Baden-Württemberg**. In Baden-Württemberg, when replacing a heating system, the owners need to employ a minimum share of renewable energy which is 15% of the heat demand. The law also proposes alternative options: the building owner may choose efficiency measures, including insulation of the building or fulfil part of the obligation by carrying out an energy audit of the building based on an individual building renovation roadmap.

Requirements regarding small measures or individual components

Some countries introduced regulation regarding obligations for smaller measures by certain dates or if a certain efficiency level is exceeded

Example: **Germany**. In Germany, boilers that are older than 30 years have to be replaced by new boilers. However, a number of exemptions are in place (e.g., single-family houses, low temperature boilers, etc., are exempted). Other obligations include the required insulation of heat distribution pipes and the mandatory insulation of the top floor ceiling.

Other requirements could include requirements for buildings that are sold, or photovoltaics.

Highlights of 3.5	<ul style="list-style-type: none"> • The Netherlands require that each office building should have an energy performance label of C or higher as of 1 January 2023. • In the State of Baden-Württemberg, when replacing a heating system, the owners need to employ a minimum share of renewable energy which is 15% of the heat demand.
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Main Outcomes of 3.5
<p>To date, a number of Member States have introduced, or are planning to introduce mandatory regulatory measures for existing buildings to increase the renovation rate. In a study, 30 relevant cases of MEPS implementation were identified, 4 of which are currently being enforced. As an example, in Great Britain, MEPS are enforced through meeting a specified EPC rating. To ensure that renovations were not performed to simply meet the standard, and thereby result in a shallow renovation, incentives were also used. In Flanders, for residential buildings specifically, MEPS are enforced through a package of stimuli and the meeting of a specified EPC rating. For non-residential buildings, MEPS are met by reaching a specified EPC rating OR carrying out a number of renovation measures that have been explicitly outlined. It was noted that acceptance of meeting these obligations has been relatively difficult for existing buildings, although this tension could be alleviated if targets and obligations were implemented gradually.</p>

4. Lessons Learned and Recommendations

This chapter will be supplied with additional information in the final version of the CTM Reports.

The aim of this central team's work is to support Member States in the preparation and implementation of their long-term renovation strategies as defined in the newly introduced EPBD Article 2a. Toward this end, a number of different elements, established as well as those newly introduced into EPBD Art. 2a, are analysed and discussed. Until April 2020, eight sessions were organised by the team and centered around procedural, methodological, strategic and policy questions of EPBD Article 2a.

As part of the long-term renovation strategies (LTRS) required under Article 2a of the revised EPBD, Member States are requested to develop a roadmap with measures, progress indicators, and indicative milestones to ensure compatibility with the long-term targets.

Each Member State has different **strategic approaches** and challenges to decarbonize its building stock, given the different points of departure with respect to the energy mix, the climate conditions, the traditions and preferences as well as the building stock characteristics. These strategic aspects were collected in country posters. One example for an energy-strategic decision is the contribution of **renewables and energy efficiency** to the overall decarbonisation target. The balance between the two approaches depends on, amongst other things, available RES potentials, the characteristics of the building stock, energy price levels and implemented policies.

Wider benefits are discussed in the Member States, especially benefits related to health and employment. In most of the member states the final figures are still missing. It has been found that building improvements, such as improving insulation or ventilation, can enhance air quality and thermal comfort, which in turn can lead to better health for occupants with associated knock-on effects to national health services. By quantifying these benefits, payback periods for energy efficiency measures can be shortened, thus more work is likely to be financed and carried out.

In the Combi project, the effects of multiple impacts of energy efficiency measures were analysed. Looking at EU wide residential refurbishments, an annual investment of €23.5bn per year was modelled to deliver 23.5TWh of energy savings per year. In addition to this, it was found that several other benefits could be achieved including over 2,300 avoided premature deaths due to particulate matter, 139Mt of material resource savings, 39 million additional workdays and 29TWh of generation of power from combustibles avoided. These wider benefit impacts have a value of around two thirds of the energy savings based on lower bound estimates.

One of the key aspects is ensuring people understand these benefits and how it will affect them so that they are more engaged. Wider benefits can be used in various communication channels to raise awareness of energy efficiency and deep renovation, e.g., between various ministries.

On a policy level, a special focus was put on **Minimum Energy Performance Standards (MEPS)** and other requirements for existing buildings. To date, a number of Member States have introduced, or are planning to introduce mandatory regulatory measures for existing buildings to increase the renovation rate. In a study, 30 relevant cases of MEPS implementation were identified, 4 of which are currently being enforced. As an example, in Great Britain, MEPS are enforced through meeting a specified EPC rating. To ensure that renovations were not performed to simply meet the standard, and thereby result in a shallow renovation, incentives were also used. In Flanders, for residential buildings specifically, MEPS are enforced through a package of stimuli and the meeting of a specified EPC rating. For non-residential buildings, MEPS are met by

reaching a specified EPC rating OR carrying out a number of renovation measures that have been explicitly outlined. It was noted that acceptance of meeting these obligations has been relatively difficult for existing buildings, although this tension could be alleviated if targets and obligations were implemented gradually.

CT 4 also addressed the issue of **workforce and skills**. In the EU, the technological revolution is causing significant changes in the working environment – some jobs are at risk of being lost to machines, others are being transformed and new ones are being created. Technological developments related to energy efficiency and digitalisation are pushing the current work force to obtain new skills. The crisis in Europe in the last decade also affected the construction sector by labour shortages. This is particularly the case in Germany and Luxembourg, where shortages are reported mainly for low- and medium-skilled jobs. Skill shortages are often affected by skill mismatch – the difference between the qualification level of jobseekers and the job requirements, and both over and under qualification can occur. More than 3 million workers in Europe require up-skilling on energy efficiency or renewable energy sources by 2020. Required skills in the building sector range from on-site workers, craftspeople, technicians, architects, engineers and building managers. Member States use different policy instruments to improve the skills situation, including certification schemes and registers of skilled professionals in more than 10 Member States, skills passports or professional skills cards, legislation on education, training, financial instruments and changes in migration law, for instance, for asylum seekers to receive training in craft/renovation.

On a procedural level, CT 4 discussed, amongst others, **indicators and milestones**, the links between LTRS and NECPs, data and modelling, as well as public participation. Different timing and responsible ministries can present a challenge for establishing the LTRS. For many useful indicators, such as renovation works that are carried out privately the activities are not usually recorded into any database until their next EPC assessment is carried out. **Trigger points** could include a change in ownership, damage or cosmetic work, children moving out, a need to change components, or recognition of poor indoor quality. In the case of multi-family houses, it's required to involve the owner, e.g. with an obligation for the owner. Trigger points can be instigated by policy instruments such as a change in regulation, the need for obligatory auditing or incentives from the state (promotion programmes, bonus systems).

Public participation is required which is considered to result in better outcomes and better governance. The main benefits are a higher acceptance of decisions and implementation as public interests are better reflected, but also the creation of new ideas and approaches. A number of different methodologies were discussed, from world cafes and focus groups to opinion polls and roundtables.

Participation approaches differ according to particularities of the countries. While in Denmark 40 stakeholders were invited, who in turn were allowed to invite four others, a combination of invited web-based feedback and two stakeholder meetings were carried out in Ireland. In Croatia, the public consultation took place as side-event to a conference and thus synergies are used. The individual approaches in the Member States can also be differentiated with regard to the outcomes: Since the public consultation in Denmark started with the discussion of potential measures, the outcome was a set of 21 proposals and measures. In Ireland, the comments and feedback on official documents were sought and in Croatia, the outcome was a signed joint charter.

The three presented public consultation processes all show different characteristics: One major advantage in the Danish process was that the minister gave positive impetus on the kick-off of the PC process. In addition, the formation of subgroups defining their own rules allowed target-group oriented discussion. In Ireland, the public consultation was well structured with a clear timeline. Due to the open web-based feedback format, one of the major challenges was to reach the right audience. Due to the organization of

(CT4) Renovation Strategies

the public consultation as side-event to a conference in Croatia, the cooperation of a broad range of stakeholders was enabled.

Success factors include clear rules, professional moderation and appropriate structures for lobby groups. Challenges are, amongst others, cost and administrative issues, language barriers, pressure from stakeholder groups, large group sizes and a lack of interest of key stakeholders.

Endnotes

1. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019H0786&from=EN>
2. <https://www.epa.gov/international-cooperation/public-participation-guide-tools-generate-and-obtain-public-input>
3. <http://www.planbatimentdurable.fr/-a635.html>
4. http://www.gbce.es/archivos/ckfinderfiles/GTR/GTR%27s_2012_Report_LD.pdf
5. Examples of indicators can also be found in the Commission's Recommendation for Building Renovation.
<https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019H0786&from=EN>
6. <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019H0786&from=EN>
7. This figure reflects the state of discussion in the respective session and does not necessarily correspond to the strategies submitted by the Member States.
8. <https://euroace.org/wp-content/uploads/2018/11/EuroACE-Guide-to-EPBD-Implementation-web-version.pdf>, page 28
9. http://www.embuild.eu/site/assets/files/1484/d6_2_factsheet_wider_benefits.pdf
10. <https://combi-project.eu/tool/>
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12. Presentation by Martin Bo Hansen (Copenhagen Economics) at the RIGA EPBD Concerted Action 2019.
13. Requirements included in the 'Minimum Energy Efficiency Standards' (MEES) that form part of the Energy Efficiency (Private Rented Property) (England and Wales) 2015 Regulation and Amendment 2019.
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