

MARCH 2021

THE ROAD TO CLIMATE-NEUTRALITY

ARE NATIONAL LONG-TERM RENOVATION STRATEGIES
FIT FOR 2050?



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Funding

This report has been made possible thanks to the support of the European Climate Foundation.

Published in March 2021 by the Buildings Performance Institute Europe (BPIE).

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EXECUTIVE SUMMARY

To achieve climate-neutrality by 2050, the building sector, representing 36% of total greenhouse gas (GHG) emissions in the EU, must be given priority at both EU and Member State level. National Long-Term Renovation Strategies (LTRS), embedded within the Energy Performance of Buildings Directive (EPBD), are foundational towards achieving this aim. However, the majority of Member States' LTRS submitted since 2020 are not compliant with the EPBD objectives towards achieving a highly energy efficient and decarbonised building stock by mid-century. Beyond this, the objectives of the LTRS (described in EPBD Article 2a) are now misaligned with the EU's strengthened 2030 Climate Target and 2050 climate-neutrality objective. To resolve this issue, a full revision of the EPBD is recommended this year.

This report answers the question of whether EU Member States' long-term renovation strategies (LTRS) are in line with the EPBD requirements on decarbonisation, and on a path towards total decarbonisation of the building stock by 2050. The analysis, representing over 50% of the EU population (covering seven EU Member States and one region, Flanders, Belgium), points to a clear misalignment between LTRS and EU 2050 Climate Objectives.

Half of the analysed strategies (Finland, France, the Netherlands and Spain) include an objective at or above 90% GHG emissions reduction, which is in line with the legal requirement of the EPBD article 2a, that requires Member States to set a long-term 2050 goal of reducing GHG emissions in the EU by 80-95% compared to 1990. However, none of the eight strategies targets 100% decarbonisation of the building stock. This means that the substantial increase in renovation activity that is required – a deep renovation rate of 3% annually by 2030¹, is unlikely to be achieved.

¹ <https://www.bpie.eu/publication/on-the-way-to-a-climate-neutral-europe-contributions-from-the-building-sector-to-a-strengthened-2030-target/>

Most strategies also fail to provide sufficient detail over the entire period to 2050 to enable an evaluation of whether the supporting policies and financial arrangements are adequate to increase the rate and depth of building renovation required to meet EU climate goals. They also appear to put more effort into decarbonising energy supply systems rather than directly improving the energy performance of buildings and thereby reducing the energy consumption in this sector. This indicates that Member States continue to underplay the role of the building sector in delivering a climate-neutral Europe.

The analysis ultimately reveals that even full compliance with EPBD article 2a, as it currently stands, is not enough to achieve 2050 climate-neutrality. Member States should now be seeking to achieve 100% decarbonisation of their building stock and developing long-term renovation strategies to deliver the climate-neutrality objective. Greater focus on energy performance would be better in line with the Energy Efficiency First principle and would

bring with it many economic, environmental and societal benefits, such as improved indoor air quality, better health, job creation and alleviation of energy poverty. This could be done through a resubmission of their 2020 strategies, but certainly no later than the deadline for the next iteration, in 2024.

The revision process of the EPBD, within the context of the Fit for 55 package in 2021, offers the opportunity to ensure a much stronger place for buildings in Member States' decarbonisation plans, who should implement the efficiency first principle. The status quo of Member States' LTRS indicates that the revised EPBD should aim at triggering building renovation at the scale required to reach the EU's climate targets, something which is not reflected in the LTRS language as defined in the EPBD recast in 2018. A full revision of the EPBD, as opposed to a light recast, is therefore strongly suggested in order to ensure that Europe achieve its strengthened 2030 climate target and its aim of climate-neutrality by 2050.

Recommendations

to align long-term renovation strategies with EU Climate Targets



EUROPEAN COMMISSION



ASSESS all Member State long-term renovation strategies in view of 2050 climate-neutrality objective



ADJUST ambition of the Renovation Wave strategy to **3% deep renovation rate by 2030**



AMEND EPBD Article 2a and consider full EPBD revision



MEMBER STATES



TARGET:
100% decarbonisation of the building stock



ALIGN LTRS with the 2050 climate-neutrality objective

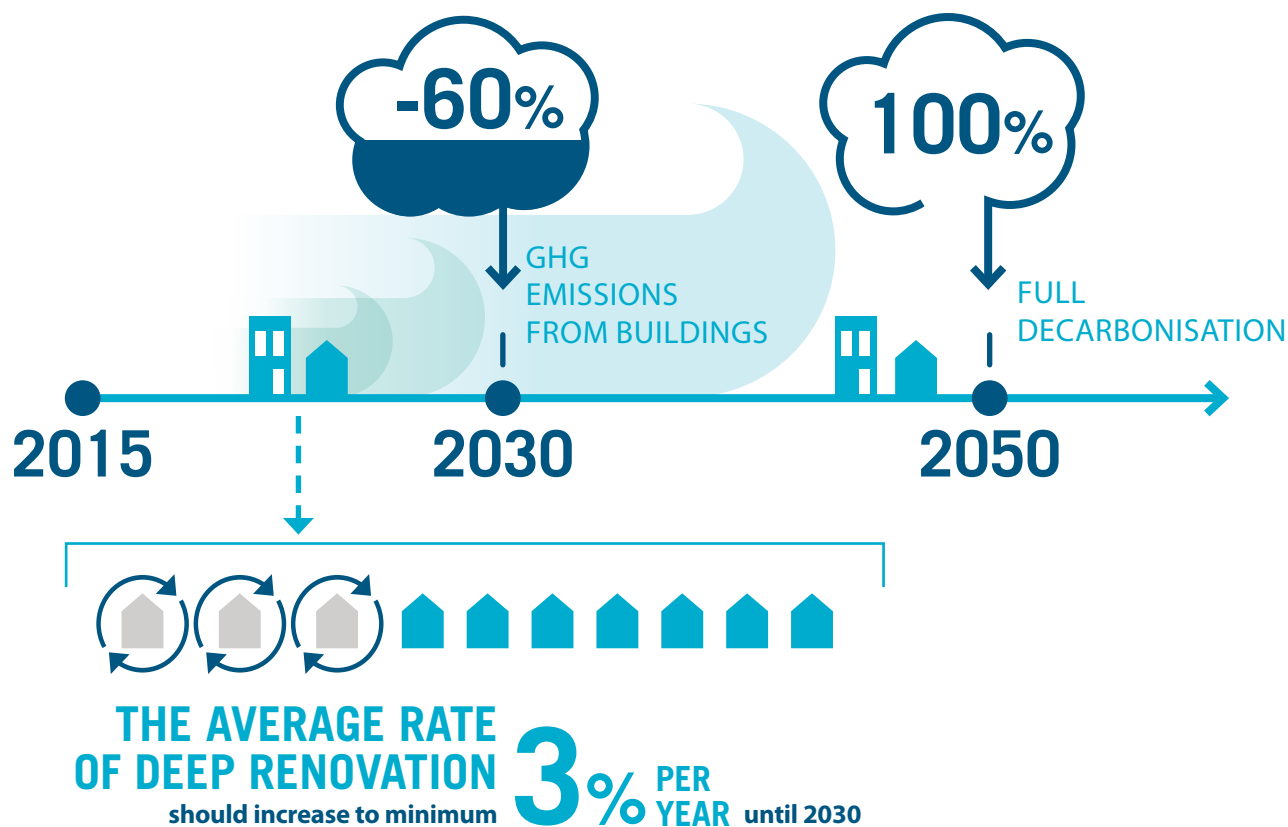
POLICY CONTEXT

With the European Green Deal, the EU has set itself the goal of becoming climate-neutral by 2050, and the European Commission has proposed to enshrine this objective into legislation with the Climate Law. In turn, it also proposed to increase the 2030 climate target of reducing greenhouse gas (GHG) emissions from 40% to at least 55% compared to 1990. This has huge implications for policies in the buildings sector, which is responsible for over a third (around 36%) of GHG emissions in the EU.

The importance of energy efficient building renovation to the EU's climate ambitions was re-emphasised in October 2020 with the publication of the Renovation Wave strategy to improve the energy performance of buildings, leading to a 60% cut in GHG emissions from buildings by 2030 compared to 2015 levels. The aim of the Renovation Wave

is to at least double renovation rates from around 1% p.a. to 2% p.a. in the next 10 years and make sure renovations lead to higher energy and resource efficiency. Among the stated benefits of doing so are an enhanced quality of life, fewer people in energy poverty, a reduction in GHG emissions, fostering digitalisation, improved reuse and recycling of materials and an additional 160,000 jobs created in the construction sector by 2030.

Analysis by BPIE, in its report "On the way to a climate-neutral Europe", demonstrates that renovation rates need to increase even more than the Renovation Wave objective, to around 3% p.a. Our analysis also shows that all renovations should follow the nearly zero-energy building (NZEB) principle by achieving the highest efficiency level of a given building type while supplying the remaining energy demand from renewable sources.



THE ROLE OF LONG-TERM RENOVATION STRATEGIES

In 2020, BPIE published its compliance review of 14 long-term renovation strategies² (LTRS), developed by Member States in accordance with the Energy Performance of Buildings Directive (EPBD). In this report, we focus our analysis of LTRS on evaluating Member States' objectives and plans for transforming existing

buildings into nearly zero-energy buildings and decarbonising the sector by 2050.

This stems from the new requirement in the 2018 recast of the EPBD, which notably adds this 'decarbonisation' aspect into the objectives of the LTRS:

EPBD Article 2a, paragraph 2³

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.

There are various ways in which a country can decarbonise its building stock. Switching all energy supply to carbon-free sources is one route; however, doing so without improving the energy performance of buildings fails to meet the "highly energy efficient" part of the EPBD requirement and does not apply the EU's "energy efficiency first" principle. Furthermore, the benefits to building occupants and society at large, as identified in the Renovation Wave strategy, will not be realised. For this reason, the decarbonisation objective needs to be accompanied by a significant reduction in building energy consumption by 2050.

The level of energy demand reduction that should be expected to be in alignment with the energy efficiency first principle can be defined with different approaches. One possible approach is to apply the generally accepted definition of a 'deep renovation', achieving a reduction of at least 60% of the energy consumption. This definition was used in the major EU study entitled "*Comprehensive study of building energy renovation activities and the uptake*

of nearly zero-energy buildings in the EU", published in 2019.⁴ An alternative approach could be to model the results of different decarbonisation scenarios. We have chosen this approach and based our benchmark on the results of a modelling exercise using the EU Calc European Calculator model.⁵ This revealed that, even with maximum effort to decarbonise upstream energy supplies, building sector energy demand needs to be reduced by around 50% to achieve carbon-neutrality by 2050.

This approach is in line with the European Commission's guidance⁶ to Member States on LTRS development which clearly states that a decarbonised building stock "*can be considered as one whose carbon emissions have been reduced to zero, by reducing energy needs and ensuring that remaining needs are met to the extent possible from zero carbon sources*". The intention is clear – existing buildings need to be transformed into highly energy efficient, nearly zero-energy buildings as part and parcel of decarbonising the building stock by 2050.

² www.bpie.eu/publication/a-review-of-eu-member-states-2020-long-term-renovation-strategies

³ https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv%3AOJL_2018.156.01.0075.01.ENG

⁴ https://ec.europa.eu/energy/sites/ener/files/documents/1.final_report.pdf

⁵ www.european-calculator.eu

⁶ https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32019H0786&from=EN_section_2.3.2

OBJECTIVE AND METHODOLOGY

The aim of this report is to analyse and evaluate selected Member States' objectives and plans for decarbonising their building sector by 2050, as required by the 2018 EPBD.

However, since publication of the revised directive, the EU has increased its ambition in terms of decarbonisation and set itself the goal of carbon-neutrality by 2050. It launched the European Green Deal⁷ and proposed a European Climate Law⁸ to turn this political commitment into a legal obligation.

Against this backdrop, the question arises as to whether the long-term renovation strategies should be assessed against the objectives legally specified in the EPBD, or against the current EU goal of climate-neutrality by 2050. We have chosen to take as the guiding benchmark for this assessment the official text in Article 2a, which mentions "the long-term 2050 goal of reducing greenhouse gas emissions in the Union by 80-95 % compared to 1990". However, we strongly advocate that Member States should now be seeking, in line with the climate-neutrality objective, to achieve a 100% decarbonisation of their building stock and developing long-term renovation strategies and renovation roadmaps to deliver this goal. This could be done through a resubmission of their 2020 strategies, but certainly no later than the deadline for the next iteration, in 2024.

The analysis in this report is based largely on a desk study of a selection of the long-term renovation strategies that have been published on the European Commission website.⁹ As of 19 January 2021, 17 strategies had been published, covering 15 countries (Belgium published three strategies, one for each region). We chose eight representative strategies (covering seven countries and one Belgian region), spanning a range of geographies and country sizes. Together, these eight strategies account for over 50% of the EU population.

The strategies we reviewed were:

 **BELGIUM - FLANDERS REGION**

 **CZECHIA**

 **ESTONIA**

 **FINLAND**

 **FRANCE**

 **GERMANY**

 **THE NETHERLANDS**

 **SPAIN**

Our primary aim was to examine the 2050 objective set within each strategy, both in terms of the decarbonisation goal and the transformation to a highly energy efficient building stock. We also sought to determine whether the long-term objectives were underpinned by clear policies and financing mechanisms, though none of the strategies provided a detailed roadmap spanning the whole period to 2050 to enable firm conclusions to be drawn.

⁷ https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en

⁸ <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1588581905912&uri=CELEX:52020PC0080>

⁹ https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/long-term-renovation-strategies_en

RESULTS

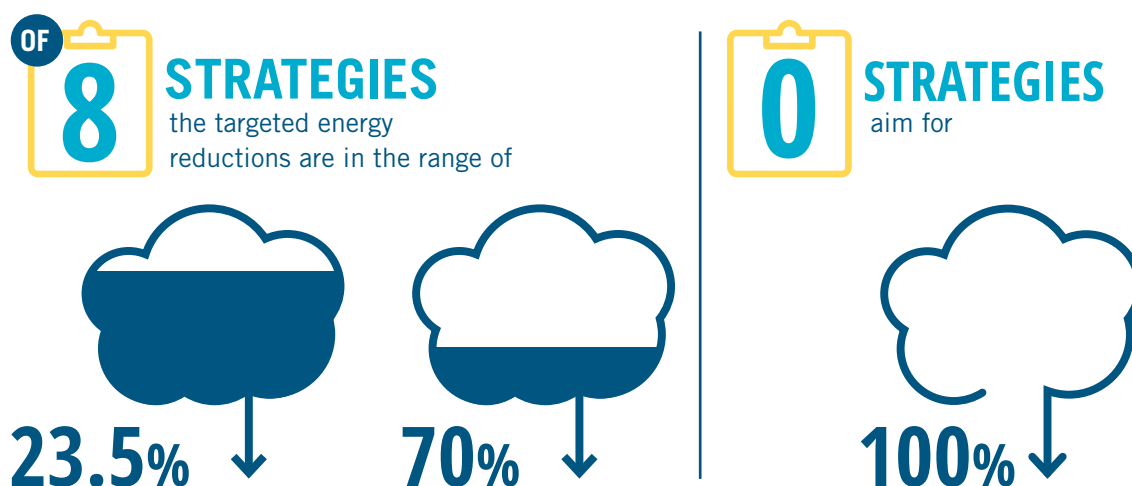
Summary results are presented in the table overleaf.

Of the eight strategies, only the Spanish one has set a goal – 98.8% reduction in GHG emissions – that approaches full decarbonisation of the building stock. Flanders has committed to full decarbonisation of its non-residential sector, but only a 74% reduction for the residential sector. The targets for Estonia¹⁰, Finland, France and The Netherlands were in the range of 89-95%, while Czechia's is only 40%. Germany did not set a 2050 decarbonisation target in its LTRS, though in the Climate Action Plan 2050¹¹ there is a goal to achieve a virtually climate-neutral building stock by the middle of the century.

With regard to energy use in buildings, the expected reductions are in the range of 23.5-70%. Only Estonia (59%) and Finland (55%) had energy saving targets for the whole building sector in excess of 50%. The Flemish target of 70% applies only to residential buildings, while for non-residential it is 33%. The target for France is 41%, for Spain 36-37%, and for Czechia only 23.5%. Germany and The Netherlands did not provide energy saving targets for 2050 in their LTRS.

It should be noted that Member States use a variety of baselines against which to report their emission reductions and energy savings (see table below), so the results are not directly comparable.

The strategies did not provide sufficient information in order to determine whether the policies, funding and other measures are adequate to deliver the 2050 objectives. However, the absence, for the most part, of new or significantly strengthened policies means that the substantial increase in renovation activity that is required – at least a doubling, as envisaged in the Renovation Wave, and in many cases even more – is unlikely to be achieved.



¹⁰ The Estonian figure refers to the results of a modelling exercise showing a theoretical renovation roadmap. However, the finance to deliver the roadmap has not been secured at the time of publication of the LTRS.

¹¹ www.bmu.de/fileadmin/Daten_BMU/Pool/Broschueren/klimaschutzplan_2050_en_bf.pdf

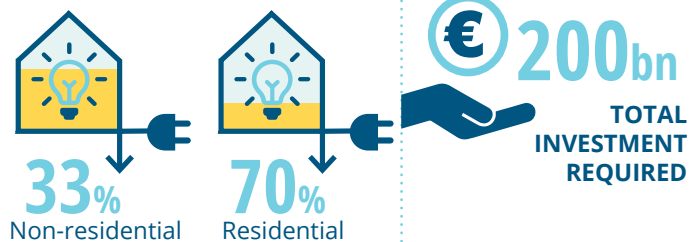
BELGIUM - FLANDERS ▶ BASE YEAR | 2005



Decarbonisation objective:
REDUCTION IN CO₂ EMISSIONS
BY 2050



Highly energy efficient building stock objective:
REDUCTION IN ENERGY USE
BY 2050



CONCLUSIONS

Both objectives fall short of EPBD requirement, since energy use in the non-residential sector remains high, while the residential sector is not fully decarbonised

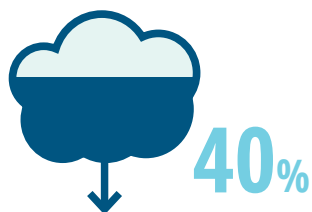
CONCLUSIONS

Both objectives fall far short of the EPBD requirement

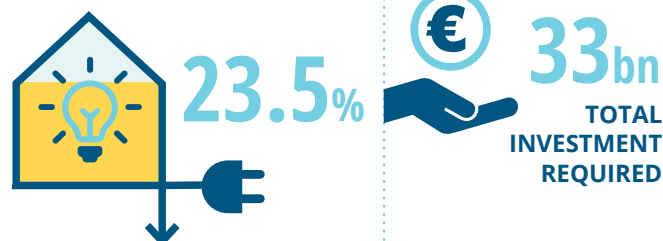
CZECHIA ▶ BASE YEAR | 2020



Decarbonisation objective:
REDUCTION IN CO₂ EMISSIONS
BY 2050



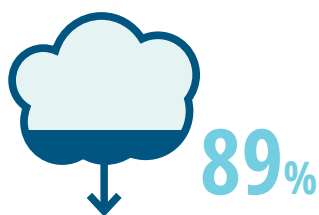
Highly energy efficient building stock objective:
REDUCTION IN ENERGY USE
BY 2050



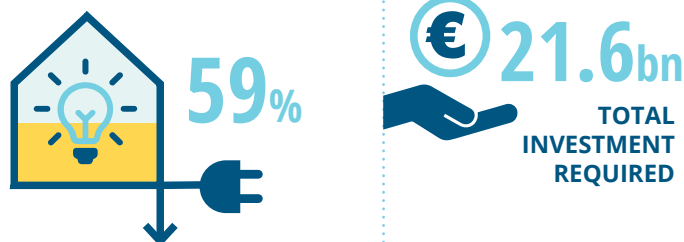
ESTONIA ▶ BASE YEAR | 2020



Decarbonisation objective:
REDUCTION IN CO₂ EMISSIONS
BY 2050



Highly energy efficient building stock objective:
REDUCTION IN ENERGY USE
BY 2050



CONCLUSIONS

Both objectives, while broadly in line with EPBD, are dependent on funding that has not yet been secured and hence do not represent a clear objective to which the government has committed

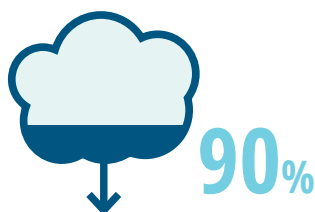
CONCLUSIONS

Objectives in line with EPBD

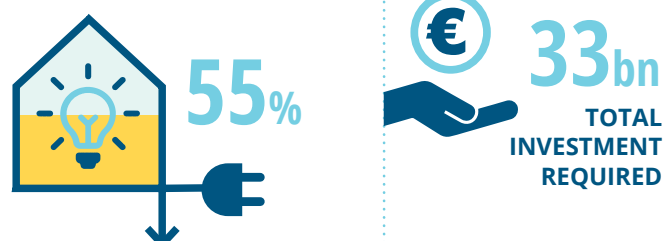
FINLAND ▶ BASE YEAR | 2020



Decarbonisation objective:
REDUCTION IN CO₂ EMISSIONS
BY 2050

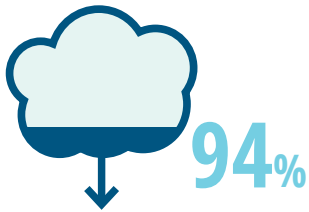


Highly energy efficient building stock objective:
REDUCTION IN ENERGY USE
BY 2050

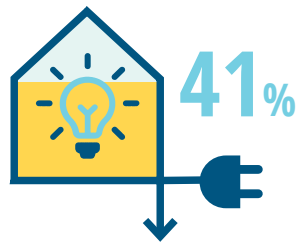


FRANCE ▶ BASE YEAR | 2015

Decarbonisation objective:
REDUCTION IN CO₂ EMISSIONS
BY 2050



Highly energy efficient building stock objective:
REDUCTION IN ENERGY USE
BY 2050



CONCLUSIONS

Insufficient effort is directed to improving the energy performance of the building stock

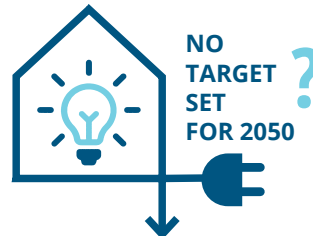
CONCLUSIONS

LTRS fails to meet minimum requirement of a clear 2050 decarbonisation objective

Decarbonisation objective:
REDUCTION IN CO₂ EMISSIONS
BY 2050



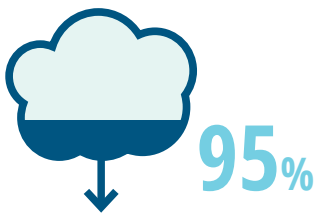
Highly energy efficient building stock objective:
REDUCTION IN ENERGY USE
BY 2050



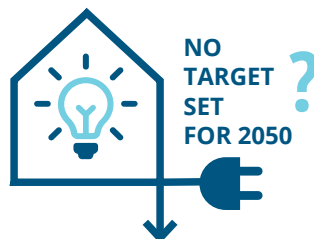
GERMANY ▶ BASE YEAR | 1990

THE NETHERLANDS ▶ BASE YEAR | 1990

Decarbonisation objective:
REDUCTION IN CO₂ EMISSIONS
BY 2050



Highly energy efficient building stock objective:
REDUCTION IN ENERGY USE
BY 2050



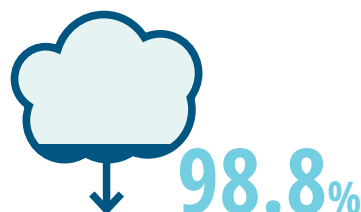
CONCLUSIONS

Energy targets need to be set for 2050

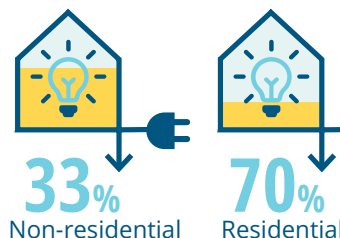
CONCLUSIONS

Insufficient effort is directed to improving the energy performance of the building stock

Decarbonisation objective:
REDUCTION IN CO₂ EMISSIONS
BY 2050



Highly energy efficient building stock objective:
REDUCTION IN ENERGY USE
BY 2050











inclusive of financing costs (residential sector only)



SPAIN ▶ BASE YEAR | 2020

SUMMARY RESULTS

Country/ region	Base year	2050 Decarbonisation objective: Reduction in CO ₂ emissions	Highly energy efficient building stock objective: Reduction in energy use by 2050	Total investment required	Conclusions
 BELGIUM FLANDERS REGION	2005	Non-residential: 100% Residential: 74%	Non-residential: 33% Residential: 70%	€200 bn	Both objectives fall short of EPBD requirement, since energy use in the non-residential sector remains high, while the residential sector is not fully decarbonised
 CZECHIA	2020	40%	23.5%	€33 bn	Both objectives fall far short of the EPBD requirement
 ESTONIA	2020	89%	59%	€21.6 bn	Both objectives, while broadly in line with EPBD, are dependent on funding that has not yet been secured and hence do not represent a clear objective to which the government has committed
 FINLAND	2020	90%	55%	€24 bn	Objectives in line with EPBD
 FRANCE	2015	94%	41%	Not provided	Insufficient effort is directed to improving the energy performance of the building stock
 GERMANY	1990 ¹²	No target set for 2050	No target set for 2050	Not provided	LTRS fails to meet minimum requirement of a clear 2050 decarbonisation objective
 THE NETHERLANDS	1990	95%	Not specified	Not provided	Energy targets need to be set for 2050
 SPAIN	2020	98.8%	Non-residential: 36% Residential: 37%	€143 bn inclusive of financing costs (residential sector only)	Insufficient effort is directed to improving the energy performance of the building stock

¹² 1990 is the baseline year used by the federal government in setting its objective of reducing national GHG emissions in Germany by at least 55% by 2030



BELGIUM - FLANDERS



2050 OBJECTIVES

The Flemish government adopted its Climate Strategy 2050 on 20 December 2019, with a goal to achieve an 85% reduction in GHG emissions in the non-ETS¹³ sectors by 2050 (compared to 2005), and ultimately reach full climate-neutrality. The national strategy formed the basis of the LTRS, with its building sector 2050 objective as follows:

- **Non-residential sector:** carbon-neutrality for heating, domestic hot water, cooling and lighting, with an exemplary role for the public authorities.
- **Residential sector:** GHG emission reduction from 8.9 MtCO₂eq to 2.3 MtCO₂eq (a reduction of 74%). Existing buildings must achieve an energy performance level comparable to newly constructed dwellings (energy label A).

Final energy consumption for heating and domestic hot water (i.e. excluding lighting and appliances) of Flemish residential buildings is forecast to reduce by 70%, from 46 TWh/yr in 2020 to 14 TWh/yr in 2050, with interim milestones 35 TWh in 2030 and 25 TWh in 2040. For non-residential buildings, the reduction in energy consumption is 11% in 2030, 24% in 2040 and 33% in 2050.

In developing its approach to building renovation, Flanders launched the Renovation Pact in 2014 with a wide group of stakeholders, organised around five “rapid acceleration working groups”. These working groups were tasked with developing the building blocks of the Flemish Energy Vision. The pact also incorporates the objectives of the Energy Poverty Programme.

¹³ Non-ETS refers to the sectors such as buildings, transport and agriculture that are outside the EU emissions trading system (EU ETS).

The process of developing the 2050 objective started with examining various scenarios, based on the following underlying findings and assumptions:

- Nearly all buildings (96.5%) need to be renovated (or demolished)
- A substantial increase in renovation activity is required – over 3% p.a. of deep renovation (95,000 dwellings per annum). This compares with the current renovation rate of 2.5% p.a., but only a minority of which are deep renovations.
- Regulatory barriers and other obstacles must be addressed.

Analysis concluded that trigger points in the lifecycle of a building were key opportunities to undertake deep renovation at the lowest cost.

To achieve this long-term objective by 2050, two paths were defined under the Renovation Pact:

- Implementation of a package of insulation and heating measures and the achievement of an energy performance indicator.
- Achieving an energy level equivalent to an energy rating (EPC figure) of 100 kWh/m² (label A), up from the current average energy label of D (390 kWh/m²/yr).



SUPPORTING POLICIES

The key pillars of the long-term renovation strategy for residential buildings are:

- Incentives for deep renovations at key trigger points such as purchase, inheritance, rental.
- Further development of the Housing ID (Woningpass), a free digital passport with all available information concerning a building, and offering targeted advice to help owners plan renovation works.
- Further development of the EPC+ as an advisory tool for housing renovation in line with the long-term objective for 2050.

The key points of the renovation strategy for non-residential buildings are:

- Implementation of a renovation obligation within five years of purchase for tertiary buildings.
- Development of a Building ID on similar lines to the Housing ID.
- Mandatory EPC for all large non-residential buildings. From 2030, these buildings must achieve a minimum energy performance level.
- Government buildings within the Flemish territory must comply with the minimum energy performance label from 2028.
- Government buildings of the Flemish public authorities must achieve an annual savings target of 2.5% on primary energy consumption from 2021 onwards.

Where possible, Flanders focuses on heating networks supplied by residual heat or green¹⁴ heat produced centrally. For more dispersed buildings, heating networks are a less efficient solution, so more emphasis is placed on solar thermal energy and electrification, mainly using heat pumps. In addition to heating networks and electrification, low-carbon and

preferably climate-neutral fuels must meet the residual heating demand in the building sector (including hydrogen, biomethane, biomass and synthetic fuels). In an intermediate phase, hybrid installations (such as the combination of a heat pump and a condensing boiler) may provide a technically and economically interesting solution.

¹⁴ The term green heat is not defined in the strategy but assumed to mean biogas or other low or zero carbon sources of heating



FINANCIAL DIMENSIONS

The total investment to renovate all existing buildings to the 2050 objective is estimated at over €200 billion (€150 billion for residential buildings, around €55,000 per dwelling, and €57 billion for non-residential buildings).

The strategy includes a useful discussion on the costs of different renovation options, as illustrated in this example of a 1920s terraced town house, based on calculations undertaken in response to the EPBD requirement to determine cost-optimal renovation options.

- **Baseline** – Assuming no investment is made to improve the energy performance of the building, the total present value of the energy consumed over the next 30 years would be €103,000. The primary energy consumption of the building is 294 kWh/m²/yr.
- **Cost optimal** – From a range of renovation options, the one with the lowest overall costs, when considering both the investment required and energy use, could have a present value of €71,400, consuming 89 kWh/m²/yr primary energy.
- **Cost neutral** – Additional investment compared to the cost-optimal option raise the present value lifetime cost to €103,000 (i.e. the same as in the baseline), but result in a primary energy surplus of 16 kWh/m²/yr.

What the above calculations show is that, financially, doing nothing (as in the baseline option) is the same as a major renovation in the cost-neutral option, yet the latter is vastly superior in terms of its carbon performance, generating a net surplus in primary energy terms.

This example illustrates why it is important to place a monetary value on the wider benefits of renovation, and crucially that these benefits are included as an integral part of the cost-optimality calculations.



Conclusions

The Flemish strategy presents different 2050 objectives for the residential and non-residential sectors. While the latter is forecast to become carbon-neutral, the former is forecast to achieve a 74% reduction in emissions. Conversely, energy use in the residential sector is set to come down by 70%, but only by 33% in the non-residential sector.

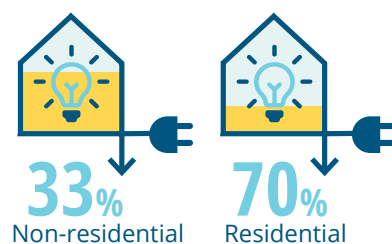
The 2050 objective falls short of the EPBD requirement for an energy efficient and decarbonised building stock, since energy use in the non-residential sector remains high, while the residential sector is not fully decarbonised.

From a policy and financing perspective, the measures currently in place do not appear to be sufficiently ambitious to achieve the level required for building stock decarbonisation. Furthermore, there is no long-term horizon for ramping up the impact of policies and measures.

Decarbonisation objective:
REDUCTION IN CO₂ EMISSIONS BY 2050



Highly energy efficient building stock objective:
REDUCTION IN ENERGY USE BY 2050



 **200bn**
TOTAL INVESTMENT REQUIRED

► BASE YEAR | 2005

Both objectives fall short of EPBD requirement, since energy use in the non-residential sector remains high, while the residential sector is not fully decarbonised



CZECHIA



2050 OBJECTIVES

Czechia is aiming for a 40% reduction in building sector GHG emissions by 2050 compared to 2020. This objective has been set following the development of three scenarios:

- **Scenario 1:** Basic. This is a “business as usual” scenario which continues with existing policies and measures, delivering energy savings of 19% by 2050.
- **Scenario 2:** Optimal. This scenario builds on the Basic scenario with additional measures aimed mainly at encouraging deeper renovations and increasing the rate in the non-residential sector. Energy savings are 23.5%.
- **Scenario 3:** Hypothetical. This is described as an idealised scenario based on rapid and thorough renovations of the building stock. The strategy notes, however, that its implementation is limited by barriers to renovation (detailed in the strategy) and the practicality of implementing measures. Energy savings are 44%.

The “optimal” scenario 2, detailed in Table 1, was selected as the goal of the LTRS, delivering a 40% reduction in emissions by 2050. It has the same renovation rate assumptions as the “basic” scenario for the residential sector (1.4% p.a. for single-family houses and 0.79% p.a. for multi-family houses) but with a shift towards deeper renovations. For the non-residential sector, there is a similar shift towards deeper renovation, as well as an increase in renovation rate, from 1.4% p.a. to 2% p.a.

Interim milestones for 2030 and 2040 are detailed in the table below.

Figure 1: Modelled final energy consumption of building stock under the three scenarios [PJ] (source: Czech LTRS).¹⁵

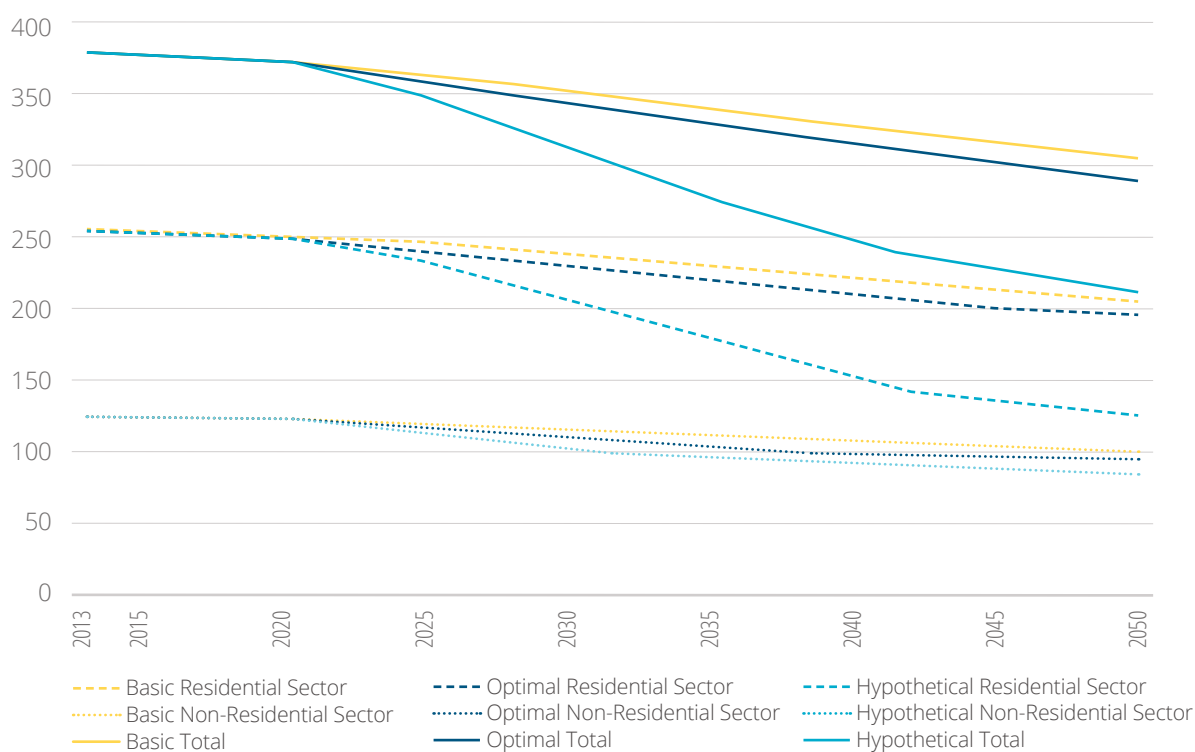


Table 1: Czech milestones for energy savings and associated investments 2020-2050 (Source: Czech LTRS).¹⁶

	Optimal	2020	2030	2040	2050
Final energy consumption in the given year		373	345	316	289
<i>single-family houses</i>		161	149	136	123
<i>apartment buildings</i>		88	83	78	73
<i>public and commercial buildings</i>		124	113	102	93
Energy savings compared to baseline 378 PJ [PJ]		-5	-33	-62	-89
Investment costs in the given year [CZK billion]		24	26	28	23
Cumulative investment costs [CZK billion]		93	356	614	856
<i>single-family houses</i>		47	168	282	388
<i>apartment buildings</i>		13	45	76	105
<i>public and commercial buildings</i>		33	142	256	362
Specific heat required for space heating [MJ/m ² .year]		493	426	368	325

¹⁵ https://ec.europa.eu/energy/sites/default/files/documents/cz_2020_ltrs_official_translation_en.pdf

¹⁶ https://ec.europa.eu/energy/sites/default/files/documents/cz_2020_ltrs_official_translation_en.pdf



SUPPORTING POLICIES

Three key planks underpin the delivery of the renovation strategy:

- **Fiscal** – High initial investment costs are addressed through financial support schemes, which are focused mainly on providing subsidies.
- **Legislative** – Acts on energy management and on spatial planning and building codes, in particular its implementing decrees on technical requirements for buildings, and on building documentation.
- **Education and consultancy** – There continues to be a low awareness across sectors about energy efficiency and energy management, and a low propensity to take up available support measures.

According to the LTRS, one of the barriers is that building owners are not used to using the services of construction companies, borrowing money or applying for a subsidy. Building owners renovate themselves, gradually, step-by-step, whenever they have enough money saved. This limits the impact of policies designed to accelerate renovation, as witnessed by the significant underutilisation of available funds in the various support measures – in most cases, less than half the available funds are taken up.

For the reasons noted above, the main new initiative in the LTRS is a major two-year information and awareness-raising campaign for 2021-2022. The aim is to address the barriers currently holding back consumers from taking advantage of the available funding and schemes to improve the energy performance of their buildings. The campaign will be underpinned by complementary services such as energy consulting and information centres, feasibility studies of energy savings and adaptation measures on and in buildings, creating strategies for improving the energy performance of buildings, and technical assistance for submitting applications for financial support from the state.



FINANCIAL DIMENSIONS

Delivering the selected scenario will require a cumulative investment of 856 billion CZK (€33 billion) to 2050 (table 1). It can be seen that annual investment in renovation increases only slightly to 2040, only to fall below the 2020 level by 2050. The reason for the reduction is not explained, but given that the scenario assumes renovation rates are maintained to 2050, it could be due to cost reductions. While the LTRS details some of the financing schemes currently in place, none of them extend beyond 2030 so it is not possible to determine how the LTRS will be financed through to 2050.



Conclusions

With a 40% GHG emission reduction target and an energy saving of 23.5%, the Czech LTRS falls far short of the EPBD requirement of achieving a highly energy efficient and decarbonised building stock.

The lack of ambition is exemplified by the paucity of measures additional to business as usual that are envisaged, which only serve to increase energy savings from 19% in the basic case to 23.5% in the selected “optimal” scenario. Essentially, the only new initiative is the marketing campaign along with the various support measures identified above, yet this is only envisaged for a two-year period ending in 2022. Judging from the trajectory of energy savings (fig 1), this campaign appears to deliver a new status quo, with no acceleration or ramping up of activity. Indeed, annual investment increases only slightly to 2040, only to fall below the 2020 level by 2050.

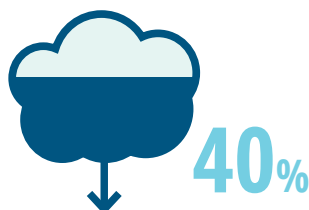
While the marketing campaign is clearly a necessary action to address the current inertia in the market, it should be considered as just one essential component of a comprehensive framework of policy tools and levers to increase renovation activity.

The level of renovation activity underpinning the “hypothetical” scenario 3 is achievable and would deliver nearly twice the level of energy savings (44%) compared to the selected “optimal” scenario. It should be considered a minimum level of ambition for Czechia. Adopting scenario 3 now, together with a more ambitious suite of policies, would address the serious shortcomings in the current 2050 objectives for renovating the homes, workplaces and public buildings of the Czech people.

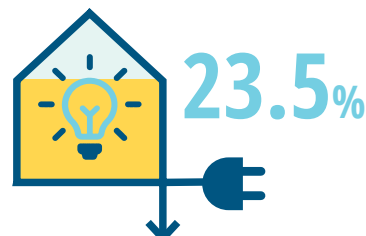
► BASE YEAR | 2020

Both objectives fall far short of the EPBD requirement

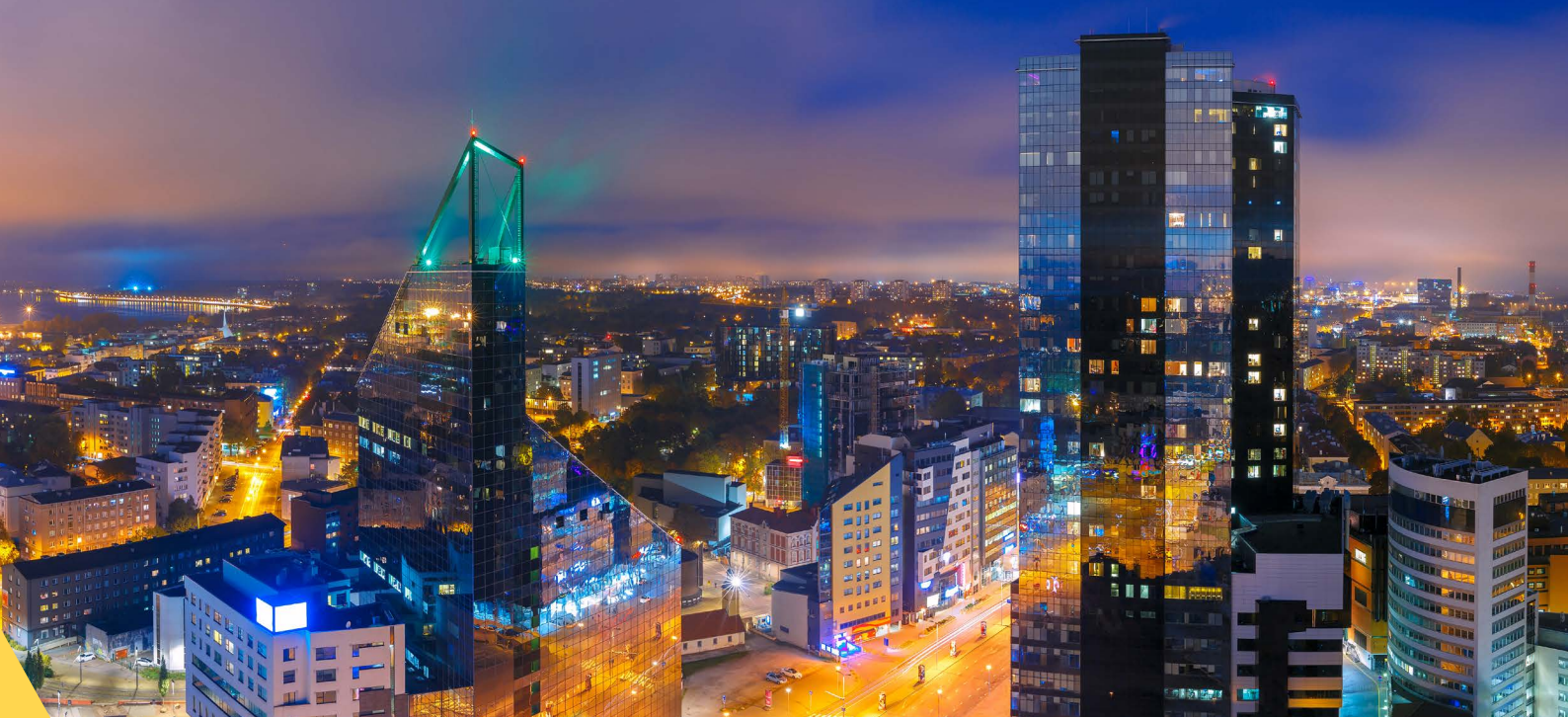
Decarbonisation objective:
REDUCTION IN CO₂ EMISSIONS BY 2050



Highly energy efficient building stock objective:
REDUCTION IN ENERGY USE BY 2050



€ **33bn**
TOTAL INVESTMENT REQUIRED



ESTONIA



2050 OBJECTIVES

The Estonian LTRS describes the main goal of the strategy as the full renovation, by 2050, of all buildings erected before 2000 to an energy performance equivalent to the current energy label C. Doing so would reduce current building sector CO₂ emissions by 89% and cut final energy consumption by 59%.

Milestones for the proportion of building stock renovated are:

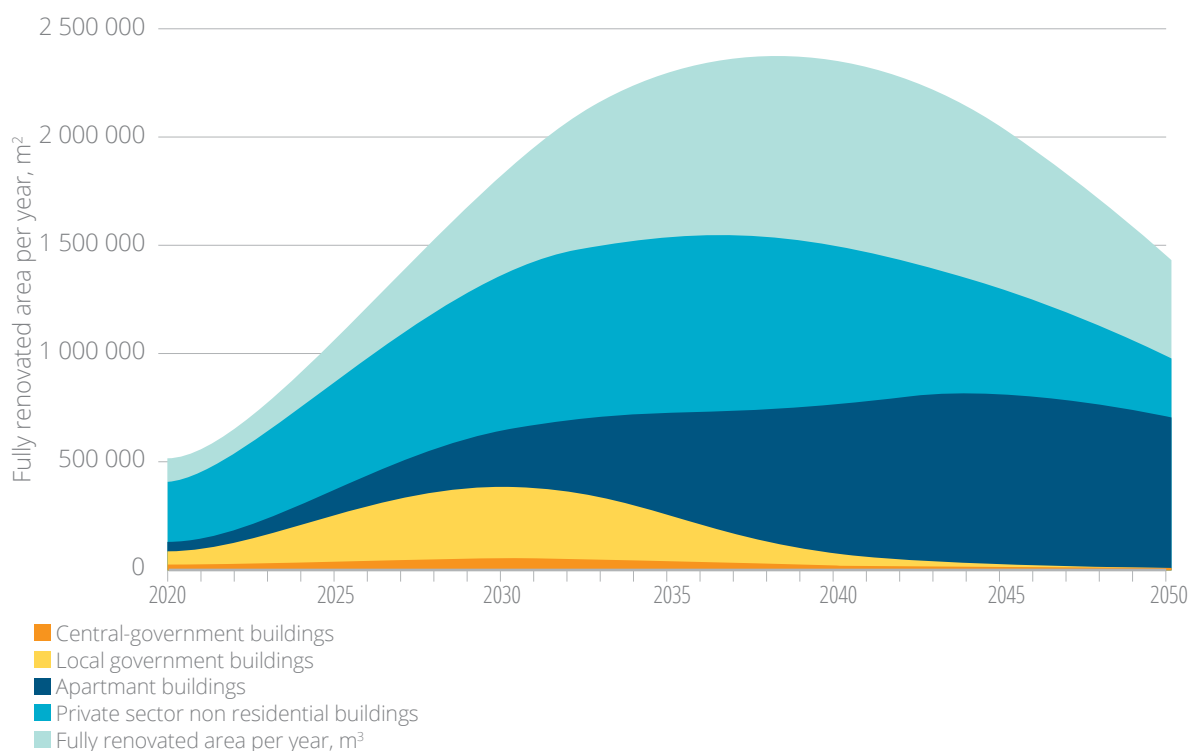
- **2030: 22% renovated**
- **2040: 64% renovated**
- **2050: 80% renovated**

It can be seen from the graph below that renovation activity peaks around 2040, at nearly five times the current level of activity. The strategy envisages local and central government buildings to lead the renovation agenda. The current focus on apartment buildings will continue to grow till around 2035. By contrast, private housing and private non-residential buildings take longer to reach maximum activity levels, peaking around 2040. The investment drops off after 2040 (except for private houses) as most buildings will have been renovated by then.

The figures assume around 20% of privately owned buildings will not get renovated due

to reluctance of owners to do so. Also excluded from the calculations is approximately 20% of the existing built area that, due to demographic changes and internal migration, is expected to fall out of use, partly to be demolished and partly to be replaced by new construction.

Figure 2: Profile of renovation activity by building typology 2020-2050 (m²) (Source: Estonian LTRS, adapted and translated by BPIE¹⁷).



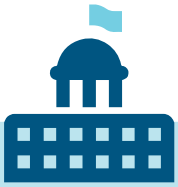
Energy savings post-renovation are presented in terms of weighted specific energy use (WSEU), which is similar to primary energy. The reductions in WSEU range from 25% to 41%, depending on building typology and heating system (district heating or natural gas).

We note that the expected level of savings is not consistent with achieving deep renovation of the building stock, which is self-evident, given the target is for buildings to achieve an energy rating of only C.

With the exception of apartment blocks, where the Estonian renovation effort has been perhaps among the best in Europe, building renovation for the sake of improving energy performance is not widespread practice. Therefore, the fivefold increase in renovation activity is seen as a challenge, particularly against the backdrop of the current situation:

- Buildings are generally renovated not to save energy but for other reasons, e.g. to improve interior climate or functionality.
- Property owners do not have enough financial capacity to achieve energy class C.
- When renovating, property owners often do not simultaneously think of sustainability, health and energy efficiency in a 20- to 30-year perspective.

¹⁷ https://ec.europa.eu/energy/sites/default/files/documents/ee_2020_ltrs_official_translation_en.pdf



SUPPORTING POLICIES

The strategy recognises that barriers need to be addressed and further support measures introduced to increase renovation activity. These include:

- Financial measures: loans, guarantees and subsidies of 30-50%, depending on sector, are considered necessary in the LTRS to motivate building owners to undertake deep renovation.
- Development of new technologies (prefabrication, digital tools, simple energy calculators for building owners).
- Awareness raising (guidance materials, advice to property owners).
- Demolition of buildings fallen out of use.
- Research and development activities.

While the strategy identifies the barriers and a range of initiatives and activities that would stimulate the renovation market, there is no indication that identified policies and actions will be implemented.



FINANCIAL DIMENSIONS

The strategy includes a detailed assessment of the buildings requiring renovation, and the overall costs. The table below shows the cost per m² for different building types, and the profile of required investment in each five-year period. Total costs are shown as €21.59bn. Annual investment in building renovation amounts to over €900 million p.a. in 2036-40, the period with the largest investment, which is nearly five times the current investment rate of €200 million p.a.

Table 2: Costs of the renovations proposed by the strategy until 2050 (Source: : Estonian LTRS¹⁸).

	Cost €/m ²	2021-2025	2026-2030	2031-2035	2036-2040	2041-2045	2046-2050	TOTAL
Private houses	400	161	381	776	1,236	1,541	1,504	5,600
Apartment buildings	300	683	953	1,189	1,160	886	530	5,400
Private sector non-residential buildings	450	379	811	1,437	1,884	1,828	1,312	7,650
Local government buildings	600	409	869	792	287	41	2	2,400
Central government buildings	600	119	142	136	90	41	13	540
		1,749	3,156	4,330	4,657	4,337	3,361	21,590

¹⁸ https://ec.europa.eu/energy/sites/default/files/documents/ee_2020_ltrs_official_translation_en.pdf



Conclusions

The objective of an 89% reduction in CO² emissions by 2050 is broadly consistent with the EPBD guidelines. However, in terms of energy efficiency, the goal of buildings meeting energy label C cannot be considered ambitious, nor adequate. While the strategy asserts that even meeting energy label C is a challenge, given the prevailing market conditions, it highlights the need for greater effort to address the challenges and nurture an environment that is much more conducive to deep renovation.

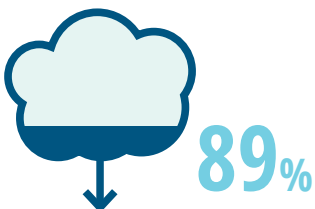
Furthermore, it is important to note that the Estonian LTRS is not presented as an action plan or roadmap, nor is it a policy commitment to deliver the described renovation scenario. This is clear from the following statement in the summary:

EXTRACT FROM SUMMARY OF ESTONIAN LTRS

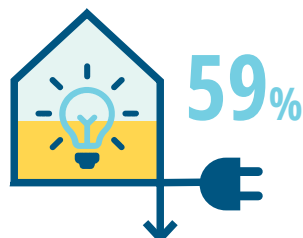
The strategy presents the long-term vision for the renovation of buildings and describes the activities and volumes necessary for attaining the goal. On the basis of the strategy, it would be possible to start looking for the financing sources needed for implementing it and to plan detailed support measures. The projections in this strategy are needs-based and do not reflect the current volume of funds for this purpose. The prerequisites for implementing the activities foreseen in this strategy are their inclusion in the national strategic planning and budgeting processes and optimal use of the funds earmarked for this purpose. Due to the limited public-sector resources, financing has to be found from various EU funds, revenues from trading GHG emission allowances, other state budget resources and private funds through market-based services

It is therefore vital that there is a process in place to secure the necessary resources, implement the various support measures and develop a thriving market for renovation of all building types.

Decarbonisation objective:
**REDUCTION IN CO₂
EMISSIONS
BY 2050**



Highly energy efficient building
stock objective:
**REDUCTION IN
ENERGY USE
BY 2050**



€ **21.6bn**
TOTAL
INVESTMENT
REQUIRED

► BASE YEAR | 2020

Both objectives, while broadly in line with EPBD, are dependent on funding that has not yet been secured and hence do not represent a clear objective to which the government has committed



FINLAND



2050 OBJECTIVES

Under the Government Programme 2019, Finland aims to become carbon-neutral by 2035, while some cities and municipalities aim for 2030. For the building sector, the LTRS objective is to reduce emissions by 90%, from 7.8 MtCO₂ in 2020 to 0.7 MtCO₂, by 2050, meaning that carbon sinks are required to offset the residual emissions from buildings, as stated in the LTRS document.

In terms of building sector energy consumption, the 2050 goal is a decrease of 49% compared to 2005. However, improving energy efficiency only accounts for about 10 percentage points of the reduction, with reduced building stock (as a result of depopulation and better utilisation¹⁹) and a warmer climate both having a bigger impact. As shown in fig. 3, interim milestones for reducing energy consumption are 22% in 2030 and 36% in 2040.

¹⁹ According to Statistics Finland, the Finnish population will start to decrease overall after 2030, but with significant regional variations: 85% of municipalities will see a decrease, while a small number of urban areas will experience strong growth. As a result, a significant part of the 2020 building stock will become underutilised or completely vacant. Municipal strategies aim to make the regional urban structure denser, while organisations also seek to rationalise the building space they occupy. On the basis of the anticipated lifecycle of the old building stock and space utilisation trends, only some 70% of all the buildings completed by 2020 will remain in 2050.

Figure 3: Milestones for reduction in heating energy consumption 2020-2050 (source: Finnish LTRS).²⁰

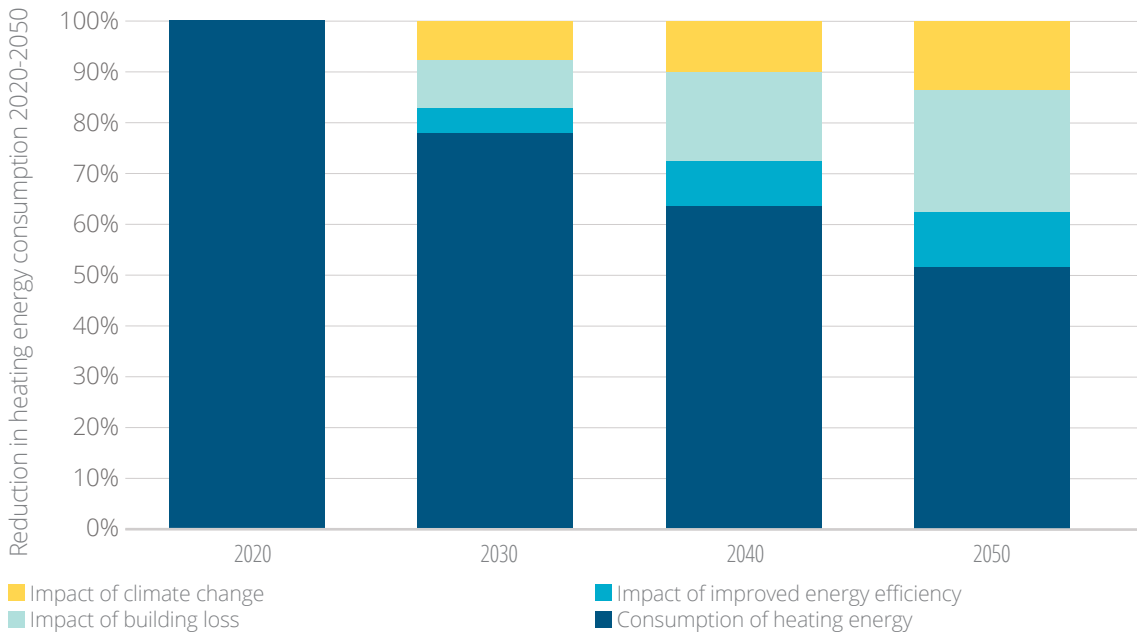
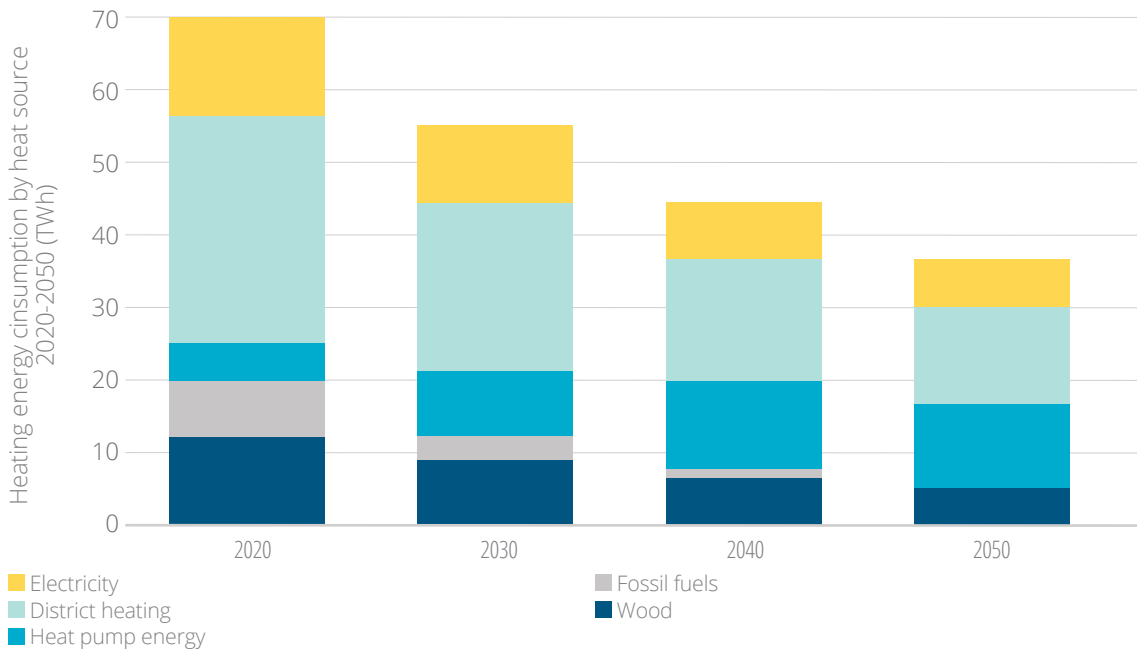


Fig. 4 shows the elimination of fossil fuels as a source of heating by 2050. All sources are set to decrease, with the exception of heat pump energy.

Figure 4: Heating energy consumption by heat source 2020-2050 (Source: Finnish LTRS)²¹.



NOTE: The graph distinguishes between heating energy generated centrally in the EU ETS sector (electricity, district heating) and property-specific heating energy generated in the effort-sharing sector (energy generated with heat pumps, fossil fuels and wood).²²

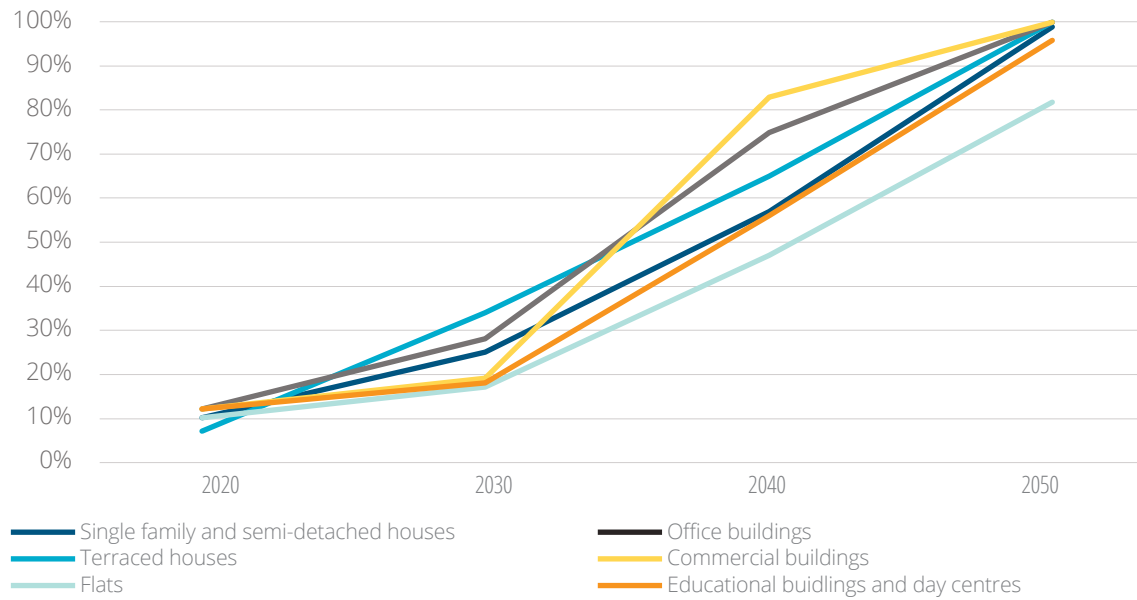
²⁰ https://ec.europa.eu/energy/sites/default/files/documents/fi_2020_ltrs_en.pdf

²¹ Ibid.

²² The distinction reflects the EU's two main targets – the EU emissions trading system (EU ETS) focussing on large emitters and covering around 40% of EU GHG emissions, and the effort sharing sector concerning emissions from most sectors not included in the EU ETS, such as transport, buildings, agriculture and waste.

The share of nearly zero-energy buildings is projected to increase from around 10% in 2020 to 96-100% in 2050 for most building types, except blocks of flats which will attain 82% (fig. 5).

Figure 5: Share of nearly zero-energy buildings 2020-2050 (Source: Finnish LTRS).²³



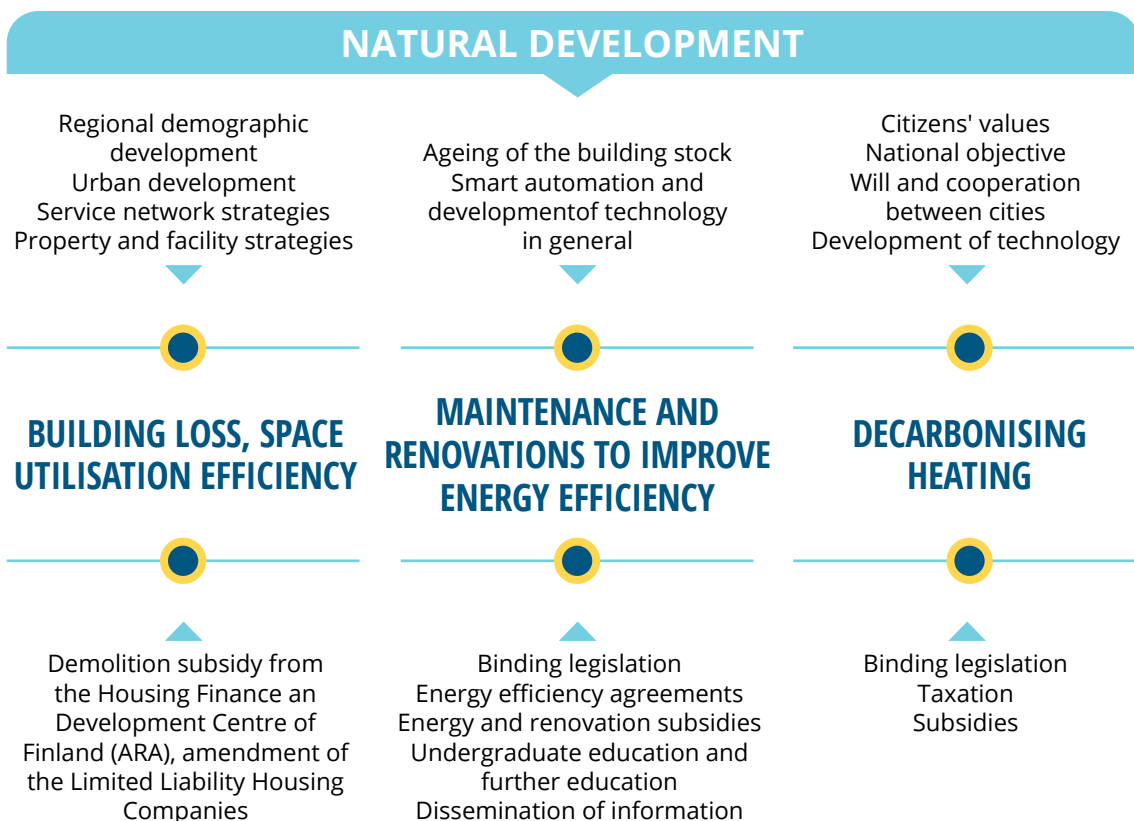
²³ Ibid.



SUPPORTING POLICIES

The Finnish approach to decarbonising its building stock is built around three key pillars (fig. 6) and a range of policies:

Figure 6: Pillars of the Finnish renovation strategy and supporting policies and measures (Source: Finnish LTRS).²⁴



POLICIES AND ACTIONS PROMOTING THE DEVELOPMENT

- **Reducing floor area by demolishing underutilised buildings and those in poor condition and improving space utilisation in remaining buildings.** This pillar reflects ongoing and predicted demographic changes, with domestic migration concentrating the Finnish population in the large urban areas in the south of the country and an overall decline in population from 2030. Supporting policies include demolition subsidies and amendments to legislation which obligate all housing companies to prepare a five-year plan on future repair needs.²⁵
- **Improving energy efficiency through renovation and maintenance.** The national building code of Finland, developed by the Ministry of the Environment, provides guidelines for property owners and designers on achieving the energy efficiency requirements for old buildings, including the most profitable renovation and maintenance measures, and also key trigger points in the lifecycle of buildings, such as change of occupancy or ownership.

²⁴ Ibid.

²⁵ The Limited Liability Housing Companies Act (2009/1599)

This pillar is supported by legislation, energy efficiency agreements, subsidies, education and dissemination of information and advice. Since 1997, municipalities and companies have been encouraged to improve their energy efficiency through voluntary energy efficiency agreements, while participating organisations are eligible for a 20% subsidy.

- **Decarbonising the supply of heat.** When existing heating systems require replacement, they should be replaced with a district heating system, a heat pump, biofuels or geothermal heating. The 2019 government programme includes a policy to abandon fossil fuel oil in state-owned buildings by 2024 and all buildings by the beginning of the 2030s. A subsidy for detached and semi-detached houses abandoning oil heating is being planned for 2021. Use of coal for heating is also to be phased out by 2029.²⁶

In order to encourage long-term property management with a view to improving energy efficiency and achieving decarbonisation, the strategy recommends:

- Establishing tools to support property maintenance (building user and maintenance manuals, condition evaluation, building maintenance plan, etc.)
- Establishing 10-15 year property strategies encompassing energy efficiency and CO² emission reduction
- Changing the current building permit procedure to encourage staged deep renovation
- Improving availability and use of design engineers, particularly in the case of residential renovation projects.

These measures are described as key components of a comprehensive renovation strategy, yet they are currently only recommendations. The government should adopt and implement these recommendations at the earliest opportunity.



FINANCIAL DIMENSIONS

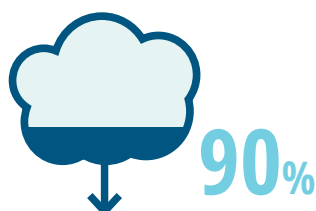
Assessed on the basis of the cost-optimal level of the minimum energy efficiency requirements used in renovation projects (2018), the Finnish renovation strategy estimates the cost of implementation at €24 billion over the course of 30 years, or an average of €800 million per year.

²⁶ Act on Prohibiting the Use of Coal in Energy Generation; laki hiilen energiakäytön kieltämisestä, 416/2019

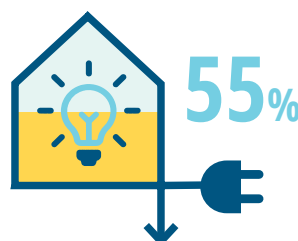
► BASE YEAR | 2020

Objectives in line
with EPBD

Decarbonisation objective:
**REDUCTION IN CO₂
EMISSIONS
BY 2050**



Highly energy efficient building
stock objective:
**REDUCTION IN
ENERGY USE
BY 2050**



€ 33bn
**TOTAL
INVESTMENT
REQUIRED**



Conclusions

Finland aims to achieve a 90% decarbonisation of its building stock by 2050 compared to 2020. While this represents a major reduction, it does not achieve a full decarbonisation of the sector, and is not consistent with the national goal of an economy-wide decarbonisation by 2035.

In terms of energy use, a reduction of 55% on 2005 levels is forecast for 2050, though the largest contributor is demolition of underutilised buildings and improved space utilisation, followed by the impact of the warming climate. Energy efficiency improvements only account for 10 percentage points of the reduction.

Investment requirements for delivering the strategy are provided, though there is no breakdown of the investment profile over time, nor the component contributions from government, end consumers and others. And, while there is some description of existing and planned subsidies and support measures, the necessary financial landscape to deliver the required investment to 2050 is not provided.

Importantly, there is no quantification of the financial benefits in terms of reduced energy expenditure which consumers will realise – by definition, these will exceed the costs, since the proposed measures are cost-effective. And, while job creation in construction is mentioned, the total employment impact across all trades, including manufacturing and professional services, is not quantified, nor are other benefits such as improved energy security.

Finally, the strategy includes 33 recommendations on topics including property management (highlighted above), education and skills, building automation, one-stop-shops and energy service companies (ESCOs). These recommendations have not been acted upon in formulating the strategy, despite them making a valuable contribution to delivering an energy efficient and decarbonised Finnish building stock. We recommend they are all implemented as a matter of priority.



FRANCE



2050 OBJECTIVES

The French LTRS was approved in mid-2020 after public consultation, and its content is in the framework of several laws, strategies and plans.²⁷ The objectives for 2050 and the interim milestones for 2030 are:

By 2030:

- 49% reduction in GHG emissions compared to 2015
- 22% reduction in energy consumption compared to 2015

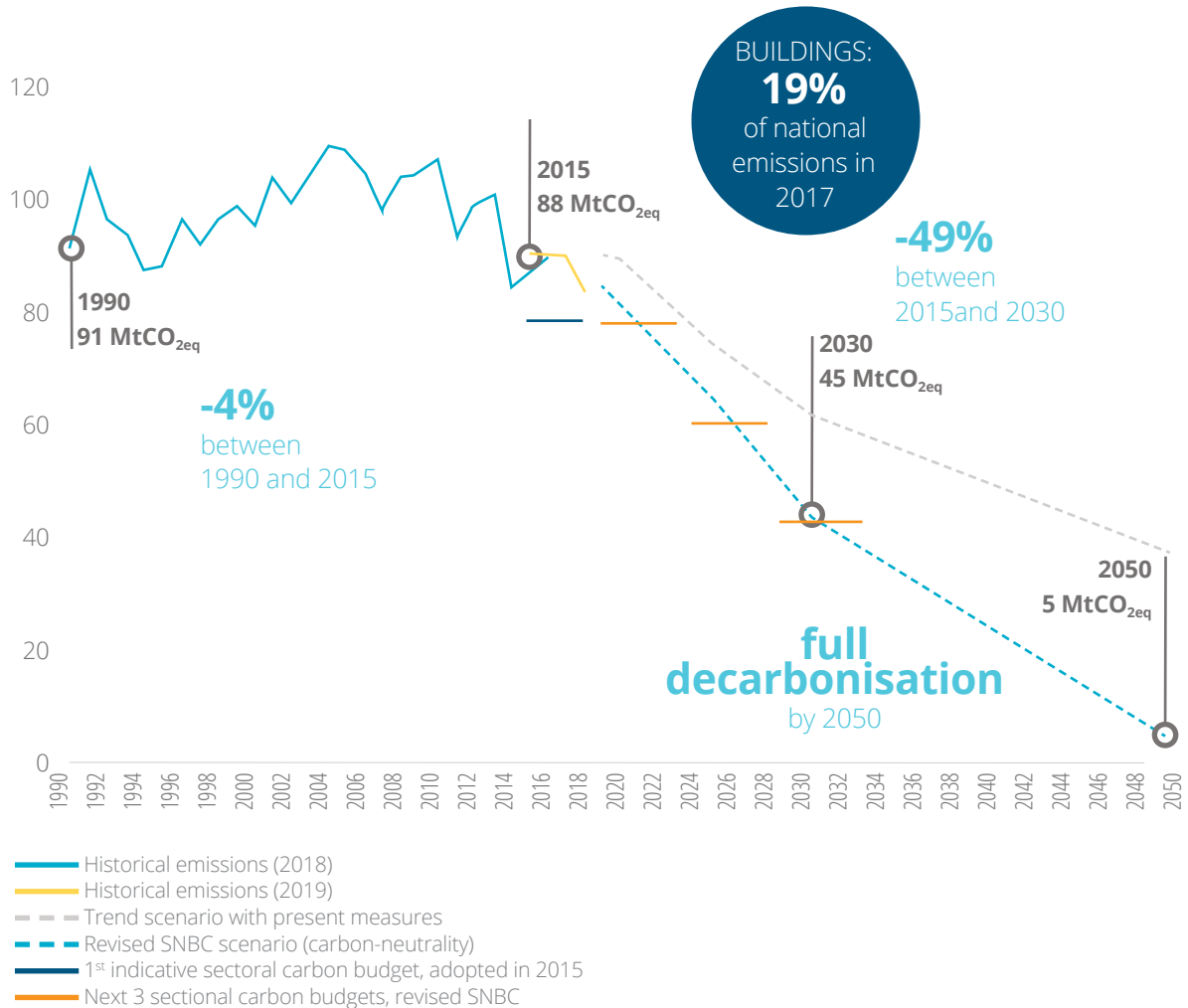
By 2050:

- 94% reduction in GHG emissions compared to 2015
- 41% reduction in energy consumption compared to 2015

There is no milestone for 2040. The trajectory of building sector decarbonisation is presented in fig. 7.

²⁷ **Plan Climat** (approved in 2017, which includes a subdocument called **PREB** ("Plan pour la Rénovation Énergétique des Bâtiments"), approved in 2018 and published in September 2020), the **LTECV** ("Loi relative à la Transition Énergétique pour la Croissance Verte", approved in 2015), the **SNBC** ("Stratégie Nationale Bas-Carbone") and the **PPE** ("Programmations Pluriannuelles de l'Énergie"), these last two approved in the first half of 2020.

Figure 7: History and projection of emissions from the French building stock between 1990 and 2050, in MtCO₂eq. (Source: French LTRS).²⁸



The headline objectives are underpinned by the three key progress indicators, which also form the basis of tracking progress towards the long term objective:

- Total annual consumption of the existing housing stock
- Segmentation of the housing stock by EPC performance level
- Distribution of the housing stock by main energy source, to monitor decarbonisation and progress towards elimination of fossil fuels as an energy source.

In the framework of the National Energy Renovation Observatory,²⁹ the calculation of these indicators is based on the data generated by the energy renovation incentive schemes. Some of these incentives are conditional upon gains in energy efficiency, while others depend on the execution of renovation measures.

²⁸ https://ec.europa.eu/energy/sites/default/files/documents/fr_ltrs_2020_en.pdf

²⁹ Observatoire national de la rénovation énergétique



SUPPORTING POLICIES

The roadmap proposed by the French government comprises a series of actions, clustered in four axes:

- Make the energy renovation of buildings a national priority
- Scale up housing renovation and fight against fuel poverty
- Accelerate the renovation and energy savings of tertiary buildings
- Strengthen skills and innovation.

One of the more interesting approaches is in the tertiary sector where, since the beginning of 2020, a decree³⁰ requires owners of tertiary-sector buildings to meet a series of energy-saving targets over a period of 30 years from 2020 to 2050. This mechanism, which is unique in Europe at the moment, includes targets for energy reduction every 10 years: 40% by 2030, 50% by 2040 and 60% by 2050.



FINANCIAL DIMENSIONS

The LTRS details a number of financial schemes to support the renovation agenda and mostly the energy efficiency aspects of it, though most initiatives only cover the short to medium term. Schemes address various sectors, including specific funding for low-income households, for social landlords, for the public sector as well as for training and awareness raising. There is no indication as to the total investment required over the period to 2050, nor how it will be financed.

Ultimately, building owners will need to finance the majority of the required investment. Accordingly, the strategy includes measures to encourage third parties to mobilise investment in energy renovation of buildings, such as the interest-free eco-loan (éco-PTZ), and the energy transition tax credit (CITE).

³⁰ The Housing, Planning and Digitalisation Development Act (Loi ELAN) includes a decree on energy-saving obligations in tertiary-sector buildings, which was at the drafting stage at the time of publication of the LTRS



Conclusions

France aims to deliver a climate-neutral building stock by 2050. This is based largely on decarbonising the sector by 94% compared to 2015, with the balance achieved using offsetting carbon sinks. The reduction in energy use is somewhat more modest – a 41% reduction by 2050. We conclude that, while the decarbonisation target is in line with the prevailing EPBD requirement, insufficient effort is directed towards improving the energy performance of the building stock.

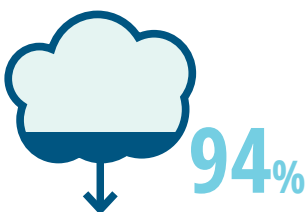
Given that sectoral emissions reduced by only 4% in the period 1990-2015 (albeit the decline since 2005 is more significant), the objective is clearly a challenging one.

While there are additional measures introduced recently and in the pipeline, it remains to be seen whether they are sufficient to deliver on the ambition.

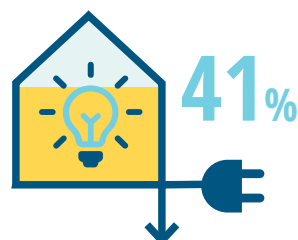
Total investment requirements are not detailed. Where funds are mentioned for specific programmes, these generally last for only a few years. While it may be unrealistic to set out the investment profile to 2050 in detail, it would be expected that the long-term decarbonisation objective should be underpinned with at least an outline of how it will be funded.

Alongside long-term funding arrangements, there needs to be a vision of the long-term policy landscape. In this regard, France has enacted an innovative approach for the tertiary sector, with long-term energy consumption reduction targets, reaching 60% by 2050. A similar long-term perspective needs to be developed for all other sectors, in order to provide the necessary impetus towards achieving the objective of an energy efficient and decarbonised building stock.

Decarbonisation objective:
**REDUCTION IN CO₂
EMISSIONS
BY 2050**



Highly energy efficient building
stock objective:
**REDUCTION IN
ENERGY USE
BY 2050**



**TOTAL
INVESTMENT
REQUIRED**

► BASE YEAR | 2015

Insufficient effort is directed to improving the energy performance of the building stock



GERMANY



2050 OBJECTIVES

The federal government has set itself the objective of reducing national GHG emissions in Germany by at least 55% by 2030 as compared with the base year 1990. Germany is also pursuing the long-term objective of net-zero GHG emissions by 2050. The federal government aims to achieve a “virtually climate-neutral building stock by the middle of the century”, according to the Climate Action Plan 2050,³¹ referring in large part to the Energy Efficiency Strategy of Buildings (ESG)³², published in 2015. The ESG lays down a corridor of actions towards achieving a reduction in primary energy consumption of 80% in 2050 compared to 2008. This is a non-binding target for the building sector adopted in the Energy Concept of 2010 and is to be achieved through a combination of increasing energy efficiency and using renewable energy.³³

The above-mentioned strategies are the basis for the development of the LTRS. However, the LTRS does not set a binding decarbonisation objective for 2050 for the building sector. The Climate Change Act has set a 67% reduction in building sector GHG emissions in 2030, compared to 1990 emissions of 210 MtCO₂eq. When compared to 2020 GHG emissions of 118 MtCO₂eq, the reduction is 41%. There are no milestones or indicators beyond 2030.

The government has set up a process to develop indicative milestones for 2040 and 2050, to be published in the next version of Germany's LTRS in 2024 and also reflected in the Climate Change Act when this is updated in 2025.

³¹ www.bmu.de/fileadmin/Daten_BMU/Pool/Broschueren/klimaschutzplan_2050_en_bf.pdf

³² www.bmwi.de/Redaktion/EN/Publikationen/energy-efficiency-strategy-buildings.pdf?__blob=publicationFile&v=7

³³ www.bmwi.de/Redaktion/DE/Downloads/E/energiekonzept-2010.pdf?__blob=publicationFile&v=5



SUPPORTING POLICIES

The 2030 Climate Action Programme was enacted at the end of 2019 and includes various instruments, including:³⁴

- Carbon price for heating fuels (starting 2021 – initial price €25 rising to €55 in 2025 and a price corridor between €55-€65 in 2026), and developing into a fully fledged emissions trading scheme on heating and transport fuels after 2026.
- Tax support for energy refurbishment measures in owner-occupied homes (starting 2020 – 20% of investments and 50% of consultation are eligible for new heating systems and optimisation of old ones, windows, roof, walls, ventilation, installation of digital systems to optimise energy consumption and operation).
- More investment support in existing programmes, to be restructured in a new federal support package for efficient buildings (starting 2021, aiming at ambitious renovations, and simplifying the application process with a single point of application).
- New support programme for serial refurbishment, also known as industrial renovation.
- The energy efficient Urban Renovation programme is planned to be continued and new funding measures are to be developed or existing ones are to be improved in 2020.
- A review of energy efficiency standards in 2023.
- Energy advice for householders will be improved, in particular through including the (optional) individual building renovation passport as part of the energy advisory process.
- At certain trigger points (e.g. change of ownership) information on options is mandatory. The costs are covered by the existing funding programmes.
- Federal buildings leading by example – new federal government buildings are to meet at least “EH 40” (i.e. 40% of the primary energy consumption of a reference building to the current energy efficiency standard – see footnote³⁵) from 2020 onwards.



FINANCIAL DIMENSIONS

In terms of financing the renovation transition, the LTRS describes the existing and new instruments for financial support and insights on their conditions. However, it does not provide overall costs or how the programmes will, collectively, trigger the necessary funding for the required investment.

³⁴ For a comprehensive description of policies and measures, please refer to the German LTRS.

³⁵ Efficiency House (EH) is an energy standard for residential buildings based on an EnEV reference building. The number after the abbreviation ‘EH’ describes the relative primary energy demand of an efficiency house level compared to the EnEV reference building. For example, an EH 40 should require only 40% of the primary energy of the EnEV reference building.



Conclusion

The German LTRS does not set a target for 2050 for the building stock. While the Energy Efficiency Strategy for Buildings does include a goal to achieve a nearly climate-neutral building stock in 2050, this is not properly reflected in the LTRS. While the quantitative GHG emission target for 2030 may be in line with the decarbonisation ambition for 2050, this needs further assessment. Confirmation of the 2050 objective and details of how this will be achieved are currently planned to be published in the next iteration of the German LTRS, in 2024.

► BASE YEAR | 1990

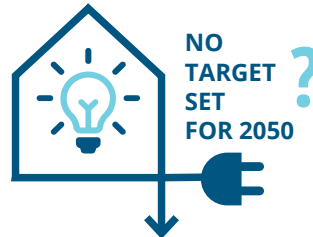
LTRS fails to meet minimum requirement of a clear 2050 decarbonisation objective

Decarbonisation objective:
REDUCTION IN CO₂ EMISSIONS BY 2050



NO TARGET SET FOR 2050

Highly energy efficient building stock objective:
REDUCTION IN ENERGY USE BY 2050



NO TARGET SET FOR 2050



?
TOTAL INVESTMENT REQUIRED



THE NETHERLANDS



2050 OBJECTIVES

The introduction to the LTRS sets the scene for the country's objective of achieving a low-carbon built environment by 2050 (see box).

Extract from the built environment section of the Dutch Climate Agreement

The Netherlands stands on the eve of a sustainable transformation of the built environment into well insulated homes and buildings that are sustainably heated and supplied with clean electricity which they partly generate themselves. The Dutch government will carry out this process incrementally up to 2050, together with residents, tenants, owners, housing associations, builders, fitting businesses, and any other interested parties.

The Netherlands has opted for a district-oriented approach to this transformation. District heating grids and renovations will be organised at district level. Local residents will collaborate with one another and with the relevant local government authority. This means collectively making the right decisions and collectively organising potential interventions in the local community and in residents' homes and perhaps even jointly owning a new geothermal or other heating source or solar panels. This is easier and cheaper than if each household is left to its own devices.

The strategy sets out the evolution of Dutch climate and energy policy since the 1970s. Within the last decade, the key policies that have influenced the current LTRS are described as:

- National Energy Agreement (2013)³⁶
- Paris Agreement (2015),
- National Climate Agreement (2019), which became the Climate Law in 2020

According to these agreements, and as detailed in the national energy and climate plan (NECP) 2021-2030³⁷ and Climate Law, the government aims to reduce national GHG emissions by 49% in 2030, compared to 1990, and 95% in 2050. This target is not subdivided by sector, so the LTRS takes the same percentage reductions as it describes as indicative milestones for the building sector:

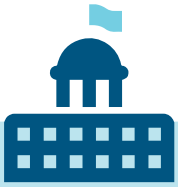
- 2030: 15.3MtCO₂eq (a 49% reduction on 1990 levels of 30 MtCO₂eq)
- 2040: 8.4MtCO₂eq (72% reduction)
- 2050: 1.5MtCO₂eq (95% reduction).

Note that, for 2040, only an indicative milestone has been set based on a linear reduction between the 2030 and 2050 targets.

The focus of the LTRS is primarily on carbon reduction. While there are projections of energy use to 2030, these are not extended to 2050, and so the contribution of improved energy efficiency, as opposed to other means of decarbonising buildings, cannot be determined. That said, the LTRS states that new measures are primarily aimed at deep renovation and making the built environment gas-free.

³⁶ <https://www.ser.nl/nl/thema/energie-en-duurzaamheid/energieakkoord/wat>

³⁷ NECP in Dutch : www.rijksoverheid.nl/documenten/rapporten/2019/11/01/integraal-nationaal-energie-en-klimaatplan
NECP in English: https://ec.europa.eu/energy/sites/ener/files/documents/nl_final_necp_main_nl.pdf

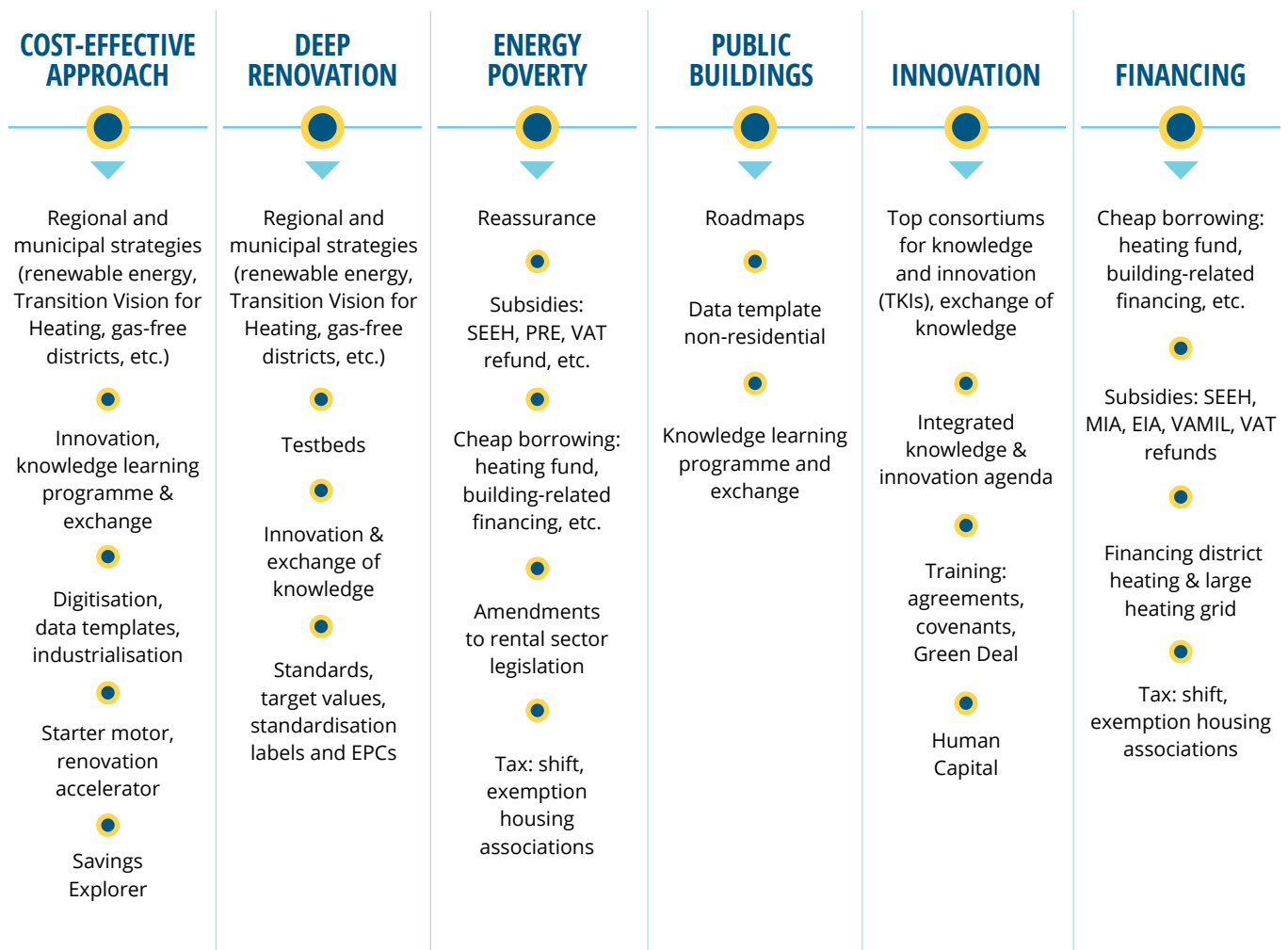


SUPPORTING POLICIES

The measures in the Dutch LTRS are subdivided into thematic measures and sectoral instruments. The thematic measures consist of existing and new measures that are designed to facilitate investments in emission and energy consumption reduction. The thematic measures are the *district approach, fiscal instruments, and innovation instruments and education*. In addition to this general subdivision of policies, measures and instruments, an integral overview of all measures has been included in the LTRS (see fig. 9), under six headings: *a cost-effective approach, deep renovation, energy poverty, public buildings, innovation and education and financing*.

Figure 9: Pillars and supporting policies of the Dutch Renovation Strategy (Source: Dutch LTRS, adapted & translated by BPIE).³⁸

LTRS BUILDING BLOCKS



³⁸ https://ec.europa.eu/energy/sites/default/files/documents/nl_2020_ltrs_en.pdf



FINANCIAL DIMENSIONS

Among the key planning, fiscal and financial instruments designed to stimulate mobilisation of investments in renovation are:

- Natural gas-free districts: €400 million programme 2018-27 to decarbonise complete districts on a municipal level.
- *Renovation Accelerator*, a €130 million programme 2020-24 which aims to aggregate demand in the social rental sector.³⁹
- *Stimulus programme for natural gas free rental buildings* for which €194 million is available in 2020-23.⁴⁰
- *Municipal Transition Vision Heating* documents and targets provide clarity, reducing risk for public and private investors.
- *National Energy Savings Fund* combines €600 million public and private capital to offer attractive financing for building owners, with the public funds intended to reduce risk for third-party financiers. The funding comes from the national government, Rabobank, ASN Bank, and the Council of Europe Development Bank. The Dutch government provides €50–80 million for this fund.⁴¹ Interest and repayments of the loans flow back into the fund and are used to provide new ones.⁴²
- 'Savings Explorer' (Besparingsverkenner) gives insight and concrete advice to residential and utility building owners related to how they can reduce energy costs and demand.
- A national heating fund will make available accessible funding to all residential building owners, legislative barriers for increasing mortgages will be reduced, and the borrowing volume provision for sustainable renovations and construction during credit will be revised and improved. Furthermore, the government is rewriting the civil code to allow building-related financing, which will allow linking loans for sustainable renovations to the building and transferring these to new buyers.
- The gas-free districts programme (Programma Aardgasvrije Wijken) aims to facilitate learning on how to decarbonise around 100 complete districts.

While these measures indicate the funding pathway for the coming years, they do not cover the whole period to 2050, so it is not possible to comment on how the renovation roadmap will be funded.

³⁹ www.rvo.nl/subsidie-en-financieringswijzer/renovatieversneller

⁴⁰ www.rvo.nl/subsidie-en-financieringswijzer/stimuleringsregeling-aardgasvrije-huurwoningen-sah-voor-verhuurders

⁴¹ www.klimaatakkoord.nl/gebouwde-omgeving/documenten/publicaties/2019/06/28/klimaatakkoord-gebouwde-omgeving-in-het-kort

⁴² Netherlands LTRS, 2020, p.65.

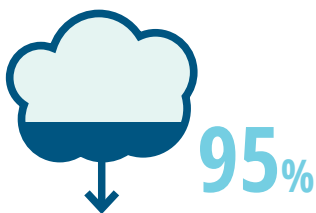


Conclusions

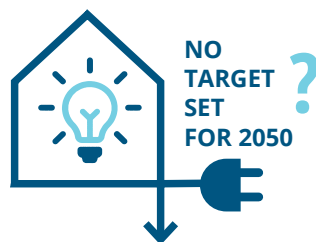
The LTRS adopts the national target of a 95% GHG emission reduction in 2050, compared to 1990 levels, as the reduction target for the building sector. In terms of energy, forecasts only extend to 2030. We recommend that a more detailed building-sector-specific target be developed, covering both GHG emissions and energy, in order to give a clear picture of the roadmap to an energy efficient and decarbonised building stock.

A comprehensive range of policies and measures is presented which target different themes and sectors, though a strong emphasis is placed on the district-led approach and engagement with communities and end consumers. However, these policies and associated funding only cover this decade, with no real insight into features of the roadmap beyond 2030. Developing this long-term picture is essential if the vision of a sustainable building stock, as expressed in the Climate Agreement, is recognisable as an achievable goal.

Decarbonisation objective:
**REDUCTION IN CO₂
EMISSIONS
BY 2050**



Highly energy efficient building
stock objective:
**REDUCTION IN
ENERGY USE
BY 2050**



► BASE YEAR | 1990

Energy targets need to be set for 2050



SPAIN



2050 OBJECTIVES

The Spanish LTRS forms part of a trilogy of national strategies which set out the country's approach to work towards climate-neutrality, the other two being:

- Long-Term Strategy for a Modern, Competitive and Climate-Neutral Spanish Economy in 2050⁴³ ("the Climate-Neutral Strategy") – the strategic planning instrument that establishes national objectives for energy saving and emissions reduction for the whole economy.
- National energy and climate plan (NECP),⁴⁴ which focuses on the period 2021-2030 and will be periodically updated.

Spain is seeking to virtually decarbonise the residential sector by 2050, reducing GHG emissions by 98.8% compared to 2020. There is no explicit target for the non-residential sector. However, the similarity of the two projected energy demand profiles in 2020-2050, described in figures 10 and 11, suggests this sector will also be almost fully decarbonised.

⁴³ Estrategia a Largo Plazo para una Economía Española Moderna, Competitiva y Climáticamente Neutra en 2050 (ELP 2050)

⁴⁴ Plan Nacional Integrado de Energía y Clima 2021-2030

Energy use in the residential sector is forecast to reduce by 37% from 2020 to 2050 (fig. 10), while for the non-residential sector the reduction is 36% (fig. 11). Over this timeframe, use of fossil energy will be eliminated in both sectors. Decarbonisation of the sector is therefore reliant on the electricity supply being almost fully decarbonised by 2050. Both figures show the interim milestones for energy consumption in 2030 and 2040.

Figure 10: Projected residential sector energy use 2020-2050 (Source: BPIE based on data in Spanish LTRS)⁴⁵.

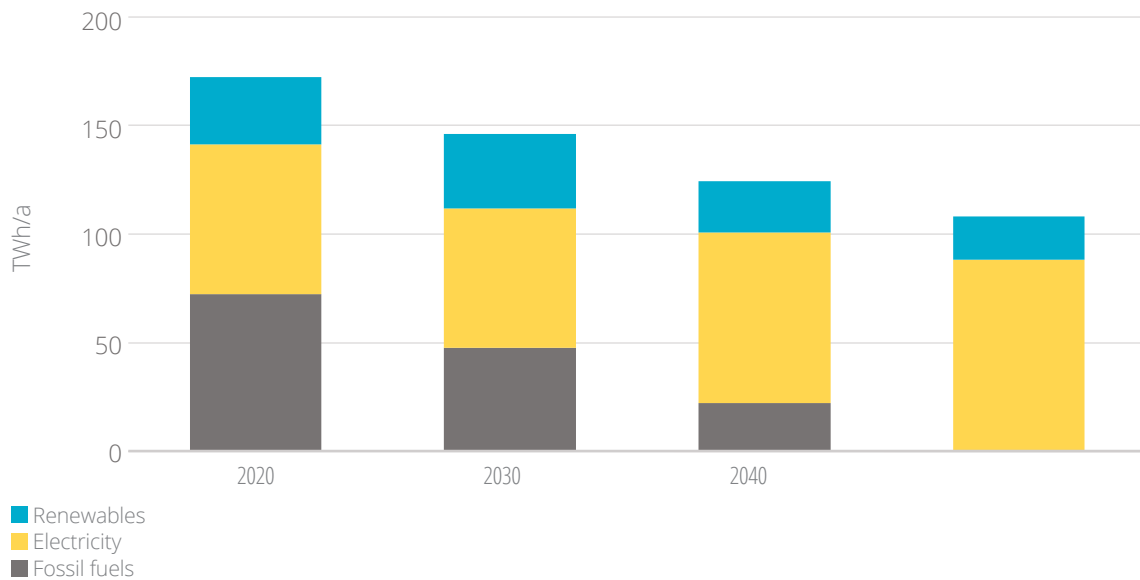
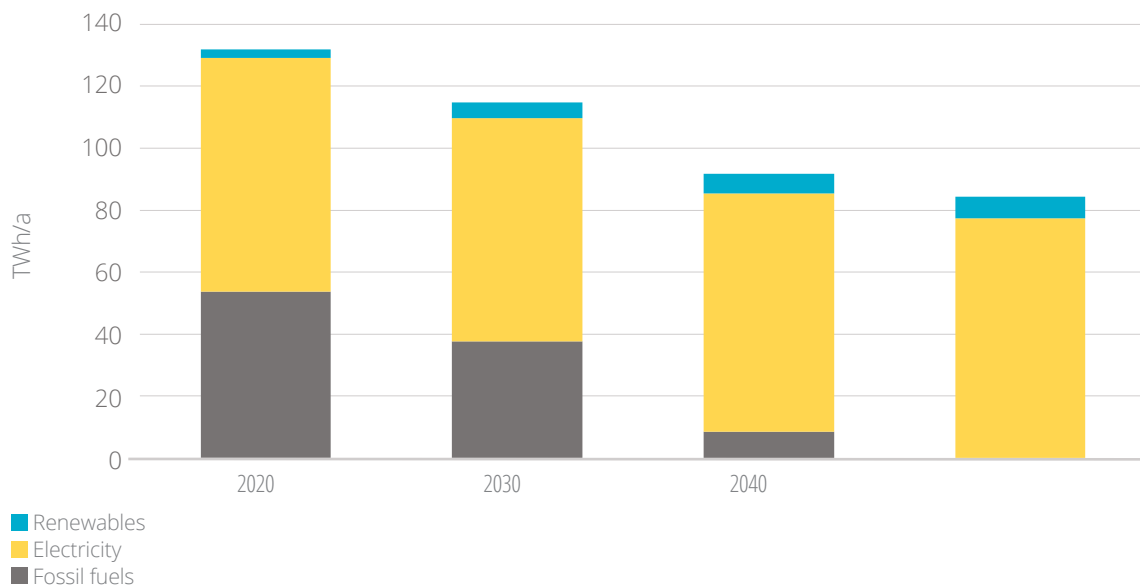
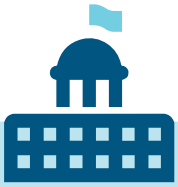


Figure 11: Projected non-residential sector energy use 2020-2050 (Source: BPIE based on data in Spanish LTRS)⁴⁶.



⁴⁵ https://ec.europa.eu/energy/sites/default/files/documents/es_ltrs_2020.pdf

⁴⁶ Ibid.



SUPPORTING POLICIES

The strategy recognises that in Spain and other Mediterranean countries with relatively warm climates and therefore low energy consumption for heating, the economic returns obtained through investing in energy efficiency are not important enough to be at the heart of national strategies. Energy renovation therefore needs to be aggregated with other objectives to make it more economically and socially attractive. With this in mind, the strategy incorporates the macroeconomic perspective of the total returns from public investment in building renovation through taxes, healthcare savings, unemployment reduction, etc. It also incorporates as triggers of the rehabilitation works not only the profitability obtained through the capitalisation of energy savings (which plays a partial role) but also the synergies with other necessary building works, such as improving habitability and comfort of the inhabitants.

One of the main vectors for the decarbonisation is the electrification of the

energy consumption in buildings, along with the systematic implementation of renewable energy sources in the Spanish energy system. Spain has set the objective of producing all its electricity from renewable energy sources by 2050.

The objectives are intended to be met through a series of rehabilitation “menus” (sets of measures), designed both for residential buildings (differentiating between envelope, domestic hot water and heating, and also addressing energy poverty) and non-residential buildings (differentiating between the private and public sector). At a broader scale, these menus are aggregated in different ways and under different hypotheses, creating whole renovation scenarios.

The policies and support measures are grouped in 11 sets of measures called “structural axes”, which are aimed at the correct implementation of the strategy in all areas, as described briefly below:

- 1. Promote coordination:** Strengthen or create the administrative structures necessary for the development and promotion of the renovation strategy at national, regional and municipal level, articulating the required coordination mechanisms at a sectoral level (between different ministerial departments), vertically (between the different public institutions involved in the implementation of the strategy) and horizontally (considering other key actors in the building refurbishment sector).
- 2. Regulatory development and administrative measures favouring energy renovation:** Promote the development of the existing regulatory framework related to building refurbishment and energy efficiency and provide instruments and tools to municipalities for the implementation of urban renewal actions.
- 3. Renovation of public administration buildings and other exemplary measures:** To extend the 3% p.a. renovation requirement laid down in Article 5 of the Energy Efficiency Directive to other public administrations.
- 4. Public financing measures:** Continue with public aid programmes, resolving aspects that have been identified as needing improvement. To this end, some new actions are established (like the opening of a network of one-stop shops) along with general criteria to be taken into account in the definition of new financing programmes or in the reform or continuation of the existing ones.

5. **Measures for the promotion and mobilisation of private financing:** This set of measures aims to encourage the mobilisation of private funding, by removing barriers that are currently preventing their large-scale deployment. They include creating a guarantee fund to cover defaults, encouraging public-private collaboration endeavours, etc.
6. **Fight against energy poverty:** This axis incorporates the measures contemplated in the national strategy against energy poverty 2019-2024⁴⁷ that are directly related to energy rehabilitation. These include the creation of administrative structures to address the problem and efforts to engage different public administrations by increasing their knowledge about the topic in their corresponding jurisdictions, among others.
7. **Measures for the deployment of a new energy model in the building sector:** Among the measures envisaged are the reform of the regulatory framework for domestic energy uses, promotion of bioclimatic architecture, implementation of community-owned renewable energy installations, improvement of the current EPCs, etc.
8. **Measures for the activation and aggregation of demand:** Facilitate decision-making and financing, as well as the search for synergies between energy rehabilitation and compulsory conservation works. Promote the aggregation of demand at building and neighbourhood level. Measures include the revision of the property law to facilitate communal decision-making as well as analysing the potential development of building renovation passports.
9. **Supply-side measures: professionalisation, modernisation of the rehabilitation, education and training:** Develop a new and modernised professional offer, addressing building renovation as a well-rounded service. Measures include improving of the academic offer in universities and technical schools concerning energy renovation of buildings and the development of technical guides to support the decarbonisation.
10. **Society and Information. Citizenship engagement:** Promote a cultural change among citizens, awakening greater societal awareness of energy savings, building maintenance and renovation, as well as urban regeneration of the towns and cities they live in. Moreover, the measures aim to effectively disseminate (in a more technical sense) pioneering or innovative experiences in the field of building renovation and urban regeneration that could be applicable in other places.
11. **Development of statistics, indicators and monitoring:** Address the current lack of knowledge about real energy consumption in Spain in the residential sector and develop monitoring indicators for publicly funded programmes in order to be able to properly evaluate public policies. These measures include conducting surveys concerning the penetration of different heating/cooling technologies in the building stock, and investing in research concerning comfort conditions and internal air quality.



FINANCIAL DIMENSIONS

While the strategy provides information on a number of financing schemes to support building renovation in different sectors, most schemes are only detailed for the next few years. Investment requirements are quantified for the residential sector only. A total investment of €122 billion would be required, plus up to €21 billion in financing costs, making a total of up to €143 billion.

⁴⁷ Estrategia Nacional contra la Pobreza Energética 2019-2024



Conclusions

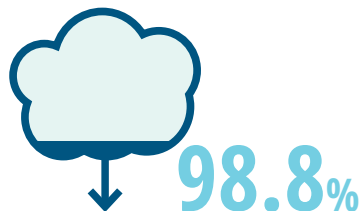
The Spanish LTRS proposes a detailed, well-rounded and realistically implementable spectrum of measures to pave the way towards a decarbonised building stock by 2050. While carbon emissions are set to be virtually eliminated (reduced by 98.8%) the reduction in energy use is much more modest, at 36-37%, which indicates that decarbonisation of energy supply is the main tool to achieve the carbon target.

That said, the strategy proposes a well thought-out roadmap which addresses all aspects of the market and seeks to utilise a comprehensive and coordinated range of tools, from fiscal and legislative to education and awareness raising, in order to raise the level of renovation activity.

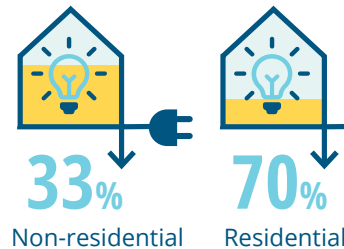
► **BASE YEAR | 2020**

Insufficient effort is directed to improving the energy performance of the building stock

Decarbonisation objective:
REDUCTION IN CO₂ EMISSIONS BY 2050



Highly energy efficient building stock objective:
REDUCTION IN ENERGY USE BY 2050



€ **143bn**
TOTAL INVESTMENT REQUIRED

inclusive of financing costs (residential sector only)



Conclusions and recommendations

The 2020 renovation strategies, pursuant to Article 2a of the 2018 EPBD, represent the third iteration of the requirement, originally introduced in 2012 under Article 4 of the Energy Efficiency Directive, with a 2014 implementation deadline. Given the shortcomings of the 2014^{48,49} and 2017^{50,51} strategies and the increasing urgency to tackle climate change, the renovation strategy requirements were strengthened in the 2018 recast of EPBD. An explicit requirement for Member States to set out long-term 2050 decarbonisation goals was added. Member States must therefore now describe their plans for how national building stocks will be renovated over the period to 2050 to deliver a “highly energy efficient and decarbonised building stock”.

Our analysis of the 2050 decarbonisation objectives of a selection of long-term renovation strategies representing over half the EU population has demonstrated that Member States continue to underplay the role of the building sector in delivering a climate-neutral Europe. Although half of the analysed LTRS (Finland, France, the Netherlands and Spain) include an objective at or above 90% GHG emissions reduction, which is in line with the legal requirement of the EPBD, **none of the eight strategies targets a 100% decarbonisation of the building stock. They are therefore not in line with achieving climate-neutrality by 2050.**

⁴⁸ www.bpie.eu/publication/renovation-strategies-of-selected-eu-countries

⁴⁹ <https://ec.europa.eu/jrc/en/publication/eur-scientific-and-technical-research-reports/synthesis-report-assessment-member-states-building-renovation-strategies>

⁵⁰ www.bpie.eu/publication/a-snapshot-of-national-renovation-strategies-examples-from-selected-eu-member-states

⁵¹ <https://ec.europa.eu/jrc/en/publication/assessment-second-long-term-renovation-strategies-under-energy-efficiency-directive>

In addition, **most strategies appear to put more effort into decarbonising energy supply systems and GHG emissions reduction, rather than improving the energy performance of buildings and thereby reducing the energy consumption in this sector.** While both are clearly needed, a greater focus on energy performance would bring with it many economic, environmental and societal benefits, such as improved indoor air quality, better health, job creation and alleviation of energy poverty.⁵²

Besides this lack of focus on the energy savings aspect, the strategies also fail to provide sufficient detail over the entire period to 2050 to enable an evaluation of whether the supporting policies and financial arrangements are adequate to meet the goals. What can be concluded from the available information, which in most cases only covers the next few years, is that the **policies and measures in force at the present time are unlikely to significantly accelerate the rate and depth of renovation in line with the need to achieve a highly energy efficient and fully decarbonised building stock by 2050.**

The Renovation Wave strategy, published in October 2020, sets the goal to increase annual renovation rates in the EU from 1% to 2% over the next decade, and to boost deep renovations.

It appears from our analysis of the LTRS, especially the part on reducing energy consumption in the buildings sector, that Member States will not deliver this doubling of the renovation rate called for by the European Commission. This can be considered as even more worrying because previous analysis by BPIE⁵³ has shown that **the Renovation Wave ambition needs to be even higher, at around a 3% deep renovation rate per year by 2030, if the EU is to achieve its 2030 GHG emissions reduction target of at least 55%.**

With the increasing urgency to take bold actions to address climate change and the need to recover from the global COVID-19 pandemic in a sustainable and socially fair way, the importance of delivering a highly energy efficient and decarbonised building stock has never been more pressing.

⁵² See International Energy Agency. 2019. *Multiple Benefits of Energy Efficiency*. www.iea.org/reports/multiple-benefits-of-energy-efficiency

⁵³ www.bpie.eu/wp-content/uploads/2020/12/On-the-way-to-a-climate-neutral-Europe_Final.pdf



Recommendations



**EUROPEAN
COMMISSION**



... ASSESS ALL MEMBER STATE LONG-TERM RENOVATION STRATEGIES

in accordance with the legal EPBD Article 2a wording, but also according to alignment with the climate-neutrality objective by 2050 (meaning higher decarbonisation objective and stronger emphasis on reducing the energy demand in the buildings sector), and guide Member States accordingly for their LTRS update (by 2024 at the latest).



3%

... ADJUST AMBITION OF THE RENOVATION WAVE STRATEGY

to deliver a 3% annual deep renovation rate by 2030 and fully align the buildings sector with the climate-neutrality objective by 2050.



... AMEND EPBD ARTICLE 2A

in its next recast to require full decarbonisation of the building sector by 2050, with the majority of effort to be directed to improving building energy performance and the delivery of a highly energy efficient, nearly zero-energy building stock.



**MEMBER
STATES**



... ALIGN LTRS WITH THE CLIMATE-NEUTRALITY OBJECTIVE BY 2050

i.e. going beyond the EPBD Article 2a wording, and commit to a 100% decarbonisation objective as well as raising their ambition for the reduction of the energy consumption in the buildings sector, as soon as possible and no later than 2024.



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