TRANSFORMING BUILDINGS, EMPOWERING EUROPE:

A PATHWAY TO PROSPERITY, EQUITY AND RESILIENCE

EU BUILDINGS CLIMATE TRACKER

3RD EDITION

BPIE

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BPIE (Buildings Performance Institute Europe) is a leading independent think tank on climate mitigation and adaptation of buildings. Our vision is a climate-neutral built environment, aligned with the ambition of the Paris Agreement, and in support of a fair and sustainable society. We provide data-driven and actionable policy analysis, advice, and implementation support to decision-makers in Europe and globally. www.bpie.eu

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EXECUTIVE SUMMARY

THE BUILDINGS SECTOR IS LAGGING ON CLIMATE GOALS

The EU Buildings Climate Tracker highlights that the buildings sector remains significantly off track, with key indicators – CO_2 emissions, energy consumption, renewable energy share and renovation investments – over 40% behind 2030 and 2050 target pathways.

2022 PROGRESS FALLS SHORT AS DECARBONISATION GAP WIDENS

The decarbonisation gap has more than doubled since 2016, underscoring the urgent need for accelerated, transformative action across the EU.

SLOW TRANSFORMATION IN BUILDINGS THREATENS EU PROSPERITY AND SOCIAL EQUITY

Insufficient decarbonisation progress risks health, stability and energy security, especially for vulnerable communities.

RIGOROUS EPBD IMPLEMENTATION MUST DRIVE TRANSFORMATION

EU Member States must prioritise rigorous implementation of the Energy Performance of Buildings Directive to accelerate decarbonisation and renewables uptake.

BOLD EU LEADERSHIP: BETTER BUILDINGS AS A PATH TO PROSPERITY AND UNITY

The European Commission should place building decarbonisation at the core of its strategy to drive sustainable prosperity in Europe.

EU BUILDINGS ARE SIGNIFICANTLY OFF TRACK TO CLIMATE NEUTRALITY.

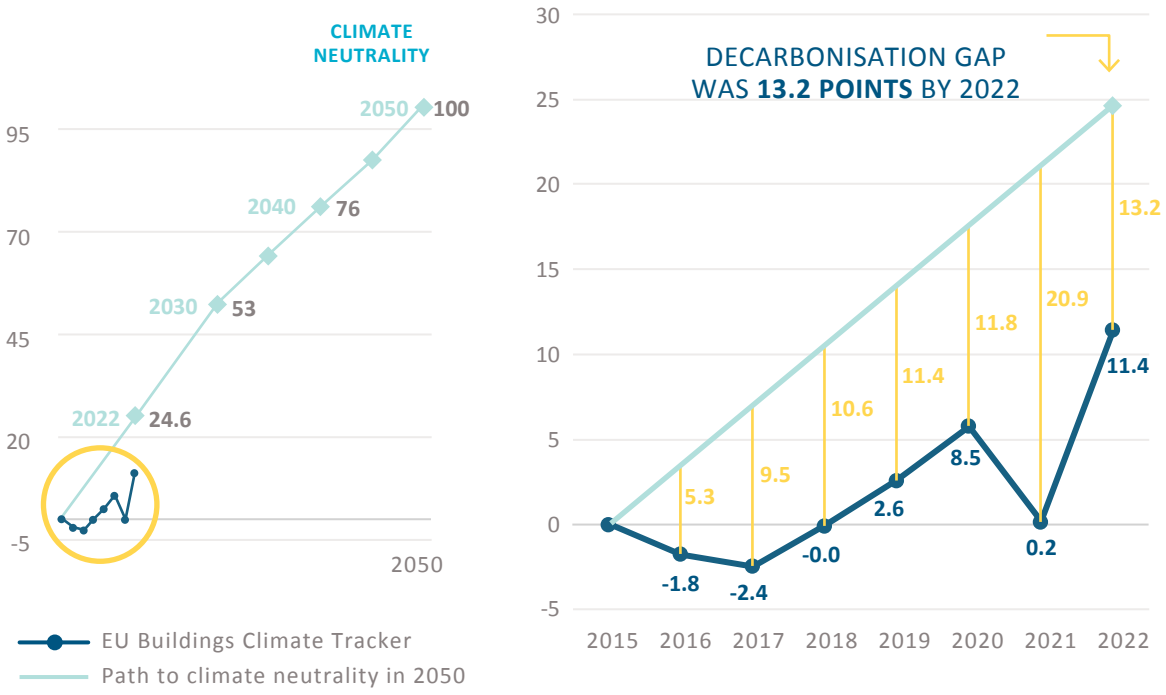
Heating and cooling of buildings is one of the largest sources of greenhouse gas emissions in Europe. As the EU and its Member States have established clear goals for reducing these emissions, progress requires close scrutiny. To evaluate whether the sector is on track to achieve carbon neutrality, BPIE has developed the European Buildings Climate Tracker (EU BCT), now in its third edition.

The latest index reveals that the EU buildings sector is significantly off track to meet its 2030 and 2050 climate goals. Overall, the four key indicators of the EU BCT – CO_2 emissions reduction, final energy consumption, renewable energy share and renovation investments – are over 40% away from the necessary decarbonisation pathway.

With 2022 marking the halfway point toward our 2030 climate milestone since the Paris Agreement, the starting point of our tracking, the stark reality is that progress at the current pace will not achieve the 2030 targets. Alarmingly, the decarbonisation gap in 2022 has more than doubled since 2016.

The Tracker is based on a 100-point scale, starting at zero in 2015 and reaching 100 for climate neutrality in 2050. In 2022, the difference between the tracker and the climate neutrality path exceeded 13 decarbonisation points, underscoring inadequate progress. This shortfall is primarily due to insufficient reductions in final energy consumption, a slow rollout of renewable heating and cooling, and unrealised renovation investments.

Figure 1: EU BCT results between 2015 and 2022



Between 2018 and 2022, building decarbonisation showed modest progress compared to 2015. However, 2021 saw a significant deviation from this positive trend, likely due to short-term factors such as the post-COVID recovery in the service sector and increased heating demands during a particularly cold winter.

While 2022 data may visually suggest strong progress, it largely reflects a return to previous trends rather than a meaningful advancement. This progress is primarily attributable to short-term actions, such as voluntary targets to reduce gas consumption by at least 15% as a direct economic reaction to the energy crisis.[1] The progress observed is therefore likely temporary and does not reflect strategic long-term measures needed for sustained change.

Policymakers should consider this context to avoid overestimating progress and ensure that long-term structural actions are prioritised. At the outset of the index in 2015, an annual decarbonisation progress of approximately 3.6 points was required to align with the reference path toward climate neutrality. Due to insufficient progress in recent years, this requirement has now risen to 5.2 points annually, indicating the need for significant additional efforts. If CO_2 emissions are not promptly reduced, future mitigation and adaptation efforts will become increasingly challenging and costly.

KEY FIGURES

- **CO_2 EMISSIONS** from building energy use have decreased by just **14.7%** since 2015, far below the required 27.9% reduction by 2022. This shortfall has resulted in an additional **367 million tonnes of CO_2** being emitted into the atmosphere, equivalent to nearly a year's worth of emissions from the entire EU building stock.

- **FINAL ENERGY CONSUMPTION** in buildings has dropped by only **2.8%**, while the target was a **6.5%** reduction. **The reduction is happening at less than half of the required pace.**

- **RENEWABLE ENERGY SHARE** has increased by only **6.3%**, far below the target of an **18% increase** by 2022, primarily due to slow adoption of renewable heating and cooling systems. Renewable uptake specifically for heating and cooling must quadruple.

- **INVESTMENT IN BUILDING RENOVATION** remains a major barrier, with investments reaching only **60.6%** of the required target for 2015-2022. This underinvestment will make future renovations more challenging and likely more expensive.

[1] https://eur-lex.europa.eu/EN/legal-content/summary/coordinated-demand-reduction-measures-for-gas.html

With 2022 marking the halfway point toward our 2030 climate milestone since the Paris Agreement, the starting point of our tracking, the stark reality is that progress at the current pace will not achieve the 2030 targets. Alarmingly, the decarbonisation gap in 2022 has more than doubled since 2016.

SLOW TRANSFORMATION OF BUILDINGS IS NOT JUST A CLIMATE PROBLEM; IT'S A PEOPLE PROBLEM.

Buildings that emit less CO_2 are better for people: they promote physical and mental health, enhance financial stability, support social equity, strengthen resilience in crises and improve energy security. Rising energy costs driven by post-COVID economic shifts and the energy crisis following Russia's invasion of Ukraine have exacerbated energy poverty, now impacting 9.3% of the EU population[2]. In 2022, households faced energy bills 24% higher than pre-2020 averages,[3] lleaving many in energy-inefficient homes vulnerable to volatile prices. Poor building conditions, which affect 15.5% of EU residents, are linked to respiratory health issues, higher healthcare costs and mental health concerns.[4] Healthier, energy-efficient buildings can improve mental well-being at home, speed up recovery times for hospital patients, reduce employee turnover in healthcare and reduce overall medical costs. In workplaces and schools, enhanced indoor conditions can boost productivity and learning outcomes, adding substantial economic value across the EU.[5,6]

Decarbonising buildings also presents a unique opportunity for job creation, with estimates suggesting 12 to 18 local jobs generated per million euros invested,[7] and up to 160,000 additional green jobs in the construction sector could emerge by 2030.[8] Investing in energy-efficient, renewable-powered buildings can drive innovation, bolster resilience and elevate quality of life – especially for those most affected by energy poverty and substandard living conditions.

CALL TO ACTION FOR MEMBER STATES: IMPLEMENT THE EPBD QUICKLY AND EFFECTIVELY

Recent legislative milestones, particularly the 2024 recast of the Energy Performance of Buildings Directive (EPBD) and key components of the Fit for 55 package, can lead the EU back on track to climate neutrality. These provide Member States with the necessary tools to significantly accelerate building decarbonisation, reduce emissions, enhance climate resilience and address societal challenges such as increasing energy prices and energy poverty.

The recast EPBD represents a powerful opportunity for Member States to lead decarbonisation at the scale and pace required for climate neutrality. It introduces new standards for building emissions, minimum renovation requirements, a zero-emission goal for 2050, and a strengthened advisory and financial framework. While the EPBD sets clear mandates for action, it also allows Member States to exceed these minimums, potentially advancing climate progress significantly. To fully leverage the EPBD's potential, Member States should prioritise rigorous, timely implementation with a strong emphasis on accelerating new standards and enhancing energy performance in renovations.

Prioritising vulnerable communities within the EPBD implementation process is crucial. Building decarbonisation must consider social impacts and ensure that all communities, especially those most affected by energy poverty, benefit from healthier living environments. Accessible financial and technical resources are essential for achieving an equitable, climate-resilient transition and fostering social cohesion. Member States should leverage their existing building inventories and available data to gain a clear understanding of their building stock's current state. This approach will enable them to prioritise actions in areas of greatest need, exceed baseline requirements and ensure long-term gains.

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2 https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20230911-1
3 Based on data from ODYSSEE database
4 According to data from Eurostat database in 2023
5 https://ec.europa.eu/eurostat/databrowser/view/ilc_mdho01/default/table?lang=en
6 https://www.bpie.eu/publication/building-4-people-valorising-the-benefits-of-energy-renovation-investments-in-schools-offices-and-hospitals/
7 https://iea.blob.core.windows.net/assets/c3de5e13-26e8-4e52-8a67-b97aba17f0a2/Sustainable_Recovery.pdf
8 https://ec.europa.eu/commission/presscorner/detail/en/qanda_20_1836

CALL TO ACTION FOR THE EUROPEAN COMMISSION: BOLD LEADERSHIP ON BUILDINGS NEEDED

With a new five-year EU policy cycle imminent, strong leadership from the EU Commission is critical to ensure that building decarbonisation becomes central to Europe's strategic agenda

For too long, the potential of building decarbonisation to address a range of pressing issues has been underestimated. Prioritising transformation of the EU building stock is not just a climate imperative; it is a strategic move that directly supports the EU's wider goals of economic growth, energy security, social equity, inclusivity and global competitiveness. Taking a slow approach to decarbonisation not only weakens our climate efforts but also undermines Europe's prosperity, weakening our standing on the global stage.

As Europe navigates complex geopolitical, social and environmental challenges, the Commission must seize the opportunity to foster resilience and inclusivity, fully embedding this commitment in the 2024-2029 mandate. By making building decarbonisation a cornerstone of Europe's prosperity strategy, the Commission will drive resilience and inclusivity, tackling energy poverty, boosting public health and creating jobs. These priorities resonate across the political spectrum, benefiting all Europeans.

Europe's role as a global leader is not a given; it depends on proactive, determined efforts to stay ahead. The Commission should lead decisively by ensuring that Member States fully implement the EPBD, scaling up support and enforcing the rules as they have been agreed.

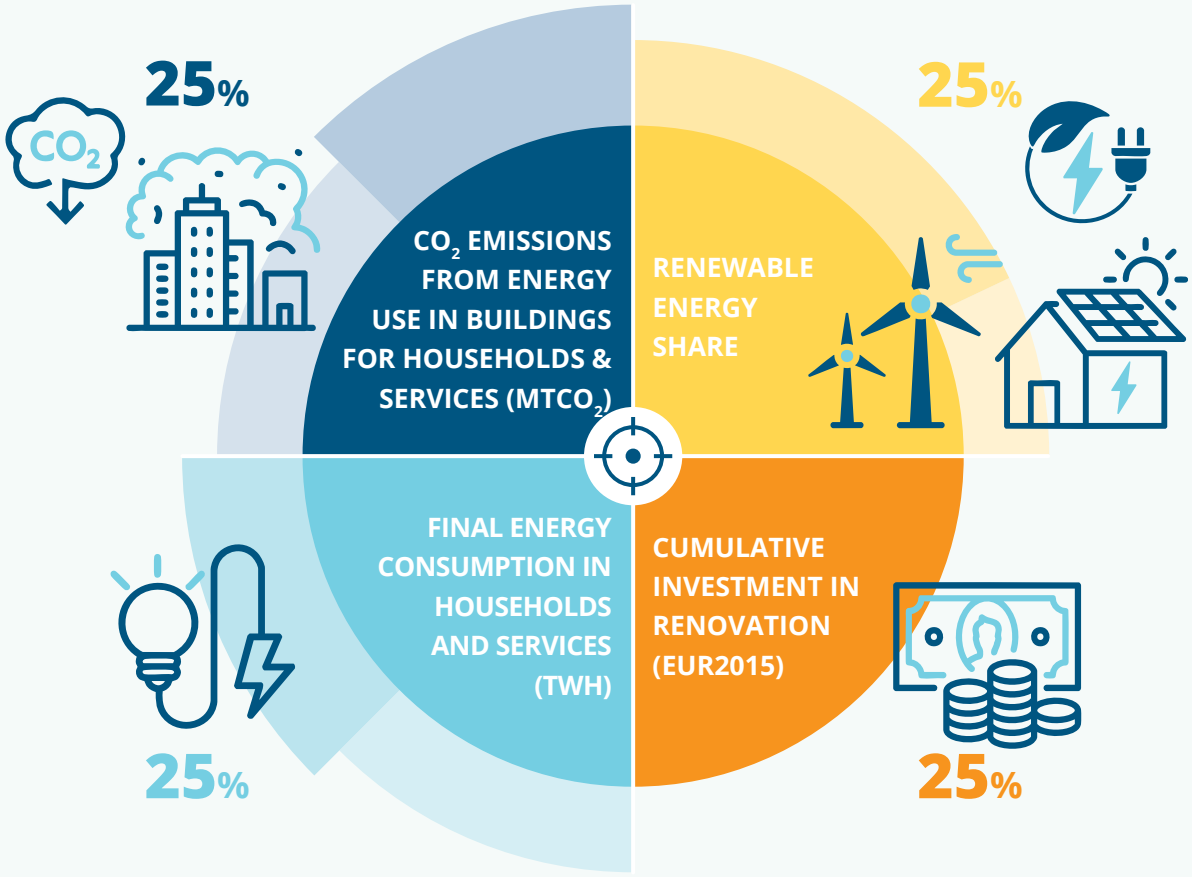
By fostering innovation, securing energy independence and promoting the well-being of communities, Europe can solidify its position as a leader on the world stage, demonstrating the value of sustainable and inclusive growth.

WHAT IS THE EU BUILDINGS CLIMATE TRACKER (EU BCT)?

The EU BCT is a composite index that measures progress towards decarbonising the EU building stock, a crucial step for achieving climate neutrality by 2050. Developed by BPIE, the tracker evaluates four key indicators: (i) CO_2 emissions, (ii) final energy consumption, (iii) renewable energy share, and (iv) investment in renovation.[9]

The EU BCT tracks progress since the adoption of the Paris Agreement in 2015, enabling policymakers to evaluate the effectiveness of various initiatives, such as the Renovation Wave and the recast of the EPBD, Energy Efficiency Directive (EED) and Renewable Energy Directive (RED III). By analysing these metrics, the EU BCT answers critical questions regarding the evolution of building decarbonisation and the necessary improvements needed to achieve climate neutrality by 2050.

Figure 2: Indicators and their weighted contribution to the EU Buildings Climate Tracker



RESULTS OF THE EU BCT 3RD EDITION: PROGRESS FROM 2015-2022

Overall, all four main indicators are more than 40% away from the climate neutrality path, which has led to the significant decarbonisation gap observed by the EU BCT. Table 1 provides an overview of the results and progress of all the indicators between 2015 and 2022, compared to the target values for 2022 from the reference path. The indicators are also analysed on a normalised scale to understand better the magnitude of the gaps observed.[10]

[9] Based on the MIX scenario from the impact assessment accompanying the Communication 'Stepping up Europe's 2030 climate ambition'

[10] A detailed analysis and description of the indicators can be found in chapter II of the full report

Table 1: Summary of indicator results

	Indicator	Achieved progress 2015-2022	Required progress 2015-2022	STATUS	How much of the required progress was achieved during 2015-2022?
1	**CO_2 emissions emissions from energy use in buildings for households and services**	**↓ 14.7%**	**↓ 27.9%**	**OFF TRACK**	
	households	↓ 12.6%	↓ 29.3%	FAR OFF TRACK	
	service-sector	↓ 19.8%	↓ 24.5%	OFF TRACK	
2	**Final energy consumption in households and services**	**↓ 2.8%**	**↓ 6.5%**	**FAR OFF TRACK**	
	households	↓ 1.4%	↓ 8.3%	FAR OFF TRACK	
	service-sector	↓ 5.4%	↓ 3.1%	ON TRACK*	
3	**Renewable energy share**	**↑ 6.3 percentage points (increased from 22.6% to 28.9%)**	**↑ 18.0 percentage points (should have increased from 22.6% to 40.6%)**	**FAR OFF TRACK**	
	heating & cooling	↑ 4.6 percentage points (increased from 20.3% to 24.9%)	↑ 19.7 percentage points (should have increased from 20.3% to 40%)	FAR OFF TRACK	
	gross electricity consumption	↑ 11.5 percentage points (increased from 29.7% to 41.2%)	↑ 12.8 percentage points (should have increased from 29.7% to 42.4%)	ALMOST ON TRACK	
4	**Cumulative investment in renovation**	**8 times the value in 2015**	**13.8 times the value in 2015**	**OFF TRACK**	

*The progress observed during 2020-2022 was not a result of improvements in the building stock but rather driven by short-term demand-reduction measures[11], including voluntary targets to reduce gas consumption by at least 15% as a direct economic reaction to the energy crisis. While some energy use rationalisation may persist, this progress is likely temporary. It is important to monitor the development of this indicator after 2022 to assess whether the observed progress is a result of structural improvements related to long-term policies or temporary reactions to the special circumstances previously mentioned.

HOW TO READ THE RESULTS IN TABLE 1?

- The **achieved progress** corresponds to the difference between the observations in 2022 and 2015.
- The **required progress** corresponds to the difference between the required target for 2022 in the reference path and the starting point in 2015.
- In the last column to the right, each house in the scale represents 10%. If the target was fully achieved, all 10 houses on the scale would be bold.

[11] https://eur-lex.europa.eu/EN/legal-content/summary/coordinated-demand-reduction-measures-for-gas.html

Indicator 1

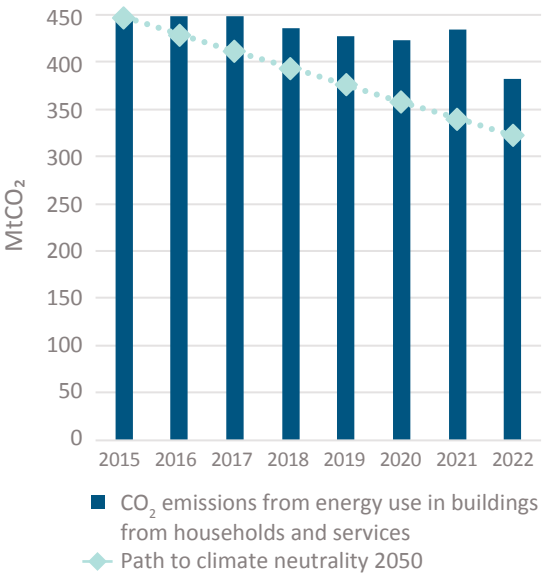
CO_2 EMISSIONS

CO_2 emissions reduction from energy use in buildings for households and services is happening at half the required pace.

From 2015 to 2022, emissions decreased by only 14.7%, falling short of the required 27.9% decrease. This resulted in approximately 367 million tonnes (Mt) of additional CO_2 emissions since 2015, equivalent to nearly a year's operation of the entire EU building stock.

- Although emissions reached their lowest level since 2015 at 381.7 $MtCO_2$ in 2022, they still exceeded the target value for 2022 by 18.4%.
- If immediate action isn't taken, the unrealised reductions will lead to greater future mitigation and adaptation costs.

Figure 3: CO_2 emissions from energy use in buildings for households and services 2015-2022



Indicator 2

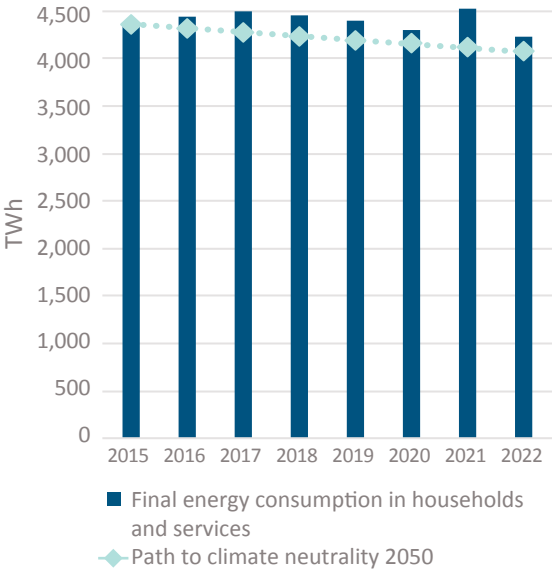
FINAL ENERGY CONSUMPTION

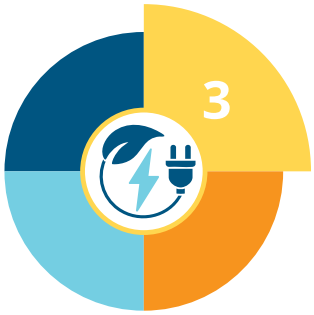
Reduction of final energy consumption in buildings is happening at less than half the required pace.

Final energy consumption in households and services remains far from targets, achieving only a 2.8% reduction against the required 6.5%.

- After a steady decrease from 2017 to 2020, consumption surged by 5.2% in 2021, reaching 4,530 terawatt-hours (TWh) due to higher heating needs and increased home office work.
- A slight decrease to 4,234 TWh occurred in 2022 due to warmer weather, but it still remains 4.0% above the target.
- During 2015-2022, final energy consumption in households and services should have decreased by 6.5%, but instead only 2.8% was achieved. **The reduction is happening at less than half of the required pace.**

Figure 4: Final energy consumption in households and services 2015-2022





Indicator 3

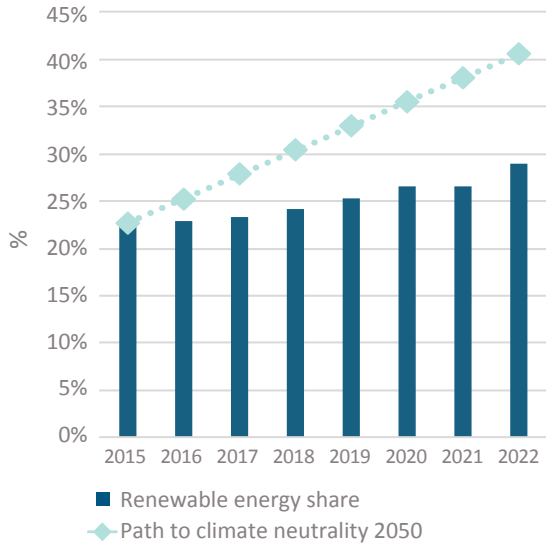
RENEWABLE ENERGY SHARE

Despite some progress, renewable energy share is not growing fast enough.

The renewable energy share in buildings has only increased by 6.3 percentage points since 2015, significantly below the required 18 percentage point increase.

- As of 2022, the renewable share reached 28.9% when the target value for 2022 was 41%.
- This slow growth is primarily due to inadequate expansion of renewable energy for heating and cooling.

Figure 5: Renewable energy share 2015-2022



Indicator 4

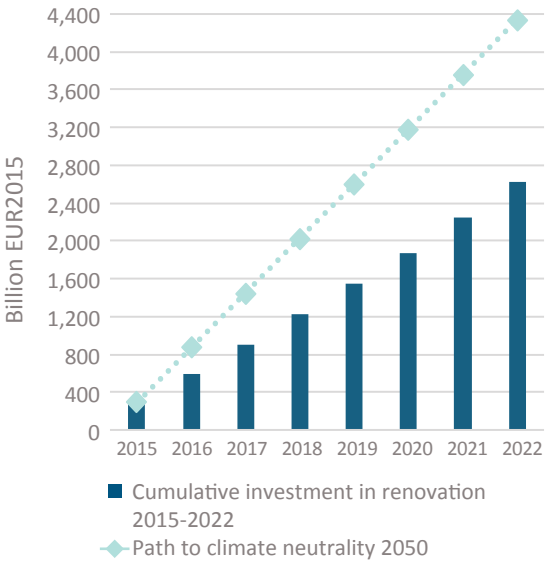
INVESTMENT IN RENOVATION

Investments in renovation fall one third below the target.

Cumulative investments in building renovation remain significantly off track, summing up to only 60.6% of the required total for the 2015-2022 period. By 2022, investments reached just €2,629 billion (in 2015 EUR), falling far short of the €4,335 billion target.

- The existing investment gap hampers the energy performance of the building stock, leading to higher energy bills and increased future renovation costs.
- Key challenges such as high upfront costs, fluctuating fossil fuel prices, limited access to funding, split incentives and various non-monetary barriers persist, hindering progress.[12]

Figure 6: Cumulative investment in renovation 2015-2022



[12] https://www.bruegel.org/policy-brief/how-finance-european-unions-building-decarbonisation-plan

Policy recommendations to Member States

The recast EPBD gives a clear mandate to Member States to accelerate building decarbonisation, with a strong emphasis on robust implementation of the Directive that prioritises the needs of vulnerable households. A comprehensive national policy framework must provide clear guidance to the full value chain of the buildings and construction sector and will generate a range of benefits for individual citizens and society at large. The following recommendations are designed with this aim in mind.

1 ADOPT CARBON-CUTTING BUILDING STANDARDS WELL ON TIME FOR EPBD SCHEDULE

Member States should accelerate adoption of zero-emission standards across all buildings, leverage renovation to cut emissions, and set clear life-cycle carbon limits to support national climate goals.

ESTABLISH ZERO-EMISSION STANDARDS FOR NEW AND EXISTING BUILDINGS EARLY IN EPBD TRANSPOSITION PROCESS

- **EPBD requirement:** Articles 7 and 11 introduce zero-emission building (ZEB) standards, mandating that new buildings achieve zero emissions as of 2028 for public buildings and as of 2030 for all new buildings.
- **Recommendation:** Member States should adopt the ZEB standard for new buildings early in the transposition process to ensure it is communicated effectively to stakeholders. This will enable smooth compliance for buildings constructed as of 2028/2030, allowing them to meet Zero-Emission Building (ZEB) standards with ease. To maximise impact, these standards should be extended to existing buildings being renovated. This approach will broaden CO_2 emissions reductions beyond new builds.

USE GREENHOUSE GAS EMISSION INDICATORS IN RENOVATION POLICIES

- **EPBD Provision:** Article 9 allows Member States to adopt greenhouse gas emission indicators, measured in $kgCO_2eq/(m^2y)$, for building renovation projects.
- **Recommendation:** Member States should use this option to explicitly link renovation efforts with emission reductions, supporting national climate targets.

SET LIFE-CYCLE GREENHOUSE GAS TARGETS FOR NEW BUILDINGS

- **EPBD Provision:** Under Article 7(5), national roadmaps must include limits on total cumulative life-cycle global warming potential (GWP) for new buildings to progressively reduce as of 2030 onwards.
- **Recommendation:** Member States should establish clear guidelines for measuring, disclosing and limiting the life-cycle GWP of new buildings, strictly adhering to the EPBD schedule of 01/01/2027. Member States should take inspiration from proven approaches of frontrunner countries and base their guidelines on the EU methodological framework as much as possible to ensure rapid up take, consistent impact reduction and comparability across the EU.

II

REDUCE FINAL ENERGY CONSUMPTION THROUGH EFFECTIVE MINIMUM ENERGY PERFORMANCE STANDARDS (MEPS) AND A STRONG RENOVATION TRAJECTORY

Member States should ensure robust MEPS for the non-residential sector, and that the trajectory for the progressive renovation of residential buildings prioritises the worst-performing buildings and vulnerable groups, notably through national MEPS.

DEFINE A CLEAR RENOVATION PATH FOR RESIDENTIAL BUILDINGS

- **EPBD provision:** Article 9(2) calls for a progressive renovation trajectory for residential buildings for the reduction of the average primary energy of this segment of the building stock.
- **Recommendation:** Given current delays in improving energy performance, Member States should consider that the reduction of primary energy use mandated by the EPBD should be accompanied by a 16.7% reduction in final energy consumption by 2030 (compared to 2022) to realign with climate targets.

EMPHASISE ENERGY EFFICIENCY ALONGSIDE RENEWABLE ENERGY IN RENOVATIONS

- **EPBD provision:** The renovation trajectory under Article 9(2) relies on primary energy use metrics.
- **Recommendation:** Member States should ensure that energy efficiency improvements accompany renewable energy installations to avoid inefficiencies while enhancing comfort and health in buildings, which do not materialise if carbon reduction is achieved only through decarbonising energy supply.

PRIORITISE RENOVATION OF THE VERY WORST-PERFORMING RESIDENTIAL BUILDINGS

- **EPBD provision:** At least 55% of the decrease in primary energy must come from the renovation of the 43% worst-performing residential buildings.
- **Recommendation:** To maximise social and energy benefits, Member States should prioritise renovating first the very worst-performing residential buildings within the 43%, as they often house vulnerable populations. Member States should also aim to achieve more than 55% of savings through these renovations.

IMPLEMENT MEPS FOR NON-RESIDENTIAL BUILDINGS

- **EPBD provision:** Article 9(1) requires the introduction of MEPS for non-residential buildings, allowing for certain exemptions.
- **Recommendation:** Member States should carefully assess the impact of any exemptions to ensure that a significant portion of the building stock remains covered by MEPS. Neglecting a large portion of the building stock would jeopardise the energy savings potential of this provision.

III

ACCELERATE AND EXPAND THE RENEWABLE ENERGY SHARE

Member States should focus on decarbonising heating and cooling and put Energy Efficiency First to accelerate fossil fuel phase-out by 2040.

ADOPT A HOLISTIC APPROACH TO BUILDING DECARBONISATION BY USING COMPLEMENTARY INDICATOR

- **EPBD provision:** Article 9 establishes primary energy use as the indicator for the renovation trajectory, and primary or final energy use for the MEPS for non-residential, while giving the possibility to use other complementary indicators on top of those.
- **Recommendation:** Member States should consider additional indicators for non-renewable and renewable energy use, and CO_2 emissions, to better track decarbonisation, particularly in heating and cooling where more renewable energy uptake is needed.

SUPPORT DIVERSE RENEWABLE ENERGY SOLUTIONS BEYOND SOLAR

- **EPBD provision:** Article 10 mandates the deployment of solar energy installations on certain categories of buildings by certain dates.
- **Recommendation:** Given that the growth rate of the renewable energy for heating and cooling must quadruple to get on track with climate neutrality, Member States should also offer support for other renewable technologies, especially for heating and cooling, prioritising renewables other than biofuel technologies, which currently dominate renewable space heating.

PRIORITISE ENERGY EFFICIENCY IN RENEWABLE ENERGY SYSTEM INSTALLATIONS

- **EPBD provision:** Some of the provisions in Articles 13, 17 and Annex II focus on heating and cooling energy supply.
- **Recommendation:** These provisions should be leveraged but their implementation should be combined with the application of the "energy efficiency first" principle to prevent sub-optimal renewable installations in inefficient buildings, optimising investments.

PHASE OUT FOSSIL FUEL BOILERS BY 2040

- **EPBD provision:** Annex II requires Member States to describe in their NBRP the implemented and planned policies and measures with a view to a complete phasing out of fossil fuel being used in boilers by 2040.
- **Recommendation:** Member States should use the legal basis offered by the EPBD Article 13§1 to set strong requirements at national level on heat generators, in order to replace boilers powered by fossil fuels in existing buildings as soon as possible before 2040.

IV

RAPIDLY INCREASE AND SCALE UP INVESTMENT IN BUILDING RENOVATION

Member States should promote specific financial support for deep renovations, monitor social impacts and prioritise accessible funding for vulnerable groups to drive equitable progress toward zero-emission buildings.

PROMOTE HIGHER FINANCIAL SUPPORT FOR DEEP AND STAGED DEEP RENOVATIONS

- **EPBD provision:** The EPBD mandates incentives for deep renovations.
- **Recommendation:** Member States should align the higher financial support towards (staged) deep renovations to the execution of renovation requirements (e.g. MEPS, trajectory) in order to incentivise renovation projects to go beyond minimum requirements, avoid lock-in effects and make best use of the financial resources available.

ENSURE SPECIAL FINANCIAL SUPPORT FOR VULNERABLE GROUPS

- **EPBD provision:** Member States must reduce barriers, such as upfront costs and split incentives, especially for vulnerable households.
- **Recommendation:** Member States should ensure optimal use and fair distribution of public financial resources, prioritising support for vulnerable populations to promote inclusive progress toward zero-emission buildings.

MONITOR SOCIAL IMPACTS OF RENOVATION PROGRAMMES AND FINANCIAL TOOLS

- **EPBD provision:** Article 9(4e) calls for monitoring the social impacts of MEPS-related financial tools.
- **Recommendation:** Member States should expand social impact monitoring to other renovations, especially those targeting low-income households, to understand and address energy poverty and improve overall health and equity in housing.

V

ENSURE TRANSFORMATION ACHIEVES RESILIENT AND EQUITABLE SOCIETIES

Member States should prioritise vulnerable communities in building decarbonisation efforts through targeted support and inclusive policies.

Focus on transforming the worst-performing buildings first

- **Action:** Prioritise the renovation of the lowest-performing residential buildings, which are often home to vulnerable populations.
- **Purpose:** Improving these buildings not only reduces emissions but also enhances living conditions and offers economic and other benefits for those most affected by energy poverty.

Integrate health, comfort and climate resilience into renovation goals

- **Action:** Incorporate environmental and health benefits, such as improved air quality and climate resilience, e.g. into renovation passport design and financial programmes.
- **Purpose:** Highlighting these broader benefits increases public support for renovations while addressing health and comfort needs.

Enhance accessibility of funding, information and technical support for all communities

- **Action:** Ensure public access to transparent information on funding, support tools and renovation benefits, particularly for vulnerable groups, and a robust financial framework that prioritises support for vulnerable households, energy-poor communities and social housing residents.
- **Purpose:** Easier access to personalised information empowers individuals and communities to make informed decisions and access available support. This support will help reduce upfront renovation costs and make energy upgrades more accessible to those who need them most.

Monitor and address social impacts of building decarbonisation programmes and financial tools

- **Action:** Expand social impact monitoring to include all renovation programmes, ensuring data collection on how policies affect low-income households.
- **Purpose:** A broader assessment allows for adjustments to financial tools, making sure they benefit all groups equitably.

Safeguard against negative social impacts, such as rent increases

- **Action:** Implement active social protection measures such as providing rent support, imposing caps on rent increases, and incentivising financial schemes that tackle the upfront costs of renovations.
- Purpose: Prevent vulnerable households from facing eviction due to steep rent hikes after energy renovations.

Extend equity measures across all decarbonisation policies

- **Action:** Broaden equity-focused provisions from the EPBD to all building decarbonisation efforts, including considerations for affordable housing and gender equality.
- **Purpose:** A comprehensive approach that addresses housing affordability, social inclusion and gender equality ensures an equitable transition for all.

INDICATOR + STATUS	TOOLS EPBD	CONSIDERATIONS FOR THE EPBD IMPLEMENTATION	OTHER CONSIDERATIONS	WHY IS ACCELERATION REQUIRED?

1 CO_2 EMISSIONS

from energy use in buildings for households & services ($MtCO_2$)

OFF TRACK

2 FINAL ENERGY CONSUMPTION

In households and services (TWh)

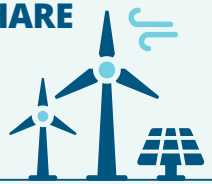
FAR OFF TRACK

Mainly due to the slow reduction of final energy consumption in households

3 RENEWABLE ENERGY SHARE

FAR OFF TRACK

Mainly due to the slow increase of the share of renewables for heating and cooling



4 CUMULATED INVESTMENT

in renovation (EUR2015)

OFF TRACK

ART. 7 (New buildings)

- Zero-emission standards in new buildings as early as possible
- Use complementary indicators for CO_2 emissions for Minimum Energy Performance standards for non-residential and trajectory for residential building stock
- Define clear principles on how to measure, disclose and limit whole-life carbon of buildings

ART. 9 (Renovation)

- Consider that the progress observed between 2020-2022 in the service sector may be temporary and linked to the Covid-19 and energy crisis
- Consider that the final energy consumption in households needs to reduce 16.7% by 2030 compared to 2022 to get back on track towards climate neutrality
- Prioritise the energy efficiency first principle
- Prioritise the improvement of worst-performing residential buildings

ART. 10 (Solar energy)

ART. 11 (ZEBs)

ART. 13 (Building systems)

- Use complementary indicators for primary renewable energy for MEPS for non-residential buildings
- Support diverse renewable technologies
- Prioritise the energy efficiency first principle
- Prioritise the decarbonisation of heating and cooling, while continuing the progress in renewables for electricity supply

ART. 17 (Finance)

ANNEX II (Template NBRP)

- Follow a "higher impact, higher support" principle
- Properly time and target the diverse financial mechanisms to support the ones that needed the most
- Couple EPC, building renovation passports, and one-stop-shops considerations with financial mechanisms
- Align individual renovation activities with national plans to avoid lock-in effects
- Monitor social impacts not only of MEPS but other mechanisms as well

BUILDING DECARBONISATION ACTIONS SHOULD:

- Not be limited to achieving a minimum requirement but rather take into consideration the status and the unrealised progress until now
- Be well-targeted, accessible, and properly timed measures for the decarbonisation of the building stock
- Be aligned with integrated and comprehensive approaches to unlock multiple benefits at the individual but also at the societal level
- Be combined with strategies to capture and monitor data on multiple benefits on environment, social, and economic matters

WHY IS ACCELERATION REQUIRED?

- Better buildings to live, learn, work, and recover, with increased indoor comfort, productivity, and multiple health benefits for building users
- More employment, economic savings from performance improvement
- Better allocation and use of financial resources
- Reduced dependency on fossil fuels and volatile markets
- Socio-economic security for building users
- Financial resources directed to mid-to-long-term solutions

ABBREVIATIONS

BCT	Buildings Climate Tracker
EEA	European Environment Agency
EED	Energy Efficiency Directive
EPC	Energy performance certificate
EPBD	Energy Performance of Buildings Directive
EU	European Union
FIEC	European Construction Industry Federation
GWP	Global warming potential
MEPS	Minimum energy performance standards
RED	Renewable Energy Directive
ZEB	Zero-Emission Building

Figure 7: Considerations to transform buildings and empower Europe through a pathway to prosperity, equity and resilience[13]

(See next page)

[13] Art. 7: New buildings, Art. 9: Minimum energy performance standards for non-residential buildings and trajectories for progressive renovation of the residential building stock, Art. 10: Solar energy in buildings, Art. 11: Zero-emission buildings, Art. 13: Technical building systems, Art. 17: Financial incentives, skills and market barriers, Annex II: Template for the national building renovation plans

INTRO-DUCTION

EU BUILDINGS CLIMATE TRACKER

The EU Buildings Climate Tracker (EU BCT) is a composite index developed to measure decarbonisation progress in the EU's building sector, targeting climate neutrality by 2050.

THE EU BCT MONITORS FOUR PRIMARY INDICATORS

(1) CO_2 emissions from energy use, (2) final energy consumption, (3) renewable energy share, and (4) cumulative investment in renovations.

WEIGHTING AND GOALS

Each of the four indicators is weighted equally (25%) to create the EU BCT composite score. Goals for 2050 are aligned with the MIX scenario from the EU Green Deal, including targets like zero CO_2 emissions and 100% renewable energy use for heating and cooling.

PROGRESS AND FUTURE UPDATES

The EU BCT tracks performance from 2015 to 2050, with reference paths and targets aligned with intermediate 2030 and final 2050 goals.

THE EU HAS PROMOTED VARIOUS ACTIONS AND POLICIES TO DECARBONISE THE BUILDING STOCK TOWARDS 2050 TO MEET THE GOALS OF THE PARIS AGREEMENT.

These include initiatives such as the Renovation Wave and the recent recast of the Energy Performance of Buildings Directive (EPBD), Energy Efficiency Directive (EED) and Renewable Energy Directive (RED III). Monitoring the progress and impacts of these efforts is essential to evaluate the level of ambition and effectiveness of the different policies and programmes. This can help develop effective strategies to be replicated and identify areas that require adjustment or improvement.

The **EU Buildings Climate Tracker (EU BCT)** was developed to track the progress of decarbonisation of the building stock in the EU. It is an index composed of a set of four[14] indicators monitoring (i) CO_2 emissions, (ii) final energy consumption, (iii) renewable energy share, and (iv) investment in renovation. The EU BCT is not a tool for modelling the future. Rather, it serves as a benchmark and assessment tool for the status of decarbonisation in the building stock and documents the progress achieved since 2015 (when the Paris Agreement was adopted) towards climate neutrality in 2050.[15]

THE EU BUILDINGS CLIMATE TRACKER ANSWERS THE FOLLOWING QUESTIONS:

- **How has decarbonisation of the EU building stock evolved since 2015?**
- **Is the building stock improving enough to achieve climate neutrality by 2050?**
- **If not, what degree of improvement is needed between the most recent observations and 2050 in order to achieve climate neutrality?**

The first edition of the EU BCT was published in 2022. It presented and assessed the status of the building stock in the EU between 2015 and 2019, as shown in Figure 8. In its second edition (2023), the EU BCT analysed the period 2015-2020, including a deep dive into the progress of the building stock in Central and Eastern Europe. That edition also included a general outlook of developments during the COVID-19 pandemic in 2020 and 2021.

[14] The EU BCT was previously composed of five indicators. More details can be found in the section *Why is the set of indicators different in this third edition?*

[15] Based on the MIX scenario from the impact assessment accompanying the Communication Stepping up Europe's 2030 climate ambition.

In this third edition (2024), the EU BCT assesses progress between 2015 and 2022. This edition highlights the relevance of building decarbonisation for people's health and socioeconomic security, underlining that buildings are not merely physical structures or energy consumers. They are the places where we live, work, learn and recover, and where we spend most of our time. This edition also expands on the role and opportunities of the EPBD recast to bridge the existing gaps shown by the indicators and bring the EU building stock back on track towards achieving climate neutrality by 2050, which is crucial for creating a resilient, healthy and prosperous future.

Figure 8: EU BCT editions summary

THE REPORT IS ORGANISED AS FOLLOWS:

- **I. METHODOLOGY** presents the EU BCT methodology, including the definition of the indicators and their goal values.
- **II. EU BCT AND ITS INDICATORS:** PROGRESS DURING 2015-2022 includes the general results of the composite index and each indicator, and analyses the gaps in progress.
- **III. SLOW DECARBONISATION OF BUILDINGS: THE SOCIAL AND ECONOMIC COSTS OF INACTION** looks at the links between building decarbonisation and people's health and socioeconomic security, and the opportunities and extra benefits of boosting action to decarbonise the EU building stock.
- **IV. EPBD IMPLEMENTATION: A STRATEGIC PATHWAY TO ADVANCE BUILDING DECARBONISATION AND SOCIAL EQUITY** presents the role of the EPBD recast to support building decarbonisation while considering the social repercussions discussed in the previous section.
- **V. CONCLUSIONS AND CALL TO ACTION** summarises the key findings and way forward for Europe to advance transformation of the building stock towards achieving multiple strategic goals.

METHODOLOGY

This section describes the methodology behind the EU BCT, including the indicators being monitored, how they are combined, and targets to support climate neutrality by 2050. It also outlines the data sources used in the analysis and highlights new features introduced in this edition.

I. WHAT IS THE EU BCT?

The EU BCT is a composite index based on four indicators to monitor and assess the decarbonisation progress in the building stock in the EU towards climate neutrality by 2050. In 2020, BPIE developed a global tracker for climate change action for the buildings and construction sector for the Global Status Report of the Global Alliance for Buildings and Construction.[16] Based on this work, BPIE developed in 2021-2022 the first edition of an equivalent tracker for the EU.

Selection of indicators

The EU BCT is based on the four indicators presented in Table 2. More than 60 European and global data sources that monitor the buildings sector[17] were reviewed in the process of selecting the indicators. To select the most relevant, the potential data sources were screened against the following criteria: EU coverage, reliability, consistency, continuity (data updated at least annually), timeline (data is available from 2015 on) and quality.

[16] 2020 Global Status Report for Buildings and Construction: Towards a zero-emissions, efficient and resilient buildings and construction sector

[17] Including the European Environment Agency (EEA), International Energy Agency (IEA), Eurostat, ODYSSEE and Tabula

Table 2: Summary of indicators included in the EU BCT

	Indicator	Description	Source
1	**CO_2 emissions from energy use in buildings for households and services**	CO_2 emissions from the direct use[18] of fossil fuel energy in buildings. Composed of two sub-indicators: 1(a) CO_2 emissions from energy use in households, and 1(b) CO_2 emissions from energy use in service-sector buildings, including institutional buildings.	European Environment Agency (EEA)
2	**Final energy consumption in households and services**	Energy consumption in households and service-sector buildings, excluding consumption by the energy sector itself and losses occurring during transformation and distribution of energy. Composed of two sub-indicators: 2(a) final energy consumption in households, and 2(b) final energy consumption in service-sector buildings.	Eurostat
3	**Renewable energy share[19]**	Composed of two sub-indicators:	Eurostat
	A **Share of energy from renewable sources for heating and cooling**	Share of renewable energy used for heating and cooling,[20] including derived heat from solar thermal, geothermal energy, ambient heat captured by heat pumps, solid, liquid and gaseous biofuels, and the renewable part of waste.	Eurostat
	B **Share of energy from renewable sources in gross electricity consumption**	Share of electricity produced from renewable energy sources including wind power, solar power, hydropower, tidal power, geothermal energy, biofuels and the renewable part of waste.	Eurostat
4	**Cumulative investment in renovation**	Cumulative investment in renovation[21] of the building stock expressed in 2015 Euros. Based on investment reported by Member States.	European Construction Industry Federation (FIEC)

[18] Emissions from diverse economic sectors are reported according to the common reporting format classification used for reporting greenhouse gas inventories according to IPCC 2006 guidelines. https://www.eea.europa.eu/themes/climate/eu-greenhouse-gas-inventory/read-me-eea-ghg-data-viewer

[19] The full description of the two indicators can be found in SHARES manual.

[20] The data available on Eurostat includes process heat as well.

[21] Renovation investments from the MIX scenario are defined as "average renovation costs by climate type and renovation deepness, as used in the PRIMES buildings module. Investment costs are the energy related expenditures needed to implement the indicated level of renovation of a building, excluding usual renovation expenditures needed for other purposes (structure, finishing materials, decoration etc.)." See EU Reference Scenario 2020 which is the baseline for the MIX scenario and its modelling approach.

II. WHY IS THE SET OF INDICATORS DIFFERENT IN THIS THIRD EDITION?

In first two EU BCT editions, the composite index included an indicator on *annual domestic energy expenditure per household*. This indicator was originally based on data collected from each Member State, which increased the diversity of the EU BCT energy consumption data and therefore its overall robustness. However, the data source for this indicator is now based on the same Eurostat data already used for the final energy consumption indicator – this would mean repeating the same data in two indicators. Additionally, since 2021, household energy expenditure has been strongly affected by increases in energy prices; although the indicator corrects for inflation, it reacted more strongly to changes in energy prices than anticipated.

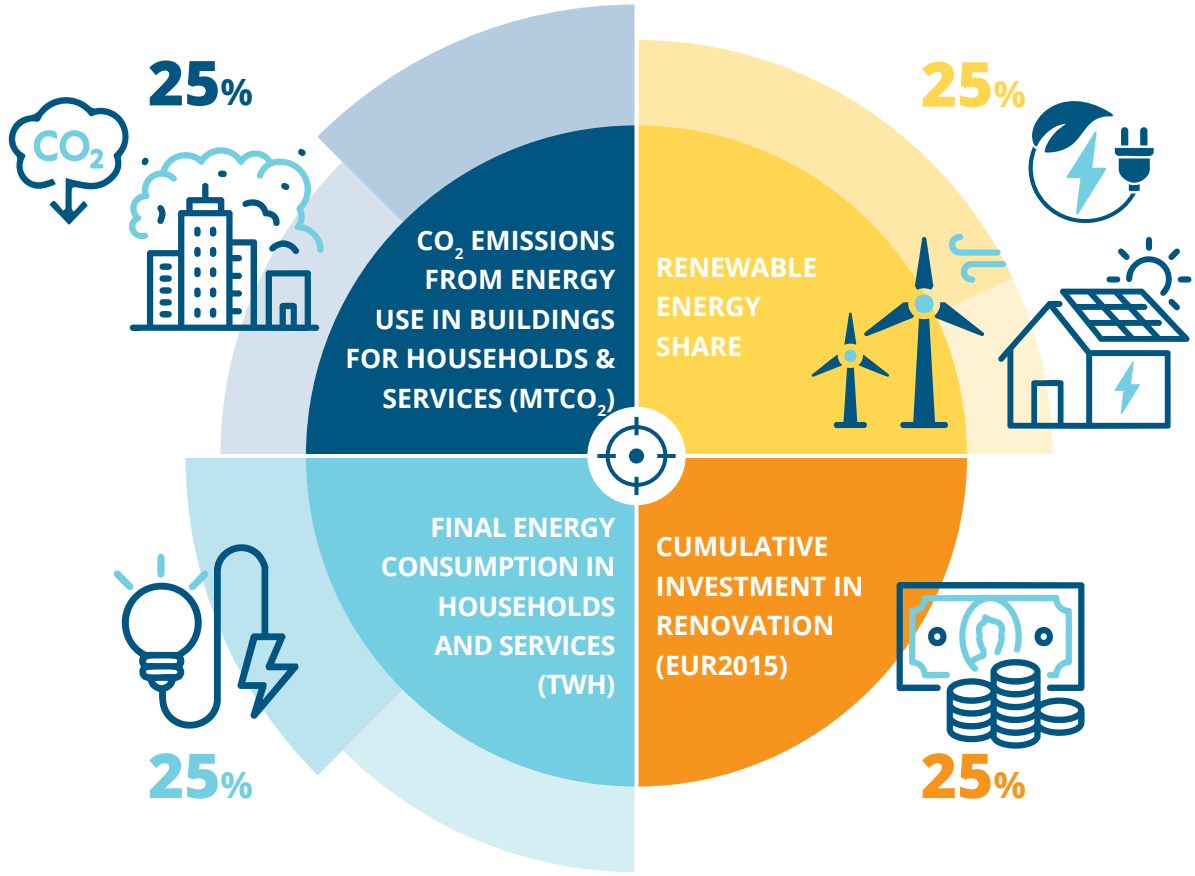
As the EU BCT is a tool designed to measure building decarbonisation based on the performance of the building stock and not consumer behaviour, we decided to exclude the indicator from the EU BCT composite index calculation. Household energy expenditure and people's reactions to energy price fluctuations remain relevant, however, and are discussed in chapter III section ii.

The results with and without this indicator included in the calculation show similar trends in the composite index: a slow start after 2015, then progressing parallel to but below the reference path after 2017 until 2019. The difference in gaps observed in the two methodologies is only around 2 decarbonisation points every year during the 2015-2019 period, before the special circumstances of the COVID-19 pandemic and the energy crisis.

III. WEIGHTING OF INDICATORS

To create the composite index of the EU BCT, weights were assigned to the indicators. Since in this edition the methodology was refined to include four indicators instead of five, the weights were redistributed. Each indicator was assigned with a 25% weight as summarised in Figure 4. The CO_2 emissions, final energy consumption and renewable energy share indicators are composed of two sub-indicators each. In the case of the CO_2 emissions and final energy consumption, the sub-indicators are simply added together. For the renewable energy share, the two sub-indicators are weighted to reflect their respective share in final energy consumption, assigning 75% to heating and cooling and 25% to the gross electricity consumption.

Figure 9: Indicators and their weighted contribution to the EU Buildings Climate Tracker



IV. TRANSLATING CLIMATE NEUTRALITY BY 2050 INTO A GOAL FOR EACH INDICATOR

To compare the observed development of the different indicators in relation to the objective of reaching climate neutrality by 2050, goal values have been determined for each indicator. The goal values presented in Table 3 are based on the MIX scenario used in various impact assessments[22],[23] undertaken by the European Commission in the framework of the EU Green Deal.

Table 3: Indicator goal values for the EU Building Climate Tracker

		Indicator	Goal value 2050	Methodology determining goal values
1		**CO_2 emissions from energy use in buildings for households and services**	0 $MtCO_2$	The MIX scenario plans for net zero greenhouse gas emissions in 2050. We assume that CO_2 emissions follow this trajectory,[24] so the goal for 2050 is set as 0 $MtCO_2$.
2		**Final energy consumption in households and services**	3,315 TWh *(24% lower than in 2015)*	The MIX scenario aims to reduce greenhouse gas emissions by 55% by 2030[25] compared to 1990. It translates this goal into a final energy consumption reduction (compared to 2015) of 17% by 2030 and 27% by 2050 (households), and 8% by 2030 and 18% by 2050 (services). The goal value is the sum of the remaining building energy consumption in 2050 for households and services.
3		**Renewable energy share**		
	A	**Share of energy from renewable sources for heating and cooling**	100% *(Compared to 20% in 2015)*	The MIX scenario translates the objective of net zero emissions in 2050 into 100% renewables in 2050.
	B	**Share of energy from renewable sources in gross electricity consumption**	85% *(Compared to 30% in 2015)*	Gross electricity production in the MIX scenario will be CO_2 neutral in 2050 but the assumptions in the scenario contain 15% nuclear power.[26] For 2030, the MIX scenario assumes 57% renewables and 19% nuclear power.
4		**Cumulative investment in renovation**	21,978 billion in EUR2015[27]	In the MIX scenario, the envisaged energy-related renovation investment (in the residential sector) in the EU is on average €190 billion per year between 2021 and 2030 and about €174 billion per year between 2031 and 2050. However, as not all Member States report their renovation investments (dataset available only for 16 Member States), the goal value is adjusted to account for this. The goal value is derived by comparing the values suggested for 2021-2030 and 2031-2050 in the MIX scenario with the value in the baseline scenario for 2011-2020.[28] Annual investments are expected to be 2.27 times greater than the investments in 2011-2020 during 2021-2030 and 2.08 times greater during 2031-2050. The average investments observed during 2015-2020 for the 16 Member States for which data is available are multiplied by these factors to estimate the equivalent expected investments during 2021-2030 and 2031-2050. Since the indicator is based on cumulative values, the final goal is defined as the sum of the currently observed and scenario-based future investments during the period from 2015 to 2050.

[22] Impact Assessment accompanying Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement

[23] Impact assessment accompanying the Communication *'Stepping up Europe's 2030 climate ambition'*

[24] This assumption is supported by the fact that non-CO_2 emissions represent only around 6% of household greenhouse gas emissions (according to EEA data for 2015). In the MIX scenario, non-CO_2 emissions are expected to reduce significantly (85%).

[25] Impact Assessment accompanying Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement

[26] While the MIX scenario decarbonisation ambition could be called into question regarding the nuclear share, it has been selected as a benchmark as it guides the setting of energy and climate objectives at EU level.

[27] The analysis excludes Croatia, Cyprus, Greece, Hungary, Latvia, Luxemburg, Malta, Poland, Romania, Slovenia and Slovakia due to the lack of available data.

[28] Impact assessment accompanying the Communication 'Stepping up Europe's 2030 climate ambition'.

While the MIX scenario is conservative regarding its final target, especially in view of the Paris Agreement 1.5°C goal and alignment with climate neutrality by 2050, it has been selected as a benchmark since it has guided the setting of energy and climate objectives at EU level as well as various policy measures. Newer scenarios, such as the scenario used for the REPowerEU Communication,[29] were also considered to define the goal values for the EU BCT, but the publicly available information does not provide the necessary data.

The EU BCT assesses progress by comparing observed values with commonly agreed goals adopted at EU level within the timespan analysed (2015 to 2022). The intermediate goals (by 2030) and final goals (by 2050) are used to create a reference path that each indicator should follow, as illustrated in Figure 10. These paths include targets for each year.

Figure 10: Illustration of reference path, annual targets and final goals for the indicators

New goals are expected to be adopted in the EU in upcoming years, notably with the agreement on a 2040 climate target[30] and its legally binding inclusion in the EU Climate Law. As new goals are adopted and made legally binding, the path to climate neutrality and goal values for the EU BCT indicators will be reviewed accordingly.

[29] https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal/repowereu-affordable-secure-and-sustainable-energy-europe_en
[30] https://climate.ec.europa.eu/eu-action/climate-strategies-targets/2040-climate-target_en

V. UPDATES TO INDICATOR DATASETS AND SOURCES

In general, the same data sources that were used during the second edition (2022) of the EU BCT were used for this edition. These sources have released new datasets, including data for additional years and updating previous values (Table 4).[31] In this new edition, the results for the composite index and the single indicators consider the period 2015-2022.

Table 4: Updates on datasets for the EU BCT indicators

		Indicator	Current data source	Change in data source	Data available until
1		**CO_2 emissions from energy use in buildings for households and services**	EEA[32]	No	2022
2		**Final energy consumption in households and services**	Eurostat[33]	No	2022
3		**Renewable energy share**	Eurostat, SHARES[34,35]	No	2022
4		**Cumulative investment in renovation**	FIEC[36]	No	2022

[31] When a data source updates the data from previous years, the changes are usually not significant and do not affect the trends or results presented in the previous editions of the tracker. In cases where the data updates represent large changes, the data is checked to obtain more details. For this edition of the EU BCT no significant updates for the data before 2022 were observed.

[32] https://www.eea.europa.eu/data-and-maps/data/data-viewers/greenhouse-gases-viewer

[33] https://ec.europa.eu/eurostat/databrowser/view/ten00124/default/table?lang=en&category=cli.cli_dri.cli_dri_nrg

[34] https://ec.europa.eu/eurostat/documents/38154/4956088/SUMMARY-results-SHARES_2021.xlsx/a3ec29ed-95d3-8dfd-6f2f-4acd1eafdc91?t=1673009663750

[35] The SHARES tool followed the calculation provisions from Directive 2009/28/EC (RED I) for results until 2020; from 2021 on, results are based on Directive (EU) 2018/2001 (RED II) provisions. One of the main modifications concerns strengthened sustainability criteria for biofuels, which may affect reporting on renewables from certain Member States.

[36] The data set includes 16 EU Member States: Austria, Belgium, Bulgaria, Czechia, Denmark, Finland, France, Germany, Estonia, Italy, Ireland, Lithuania, Netherlands, Portugal, Spain and Sweden.

THE EU BCT AND ITS INDICATORS:

PROGRESS DURING 2015-2022

THE DECARBONISATION GAP IS WIDENING

By 2022, the gap between the tracker and the reference path was more than 13 points, it has more than doubled since 2016. In 2015, around 3.6 points of decarbonisation progress were required every year to align with the reference path. Due to inadequate progress, 5.2 points of progress are now required every year to get back on track by 2030.

INSUFFICIENT REDUCTION OF CO_2 EMISSIONS IN BUILDINGS

From 2015 to 2022, CO_2 emissions from energy use in buildings (households and services) dropped by only 14.7%, reaching 381.7 million tons—significantly short of the required 27.9% reduction for this period.

LIMITED DECREASE IN FINAL ENERGY CONSUMPTION IN HOUSEHOLDS AND SERVICES

Energy consumption only dropped by 2.8% compared to the required 6.5% decrease. Final energy consumption is still influenced by external factors like weather variations and economic rebounds post-COVID-19, suggesting structural changes are needed.

SLOW UPTAKE OF RENEWABLE ENERGY, ESPECIALLY FOR HEATING AND COOLING

The renewable energy share increased from 23% to 29% between 2015 and 2022, yet it remains 11.7 percentage points below the target. Renewable energy in heating and cooling particularly lags, with progress occurring at only a quarter of the necessary rate.

UNDERWHELMING INVESTMENT IN BUILDING RENOVATIONS

By 2022, cumulative investments in building renovations were 39.4% lower than the targeted amount. Limited investments highlight the financial and structural barriers in achieving energy efficiency upgrades, which are essential to reduce emissions and improve energy savings.

POSITIVE MOMENTUM IN RENEWABLE ELECTRICITY AND HEAT PUMP DEPLOYMENT

The renewable energy share in electricity generation is near its target, achieving 41.2% of gross electricity consumption in 2022, just shy of the 42% target. Heat pump installations are also accelerating, doubling in capacity from 2019 to 2022, driven by increased political support and the REPowerEU plan. Although these are positive trends, their current impact remains modest within the broader energy landscape.

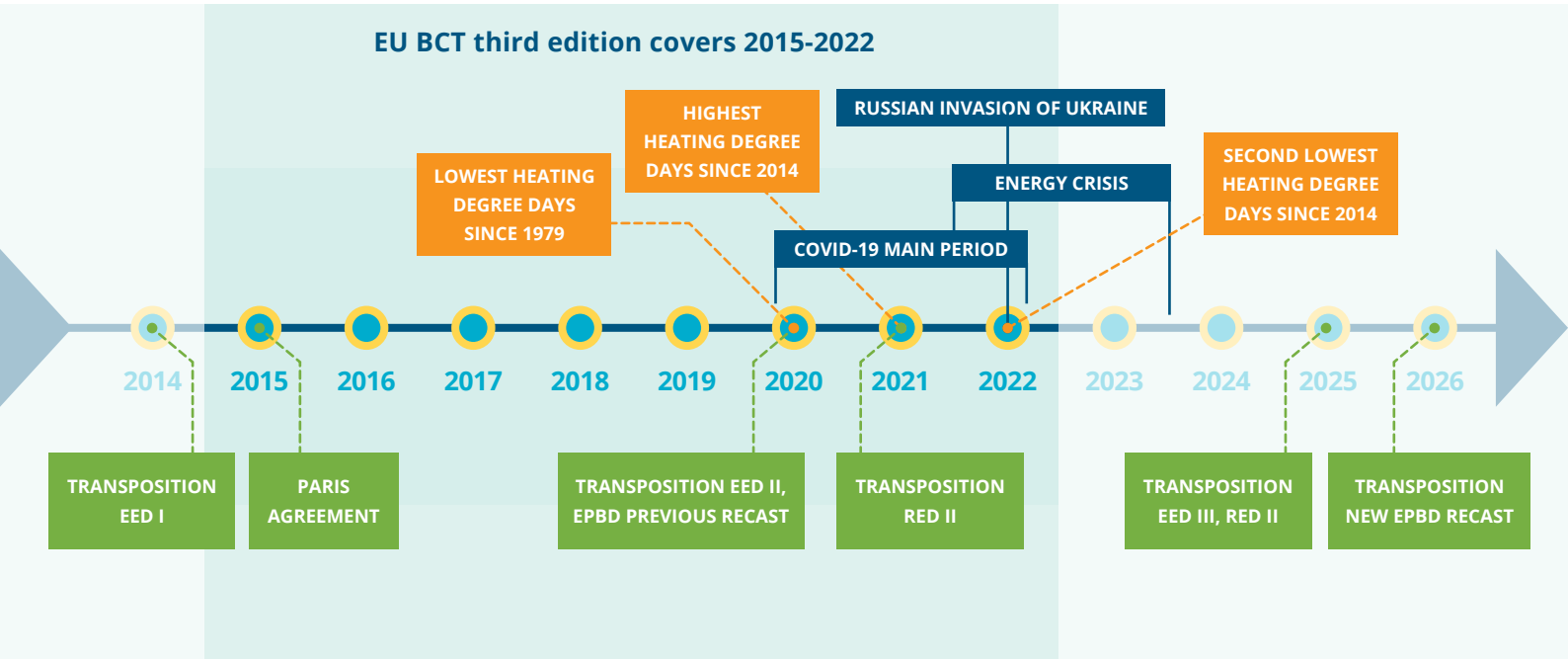
THE RESULTS IN THE FOLLOWING SECTIONS SHOULD BE VIEWED AGAINST THE BACKDROP OF SEVERAL SIGNIFICANT GLOBAL EVENTS AND POLICY DEVELOPMENTS FROM 2015 TO 2022.

During this period, EU directives like the EED II, RED II and the previous recast of the EPBD were incorporated into national laws, shown in Figure 11.

Meanwhile, major events – the COVID-19 pandemic, Russia's invasion of Ukraine, and the resulting energy crisis – significantly shaped energy markets and affected the trends tracked by the EU BCT. Beginning in 2021, the energy crisis escalated as post-pandemic demand surged, followed by extreme market instability in 2022 due to Russia's supply cuts to multiple EU countries, which drove record-high energy prices across Europe.[37] These factors, along with notable weather variations from 2020 to 2022, provide essential context for interpreting the results, and they are referenced throughout the report where relevant.

The timeline below focuses on the three main directives linked to building decarbonisation and the EU BCT indicators. It is not exhaustive and does not include all policies and events that may have occurred during this period.

Figure 11: Timeline and context of the period covered by the EU BCT

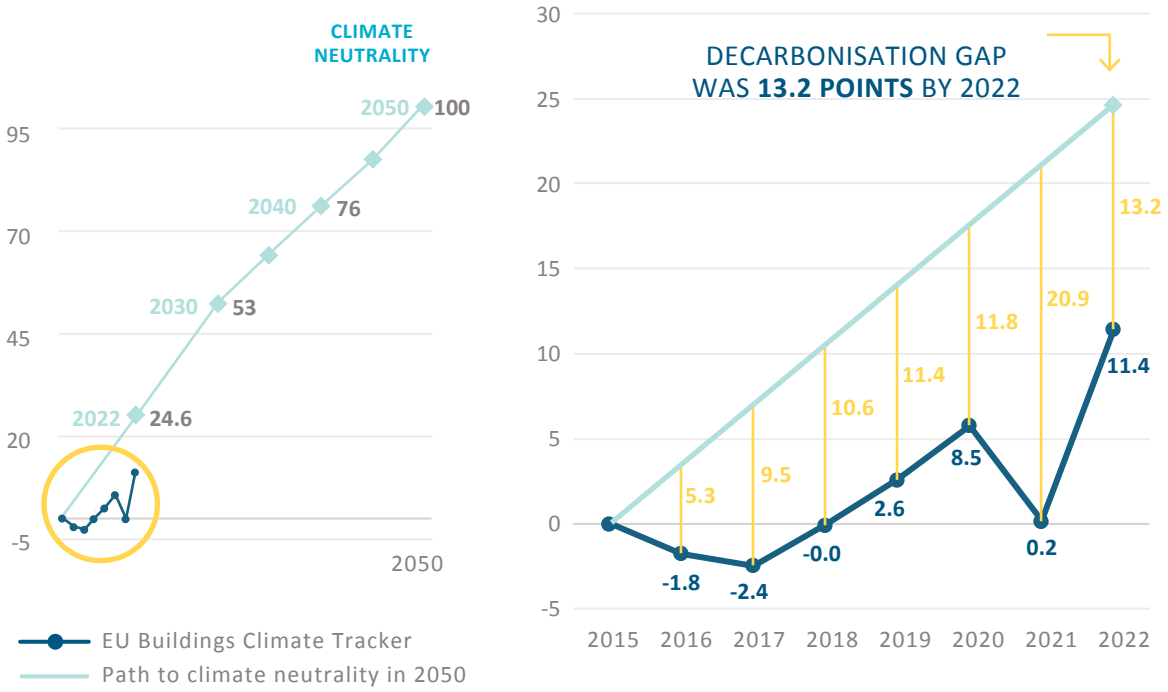


[37] https://www.consilium.europa.eu/en/policies/energy-prices-and-security-of-supply/#:~:text=The%20energy%20crisis%20peaked%20in,and%20swift%20in%20their%20response.

I. COMPOSITE INDEX OF THE EU BCT

The EU BCT integrates the four indicators described above to give a single index number representing the overall progress of the building stock in the EU towards the climate neutrality goal. Figure 12 shows the difference between the observed results and the necessary progress between 2015 and 2022. The gap (orange) between the actual progress made until 2022 (dark blue line) and the reference path (grey dotted line) is significant. The reference path corresponds to the resulting path combining the paths of all the indicators towards their final goal (see Figure 10).

Figure 12: EU BCT results between 2015 and 2022



Between 2016 and 2018, progress dropped below the 2015 level (negative values mean that the overall decarbonisation is below the reference point in 2015) before steadily increasing in 2019 and 2020. In 2021, an important deviation from the trend is observed, which is likely linked to two special circumstances: the rebound effect of the service sector after the lifting of restrictions related to the COVID-19 pandemic, and the higher heating needs during an unusually cold winter.[38]

From 2018 until 2022, there was overall progress beyond the starting level in 2015, but building decarbonisation in the EU remained off track compared to the reference path. By 2022, even though the index shows some recovery after the special 2021 circumstances, the gap between the tracker and the reference path was more than 13 points. The gap has more than doubled since 2016, highlighting the inadequate progress in the decarbonisation of the building stock.

[38] 2021 registered the highest number of heating degree days since 2014. Heating Degree Days is a weather-based technical index designed to describe the need for the heating energy requirements of buildings. It is calculated by subtracting the average of daily maximum and minimum outdoor temperatures from a reference temperature (usually 18°C). A positive result indicates the need for heating. A higher number of Heating Degree Days suggests increased demand for heating energy during cold periods.

This gap is a consequence of, among others, the lack of sufficient progress in the reduction of final energy consumption, the too-slow roll-out of renewables for heating and cooling, and unrealised investments in renovation (see sections iii. and iv. of this chapter). Although there has been a positive trend since 2015, suggesting that existing policies are having some effect, progress falls short of what is required. If this gap remains or increases, it will be increasingly difficult to adjust the trend to get on track.

At the start of the index in 2015, around 3.6 points of decarbonisation progress were required every year to align with the reference path. Based on the current situation, 5.2 points of progress are now required every year to get back on track by 2030. This demands a mix of both rapid actions to get the decarbonisation of the building stock back on track and more structural measures to ensure that high levels of energy savings and CO_2 emissions cuts are delivered and maintained consistently. If CO_2 emissions are not reduced promptly, future mitigation and adaptation efforts will have to be considerably greater.

The EPBD recast, in conjunction with some of the provisions of the EED and RED III and other components of the Fit for 55 package, brings diverse opportunities to bridge the decarbonisation gap. To unlock all their potential, the transposition and implementation of these provisions needs to be rapid and effective.

The transposition of the EPBD should take into consideration the lack of progress in the EU BCT indicators to develop a clear strategy to catch up with the path to climate neutrality, with a clear view to leverage the process for the benefit of people and society.

From housing and economic stability to energy security and independence, to resilience in the face of climate impacts and health crises, buildings represent a massive opportunity to address our most pressing issues with maximum efficacy.[39]

[39] https://www.bpie.eu/publication/building-prosperity-10-policy-priorities-to-achieve-growth-and-social-value-through-resilient-healthy-and-affordable-zero-emission-buildings/

II. RESULTS FOR ALL SINGLE INDICATORS

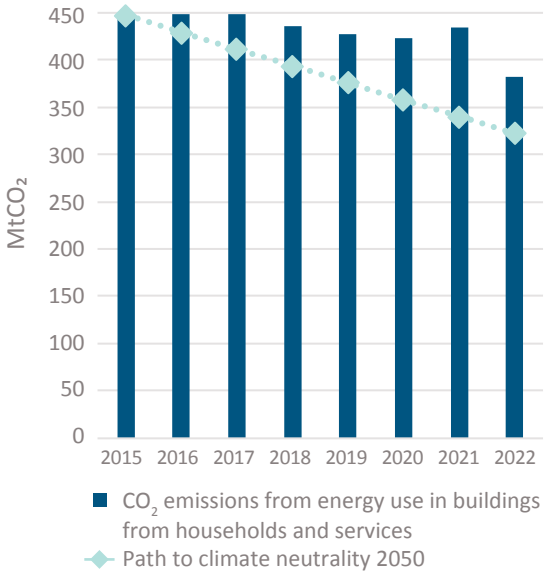
This section provides an overview of the results and progress of all the indicators between 2015 and 2022. The results are mainly compared to the target values from the reference path for each indicator for the years 2021 and 2022. The indicators are also analysed on a normalised scale to understand better the magnitude of the gaps observed until 2022. For a more detailed analysis of the indicators with more contextual information and in relation to other complementary indicators, see chapter IV.

CO_2 EMISSIONS FROM ENERGY USE IN BUILDINGS FOR HOUSEHOLDS AND SERVICES

This indicator monitors the CO_2 emissions from the direct use of fossil fuel energy in buildings. It is composed of the simple addition of two sub-indicators: 1(a) CO_2 emissions from energy use in households, and 1(b) CO_2 emissions from energy use in service-sector buildings, including institutional buildings.

- As shown in Figure 13, CO_2 emissions from energy use in buildings for households and services decreased steadily between 2017 and 2020 but are still far from the path to climate neutrality.
- In 2021, the decreasing trend was interrupted and this indicator increased by 2.7%, reaching 433.9 $MtCO_2$, **which is 27.6% higher than the target value for that year.** This was mainly due to the increase of final energy consumption in households because of the cold winter and the rebound effect in the service sector after COVID-19 pandemic restrictions were lifted.
- In 2022, CO_2 emissions from energy use in buildings for households and services decreased compared to all years before, reaching their lowest value since 2015 (381.7 $MtCO_2$). However, this indicator is still **18.4% higher than the target value for that year.**

Figure 13: CO_2 emissions from energy use in buildings for households and services 2015-2022



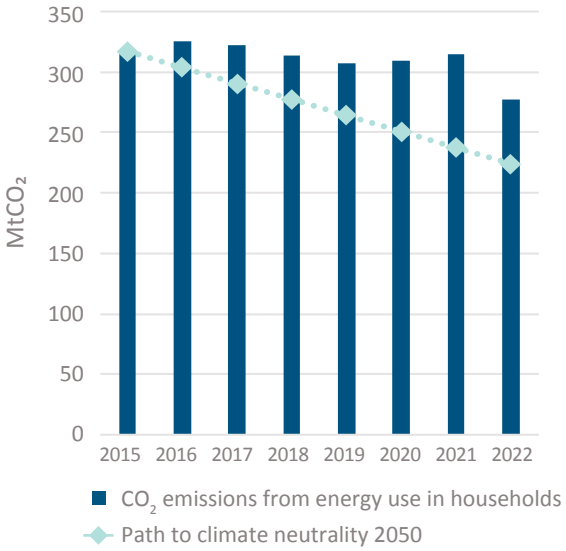
- During 2015-2022, CO_2 emissions should have decreased by 27.9%, but only 14.7% was achieved. **The pace of reduction is only about half of the required rate.**
- **During 2015-2022, around 367 Mt more CO_2[40] was released than would have been if progress had been on track.** The extra emissions released every year due to unrealised reductions have irreversible environmental impacts.

[40] These extra emissions correspond to the difference between the progress observed and the required values in the reference path towards climate neutrality.

1(a) CO_2 emissions from energy use in households

- As shown in Figure 14, CO_2 emissions from energy use in households decreased steadily between 2016 and 2019.
- In 2020 and 2021, the decreasing trend was interrupted and emissions increased, reaching 314.6 $MtCO_2$ in 2021, **32.6% higher than the target value.** This was likely related to the increase in working from home[41] and the fact that 2021 had the highest level of heating degree days since 2014,[42] meaning households needed more energy for heating that year.
- In 2022, CO_2 emissions from energy use in households decreased by 11.9% compared to 2021, reaching 277.1 $MtCO_2$. However, the indicator is still **23.7% higher than the target value.**
- During 2015-2022, CO_2 emissions from households should have decreased by 29.3%, instead of only 12.4%. **The reduction rate is less than half of the required pace.**

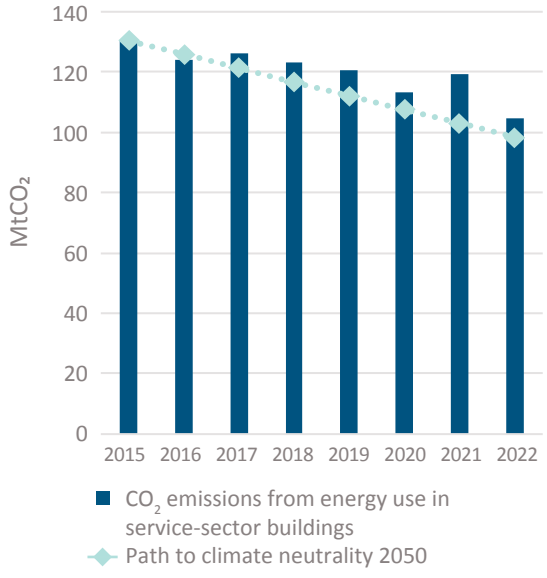
Figure 14: CO_2 emissions from energy use in households 2015-2022



1(b) CO_2 emissions from energy use in service-sector buildings

- As shown in Figure 15, CO_2 emissions from energy use in service-sector buildings decreased steadily between 2017 and 2020.
- In 2021, the decreasing trend was interrupted and emissions increased, reaching 119.4 $MtCO_2$, 16% higher than the target value for that year. This is likely related to the rebound effect after the lifting of COVID-19 restrictions.
- In 2022, CO_2 emissions from energy use in service-sector buildings were reduced by 12.4%, reaching 104.5 $MtCO_2$, 6.3% higher than the target value for that year. This reduction may be related to the coordinated demand-reduction measures for gas[43] following the Russian invasion of Ukraine and high gas prices.[44]

Figure 15: CO_2 emissions from energy use in service-sector buildings



- Between 2015 and 2022, CO_2 emissions in this sector should have decreased by 24.5%, instead of 19.8%. Faster progress is needed to get on track.

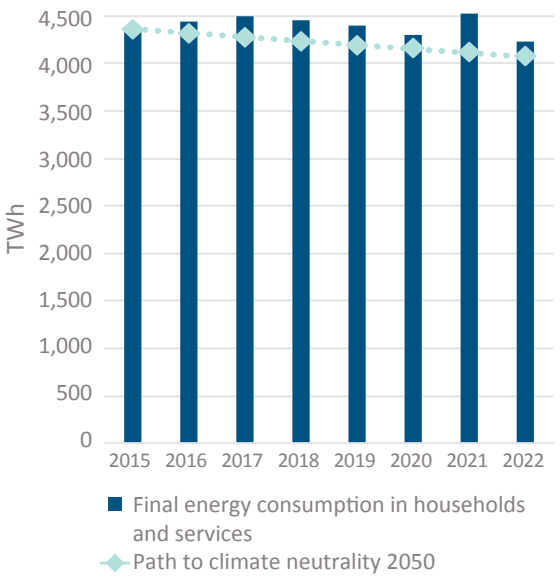
[41] See Eurostat database
[42] According to the Eurostat database, which has records for heating degree days since 1979.
[43] https://eur-lex.europa.eu/EN/legal-content/summary/coordinated-demand-reduction-measures-for-gas.html
[44] https://ec.europa.eu/eurostat/databrowser/view/nrg_pc_203$defaultview/default/line?lang=en

FINAL ENERGY CONSUMPTION IN HOUSEHOLDS AND SERVICES

This indicator describes the energy consumption of end-users in households and service-sector buildings. It is composed by the simple addition of two sub-indicators: 2(a) final energy consumption in households, and 2(b) final energy consumption in service-sector buildings.

- As shown in Figure 16, the final energy consumption in households and services decreased steadily between 2017 and 2020.
- In 2021, the decreasing trend was interrupted and the final energy consumption increased by 5.2%, reaching 4,530 TWh, **10.2% higher than the target value for that year.** This is mainly due to the increase of final energy consumption in households because of more heating degree days and increased working from home, and the rebound effect in the service sector after COVID-19 pandemic restrictions were lifted.
- In 2022, the final energy consumption in households and services decreased, reaching 4,234 TWh. This is still **4.0% higher than the target value for that year.** This reduction can be linked to the fact that 2022 had the second lowest number of heating degree days since 2014,[45] meaning lower heating needs.

Figure 16: Final energy consumption in households and services 2015-2022



- During 2015-2022, final energy consumption in households and services should have decreased by 6.5%, but instead only 2.8% was achieved. **The reduction is happening at less than half of the required pace.**

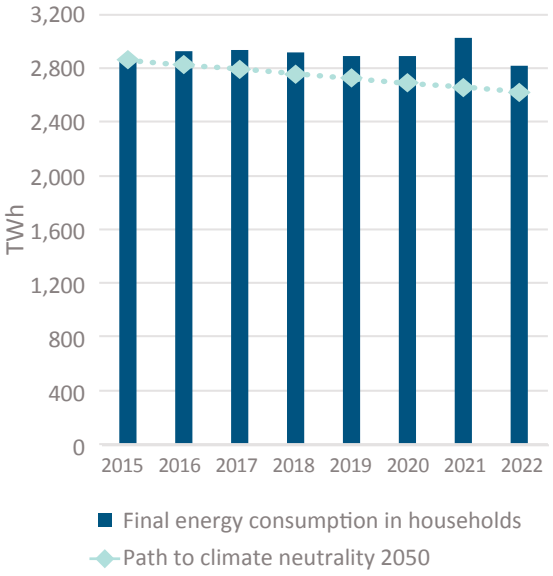
2(a) Final energy consumption in households

- As shown in Figure 17, the final energy consumption in households decreased during 2017-2019 but remained above 2015 levels.
- In 2021, it reached its highest value of 3,025 TWh, **13.9% higher than the target value.** This may be linked to the increase in home-working and the fact that 2021 had the highest level of heating degree days since 2014,[46] meaning households had high heating needs.

[45] According to the Eurostat database
[46] According to the Eurostat database

- In 2022, the final energy consumption in households reduced by 6.8% and was below 2015 levels for the first time, reaching 2,819 TWh. However, it was still **7.5% higher than the target value.** This reduction may be linked to the fact that 2022 had the second lowest heating degree days since 2014. Even though heating needs were lower than in 2021, the proportion of households unable to keep their home adequately warm increased by 2.4 percentage points on that year.[47]
- During 2015-2022, the final energy consumption in households should have decreased by 8.3%, but instead it decreased by only 1.4%. **The reduction is happening at a much slower pace than required – only a sixth of the required reduction was achieved by 2022.**

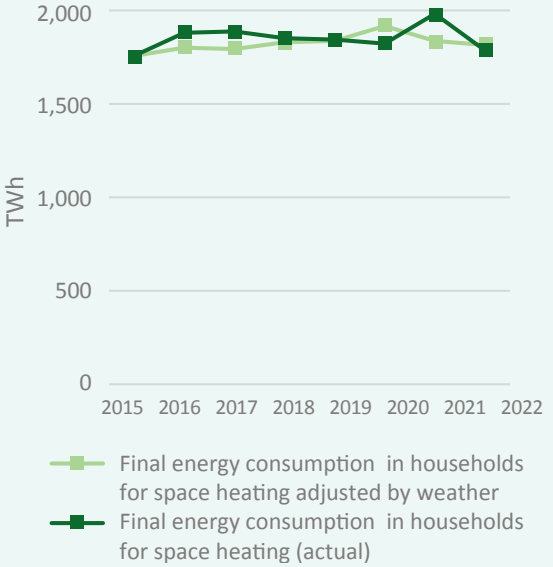
Figure 17: Final energy consumption in households 2015-2022



Final energy consumption in households for space heating

- Figure 18 shows the actual observations (dark) of the final energy consumption in households for space heating and the values adjusted according to heating degree days (light). Climate adjustment is used to account for temperature variations, enabling a more accurate comparison of energy consumption across milder and colder years.
- By adjusting the relatively low final energy consumption for household space heating in 2020 to account for the mild temperatures during the heating period, we observe that energy consumption was higher than expected for a mild year. This is likely due to the lockdowns and increased home-working during the COVID-19 pandemic.
- In contrast, the seemingly high energy consumption in 2021 was mostly due to cold temperatures, as this year experienced the highest number of heating degree days since 2014. When adjusted for temperature, energy consumption for household space heating in 2021 was similar to 2019 levels though significantly higher than in 2015.

Figure 18: Final energy consumption in households for space heating between 2015 and 2022

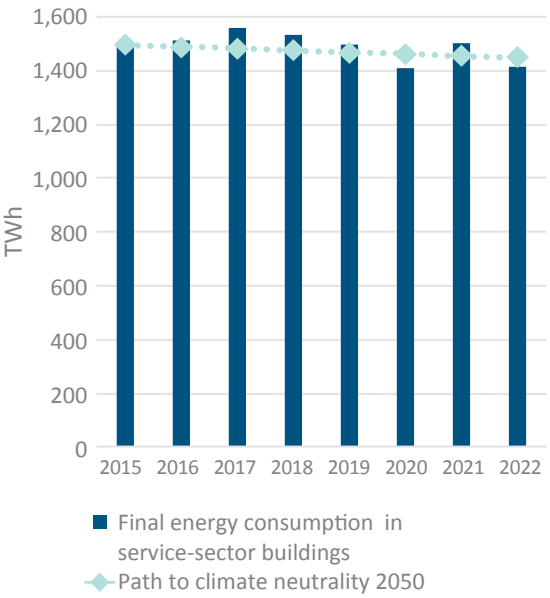


[47] More details in chapter III of this report.

2(b) Final energy consumption in service-sector buildings

- As shown in Figure 19, the final energy consumption in service-sector buildings decreased during 2017-2020. It reached values below 2015 levels for the first time in 2020, mainly likely due to the low activity in this sector during the COVID-19 pandemic.
- In 2021, the decreasing trend was interrupted and this indicator experienced a rebound effect, reaching 1,505 TWh, similar to the levels observed in 2019 before COVID-19.
- In 2022, this indicator decreased 6.0%, reaching 1,415 TWh, **2.3% lower than the target value for that year.**[48]
- During 2015-2022, this indicator decreased by 5.4%, more than the required 3.1%. However, until 2019, no progress had been observed, and the final energy consumption in service-sector buildings was higher than 2015 levels. The progress observed during 2020-2022 may be temporary, related to circumstances linked to COVID-19, the energy crisis and short-term demand-reduction measures,[49] including voluntary targets to reduce gas consumption by at least 15%.

Figure 19: Final energy consumption in service-sector buildings 2015-2022



It is important to monitor the development of this indicator after 2022 to assess whether the observed progress is a result of structural improvements related to long-term policies or temporary reactions to these special circumstances.

[48] The reduction observed in 2022 in this sector (6.0%) is similar to that observed in households (6.8%). However, while the latter indicator is off-track, the indicator for service-sector buildings is ahead of the reference path. This reflects the level of ambition of the goals in the MIX scenario for this sector compared to households (see Table 3)

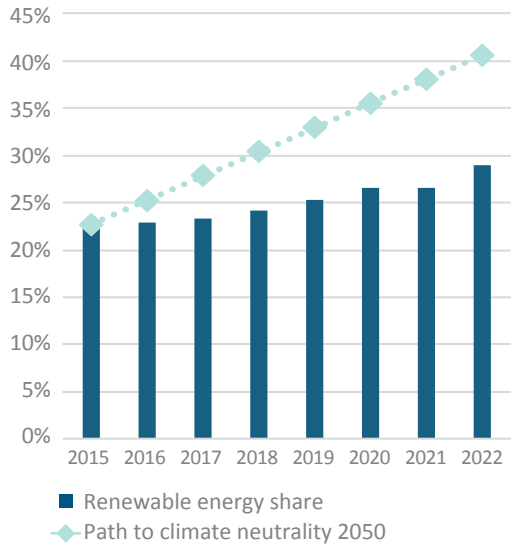
[49] https://eur-lex.europa.eu/EN/legal-content/summary/coordinated-demand-reduction-measures-for-gas.html

3 RENEWABLE ENERGY SHARE

The renewable energy share indicator is composed of the weighted sum of two sub-indicators: 3(a) share of energy from renewable sources for heating and cooling (75%) and 3(b) share of energy from renewable sources in gross electricity consumption (25%).

- As shown in Figure 20, the share of renewable energy used for electricity and for heating and cooling has increased since 2015, but is still far from the reference path. This is mainly due to the slow roll-out of renewable energy for heating and cooling.
- In 2022, the renewable energy share reached 28.9%, **11.7 percentage points lower than the target value for that year.**
- During 2015-2022, the renewable energy share should have increased by 18 percentage points, but instead increased by only 6.3 percentage points. **The increase is happening at only around a third of the required pace.**

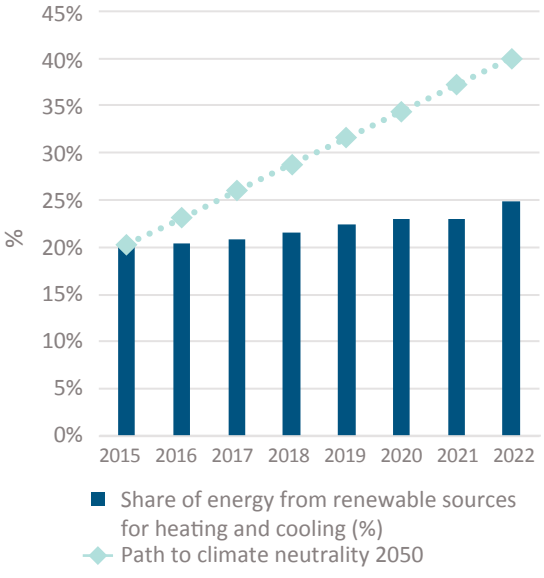
Figure 20: Renewable energy share 2015-2022



3(a) Share of energy from renewable sources for heating and cooling

- As shown in Figure 21, the share of energy from renewable sources for heating and cooling increased from 20% in 2015 to 24.9% in 2022. **In 2022, it is 15.1 percentage points lower than the target value. The progress for this indicator is too slow: it remains far from the path to climate neutrality.**
- In 2022, the share of energy from renewable sources for heating and cooling increased by 2 percentage points compared to 2021. This is likely due to a drop in energy consumption, rather than an absolute increase of energy produced by renewable sources. In 2022, the gross final energy consumption for heating and cooling decreased by 8.1%, likely due to the second lowest number of heating degree days since 2014.[50]

Figure 21: Share of energy from renewable sources for heating and cooling 2015-2022



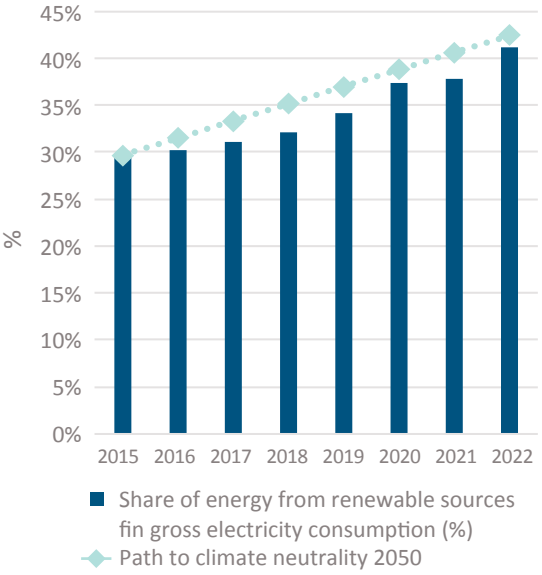
- During 2015-2022, this indicator should have increased by 19.7 percentage points, but instead increased by only 4.6 percentage points. **The increase is happening at a much slower pace than required – only around a quarter of the required increase was achieved up to 2022.**

50

3(b) Share of energy from renewable sources in gross electricity consumption

- As shown in Figure 22, the share of energy from renewable sources in gross electricity consumption has been increasing since 2015, except for the stabilisation that occurred between 2020 and 2021.
- In 2022, this indicator reached 41.2%, only **1.2 percentage points below the target value.**
- During 2015-2022, the share of energy from renewable sources in gross electricity consumption increased by 11.5%, **close to the required increase of 12.8%.**

Figure 22: Share of energy from renewable sources in gross electricity consumption 2015-2022

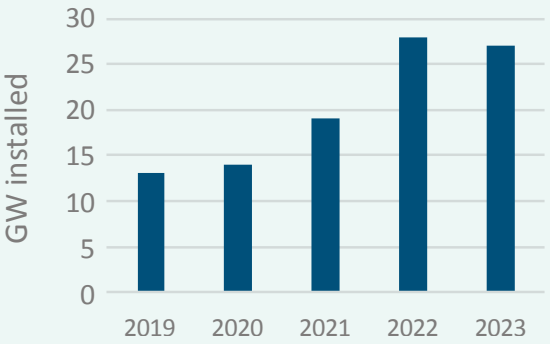


Evolution of heat pump deployment

Heat pumps use electricity to move heat from ambient outside air, water or ground to a building's interior and to heat water. They contribute to emissions reductions in two ways. Firstly, they deliver three to five units of heat for each unit of electricity needed to run them.[51] This means 70–80% of energy provided by an average heat pump is renewable.[52] This is considered in the EU BCT indicator 3(a) Share of energy from renewable sources for heating and cooling. Secondly, the use of electricity facilitates central and distributed decarbonisation, as demonstrated by the increasing share of renewable energy in electricity. This is considered in the EU BCT indicator 3(b) Share of energy from renewable sources in gross electricity consumption.

In the EU, up to 2022, there were 20.67 million heat pumps installed.[53] Heat pump sales have increased since 2019, with capacity doubling between 2019 and 2022, as shown in Figure 23.[54] This growth has likely been driven by the energy crisis.[55] Since the publication of the MIX scenario in the Fit for 55 package (2022),[56] political ambition to deploy heat pumps has notably increased, especially under the REPowerEU plan (May 2022), including targets to deploy 30 million additional heat pumps by 2030 to phase out gas boilers.

Figure 23: Heat pump sales in the EU *(source: IEA)*

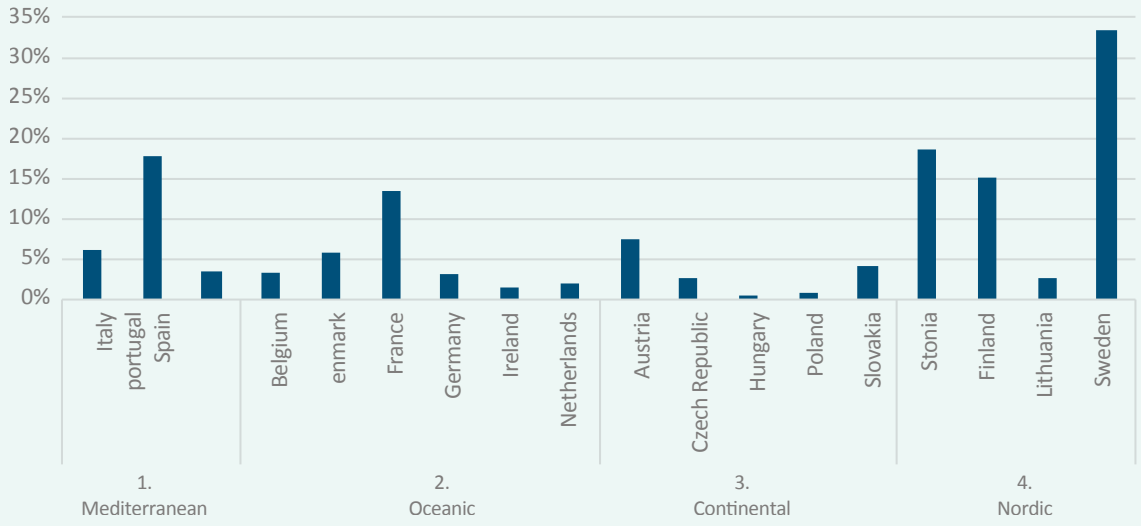


[51] From using heat to using work: reconceptualising the zero carbon energy transition. https://link.springer.com/article/10.1007/s12053-021-09982-9
[52] Heating up the global heat pump market. https://www.nature.com/articles/s41560-022-01104-8
[53] https://www.ehpa.org/market-data/
[54] https://www.iea.org/data-and-statistics/charts/heat-pump-sales-by-country-or-region-2019-2023
[55] https://www.iea.org/commentaries/global-heat-pump-sales-continue-double-digit-growth
[56] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020SC0176

Figure 24 shows the final energy savings achieved thanks to heat pumps out of total household heating and hot water consumption. In many Member States, without heat pumps, the final energy consumption for heating and hot water would be higher (e.g. 30% more in Sweden). The impact of heat pumps is therefore also reflected in the EU BCT indicator 2 (Final energy consumption in households and services). However, as heat pumps represent only 3.7% of the total energy from all sources,[57] their impact remains relatively small and difficult to distinguish within broader energy consumption trends.

Other technologies such as district heating (nearly half of it supplied from renewable and waste heat sources) and district cooling have also seen an increase of 5.5% and 8% in 2022.[58]

Figure 24: Final energy savings from heat pumps in % of total household consumption for heating and hot water, 2018 *(source: BPIE analysis based on EHPA and Eurostat)*



[57] https://ec.europa.eu/eurostat/documents/38154/4956088/SUMMARY-results-SHARES_2021.xlsx/a3ec29ed-95d3-8dfd-6f2f-4acd1eafdc91?t=1673009663750
[58] https://api.euroheat.org/uploads/Market_Outlook_2024_beeecd62d4.pdf

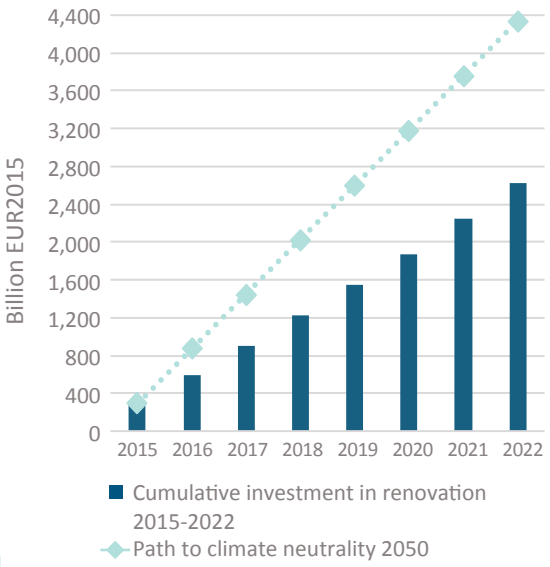
4 CUMULATIVE INVESTMENT IN RENOVATION

This indicator describes cumulative investment in renovation of the building stock,[59] as reported by Member States[60] and expressed in 2015 Euros.

- As shown in Figure 25, the cumulative investment in renovation has increased steadily since 2015 but is still far from the path to climate neutrality.
- **In 2022, this indicator accumulated to only 2,629 billion EUR2015, 39.4% lower than the target value.** Challenges such as high upfront costs, fossil fuel pricing, access to funding, split incentives and other non-monetary barriers still persist.[61]
- **Unrealised investments in previous years are leading to a more inefficient and deteriorated building stock,** making currently delayed and future renovations more challenging and likely more expensive.

Early and well-timed investments can help avoid this situation and boost renovation efforts.

Figure 25: Cumulative investment in renovation 2015-2022



[59] The analysis excludes Croatia, Cyprus, Greece, Hungary, Latvia, Luxemburg, Malta, Poland, Romania, Slovenia and Slovakia due to unavailable data.

[60] When analysing the results for this indicator, it is important to note that while the goal is based on energy-related renovation, the dataset available does not explicitly differentiate between types of renovation – some countries also include the renovation of other urban infrastructure in their reports.

[61] https://www.bruegel.org/policy-brief/how-finance-european-unions-building-decarbonisation-plan

III. SUMMARY OF OBSERVATIONS

Table 5 summarises the results for all the indicators, giving absolute values for the start year (2015), the final year of available data (2022), and the required value for 2022 according to the reference path. It shows the progress achieved during 2015-2022 and what is required to be on track towards climate neutrality. Progress is evaluated graphically in the final column using a scale showing 10 houses, each representing 10% of the progress required during the analysed period.[62]

Table 5: Summary of observations and progress of the EU BCT composite index and single indicators

	Indicator	VALUES			DEVELOPMENTS		
		2015	2022 (achieved)	2022 (required)	2015-2022 (achieved)	2015-2022 (required)	How much of the required progress was achieved during 2015-2022?
1	**CO_2 emissions emissions from energy use in buildings for households and services**	**447.2 $MtCO_2$**	**381.7 $MtCO_2$**	**322.3 $MtCO_2$**	**↓ 14.7%**	**↓ 27.9%**	
	households	316.9 $MtCO_2$	277.1 $MtCO_2$	223.9 $MtCO_2$	↓ 12.6%	↓ 29.3%	
	service-sector	130.3 $MtCO_2$	104.5 $MtCO_2$	98.3 $MtCO_2$	↓ 19.8%	↓ 24.5%	
2	**Final energy consumption in households and services**	**4,355.9 [TWh]**	**4,234.5 [TWh]**	**4,070.8 [TWh]**	**↓ 2.8%**	**↓ 6.5%**	
	households	2,860.4 [TWh]	2,819.5 [TWh]	2,621.9 [TWh]	↓ 1.4%	↓ 8.3%	
	service-sector	1,495.5 [TWh]	1,415.0 [TWh]	1,448.9 [TWh]	↓ 5.4%	↓ 3.1%	
3	**Renewable energy share**	**22.6%**	**28.9%**	**40.6%**	**↑ 6.3 percentage points (increased from 22.6% to 28.9%)**	**↑ 18.0 percentage points (should have increased from 22.6% to 40.6%)**	
	heating & cooling	20.3%	24.9%	40%	↑ 4.6 percentage points (increased from 20.3% to 24.9%)	↑ 19.7 percentage points (should have increased from 20.3% to 40%)	
	gross electricity consumption	29.7%	41.2%	42.4%	↑ 11.5 percentage points (increased from 29.7% to 41.2%)	↑ 12.8 percentage points (should have increased from 29.7% to 42.4%)	
4	**Cumulative investment in renovation**	**292.3 [billion EUR2015]**	**2,629 [billion EUR2015]**	**4,335 [billion EUR2015]**	**8 times the value in 2015**	**13.8 times the value in 2015**	

ENERGY PERFORMANCE CERTIFICATES

Energy performance certificates (EPCs) are one of the main sources of bottom-up information on the energy performance of individual buildings. They are increasingly recognised as a vital source of information on building stock performance. Improvements in EPC ratings could therefore provide a useful indicator for the EU BCT. However, challenges presented in previous editions of the EU BCT remain, due to the lack of availability and consistency of EPC data at national and EU levels.

Between 2022 and 2024, it was possible to obtain the number of EPCs for 20 of the 27 EU Member States, but not for Austria, Belgium Brussels and Flanders regions, Cyprus, Czechia, Luxembourg, Malta, Poland and Romania. Nonetheless, the 20 Member States for which data was collected in 2022-2024 represent 87% of the total floor area of the building stock in the EU. Even though data availability has increased, some countries have made changes in their EPC scales and reporting methodologies, which makes data comparison through the years more difficult. Moreover, many countries report only information for the residential sector.

The EPBD recast includes multiple provisions to drive a transformation in EPC frameworks towards schemes with more consistent and regularly updated data. The Directive also promotes the role of EPCs in renovation activities, with provisions on including information in EPCs about renovation measures, one-stop-shops, and steps to implement the recommendations. Member States must implement these provisions by 29 May 2026.[63] There are certain similarities in national EPC scales and methods across countries in the same climate regions.[64] These similarities can be explored to leverage synergies that can support the EPBD recast implementation. When these provisions are transposed and implemented at national level, more consistent and regularly updated data is expected to be available, which may enable the use of EPCs as an indicator to monitor the energy performance of buildings within the EU BCT.

PROVISIONS FOR EPC DATA

- Use of Primary energy use (kWh/(m2y)) as the main indicator, on **a closed scale using only letters A to G.**
- The **letter A** corresponds to **zero-emission buildings,** A+ for positive-energy buildings. The **letter G c**orresponds to the **very worst-performing buildings.**
- Member States should ensure a **common visual identity within the country, quality, reliability** and **affordability**. The EPBD includes a **template with the minimum information** that must be included in any EPC.
- EPCs must be **uploaded to the database** for the energy performance of buildings that Member States shall develop as part of EPBD Article 22.

PROVISIONS FOR THE ROLE OF EPCS

- EPCs should include recommendations for the cost-effective improvement of **energy performance, operational greenhouse gas emissions** and **indoor environmental quality** of the building. Advice on how to increase the climate resilience of the building.
- **EPCs should include steps** to implement the recommendations, the contact information of **relevant one-stop shops,** and **financial support** options.
- For EPCs **below level C**, building owners are invited to a one-stop shop to receive renovation advice.

[63] Member States that already rescaled their EPCs between 1 January 2019 and 28 May 2024 (prior to entry into force of 2024 EPBD recast), can postpone it until 31 December 2029.
[64] The abstract is openly available here

IV. GAPS IN BUILDING STOCK DECARBONISATION

To better understand the magnitude of the gaps between the status of each indicator and the reference path for climate neutrality by 2050, Figure 26 to Figure 29 present the four main indicators on a normalised scale.[65] This enables a harmonised analysis of the gaps across indicators.

Figure 26: CO_2 emissions from energy use in buildings for households and services 2015-2022, normalised

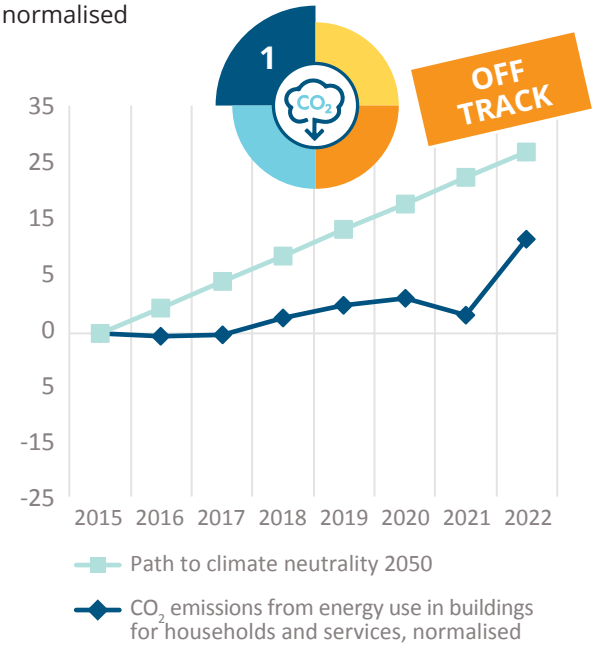


Figure 27: Final energy consumption and services 2015-2022, normalised

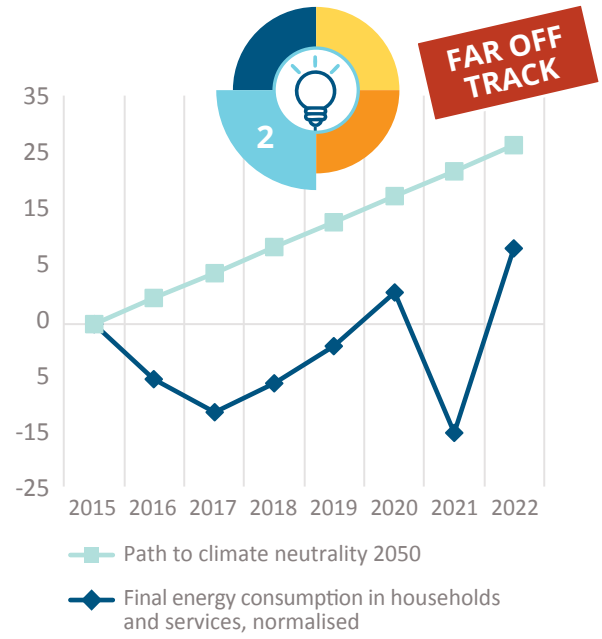


Figure 28: Renewable energy share 2015-2022, normalised

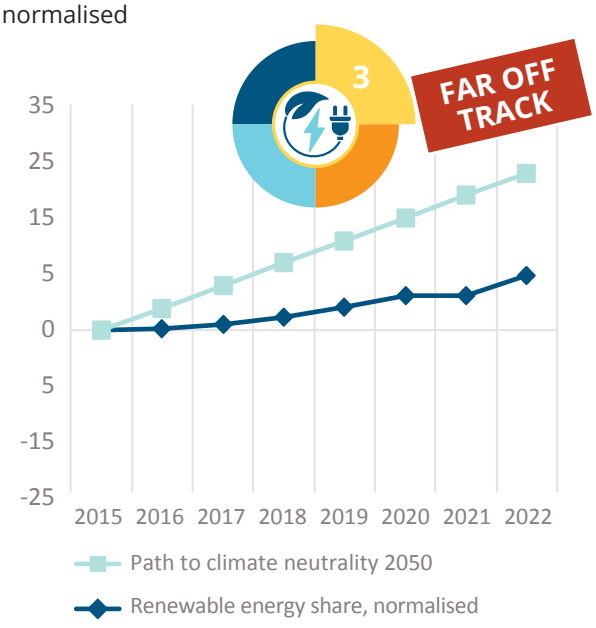
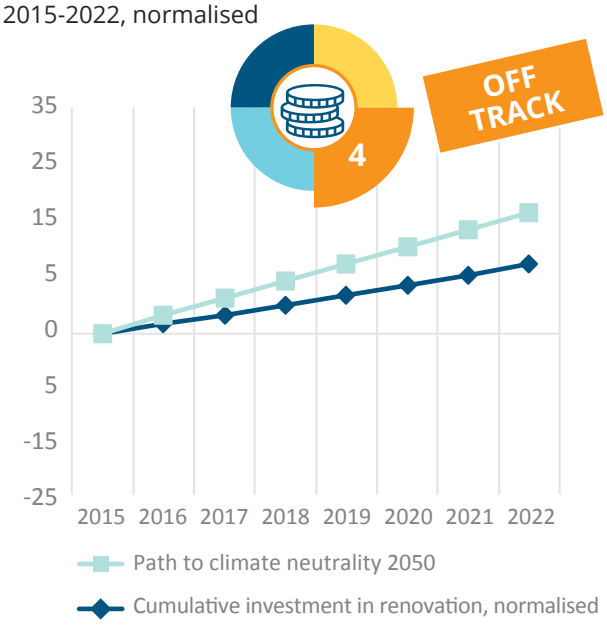


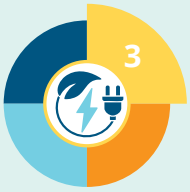
Figure 29: Cumulative investment in renovation 2015-2022, normalised



[65] Normalising indicators means that they are translated into a common scale based on the path to climate neutrality and expected increase or decrease for each indicator, from 0 (levels in 2015) to 100 (final goal in 2050). See the EU BCT first edition. In general, 10 points on the normalised scale mean that the indicator has achieved 10% of the reduction or increase that it should achieve during 2015-2050.

For each indicator, an assessment is given for the gap between the 2022 status (on the normalised scale) and the reference path. More details on the methodology for this assessment and the graphs for the sub-indicators are presented in Annex I. Despite some progress in each indicator and some trends moving towards or parallel to the reference path, all the indicators are off track or far off track. The gap between the actual progress and the reference path has been increasing constantly for most, with temporary fluctuations observed in the final energy indicator. Table 6 summarises the results for all four main indicators and their sub-indicators.

Table 6: Summary of the existing gaps for the EU BCT indicators based on the normalised values

	INDICATOR	ASSESSMENT	GAP
	**CO_2 emissions emissions from energy use in buildings for households and services**	**OFF TRACK**	**47.5%**
	households	**FAR OFF TRACK**	**57.2%**
	service-sector	**OFF TRACK**	**19.4%**
	**Final energy consumption in households and services**	**FAR OFF TRACK**	**57.4%**
	households	**FAR OFF TRACK**	**82.9%**
	service-sector	**ON TRACK**	**-72.6%**
	**Renewable energy share**	**FAR OFF TRACK**	**65.0%**
	heating & cooling	**FAR OFF TRACK**	**76.9%**
	gross electricity consumption	**ALMOST ON TRACK**	**9.7%**
	**Cumulative investment in renovation**	**OFF TRACK**	**42.2%**

* The progress observed during 2020-2022 was not a result of improvements in the building stock but rather driven by short-term demand-reduction measures, including voluntary targets to reduce gas consumption by at least 15% as a direct economic reaction to the energy crisis. While some energy use rationalisation may persist, this progress is likely temporary.

The gap for each indicator on the normalised scale can be read as follows: if the indicator has a gap of 65% in 2022, it means it did not achieve 65% of the reduction or increase that was required in that year.

The gap in the first two indicators is mainly the consequence of the lack of progress in the household segment. For CO_2 emissions, the household sub-indicator shows **a gap of 57.2%** (i.e. the residential sector did not achieve 57.2% of the CO_2 emissions reduction required for 2022) and for final energy consumption the household sub-indicator shows **a gap of 82.9%** (i.e. the residential sector did not achieve 82.9% of the final energy consumption reduction required for 2022). **This calls for action to accelerate the improvement of the energy efficiency and energy performance of households.** Investments in renovation will play a key role in this. By 2022, the accumulated investment had **a gap of 42.2%**. The unrealised investment means a more inefficient building stock, increasing the magnitude of the investments that will be required in the future.

The gap for the renewable energy share is a consequence of the slow progress in renewable energy for heating and cooling (a gap of 76.9% in 2022). The decarbonisation of the building stock cannot get on track without a significant increase of renewable capacity for heating and cooling supply, coupled with a phase-out of fossil fuels.

Even though the final energy consumption in service-sector buildings seems to be on track – and even over-achieving – in 2022, the observed progress may be temporary, related to the particular circumstances of the COVID-19 pandemic and the energy crisis, with more people working from home and diverse coordinated demand-reduction measures.[66] Before 2019, this indicator had not reduced below 2015 levels. The overall 5.4% reduction observed occurred during the period 2020-2022.

Policymakers at EU and national level should recognise the benefits of this reduction thanks to short-term actions, but also prioritise renovation actions and decarbonisation of the building energy supply for the service sector to ensure long-term progress.

The share of energy from renewable sources in gross electricity consumption was almost on track by 2022. This indicator partially benefited from a reduction of the gross final electricity consumption in 2020 and 2022. Though this indicator shows significant progress, it is important to maintain efforts to decarbonise the electricity sector so that this indicator gets and stays on track.

Overall, the insufficient progress reflected in most indicators underscores the urgent need for targeted action to meet annual targets and get back on track toward decarbonisation.

With 2022 marking the halfway point to 2030 – our first critical milestone for climate neutrality – it's alarming that all four of the main indicators remain over 40% off the reference path. If current trends persist, 2030 goals will not be met. Additional, more effective and accelerated efforts are urgently required. The EPBD recast presents numerous opportunities to drive this progress (see chapter IV).

[66] https://eur-lex.europa.eu/EN/legal-content/summary/coordinated-demand-reduction-measures-for-gas.html

SLOW DECARBONISATION OF BUILDINGS:

THE SOCIAL AND ECONOMIC COSTS OF INACTION

- **DECARBONISING BUILDINGS IS ESSENTIAL FOR IMPROVING PUBLIC HEALTH AND REDUCING EMISSIONS**

  Upgrading buildings can prevent health issues like respiratory problems and heat stress, which cost the EU billions annually.

- **ENERGY-EFFICIENT BUILDINGS ENHANCE ENERGY SECURITY AND REDUCE ENERGY POVERTY**

  Energy-efficient buildings reduce household energy costs by up to 30%, helping shield families from energy price volatility. This is particularly critical for the 34 million people in the EU affected by energy poverty.

- **QUANTIFYING THE SOCIAL AND ECONOMIC BENEFITS OF BUILDING UPGRADES CAN GUIDE BETTER POLICY**

  Tools like the MBx platform help measure the broad economic and social benefits of renovations. For example, every €1 invested in energy efficiency can generate €3 in broader economic returns, including job creation and reduced healthcare costs.

- **PUBLIC INVESTMENT SHOULD PRIORITISE VULNERABLE GROUPS FOR FAIR ACCESS TO DECARBONISATION**

  Ensuring equitable access to funding and renovation services can uplift disadvantaged communities, including those most impacted by energy poverty and poor living conditions.

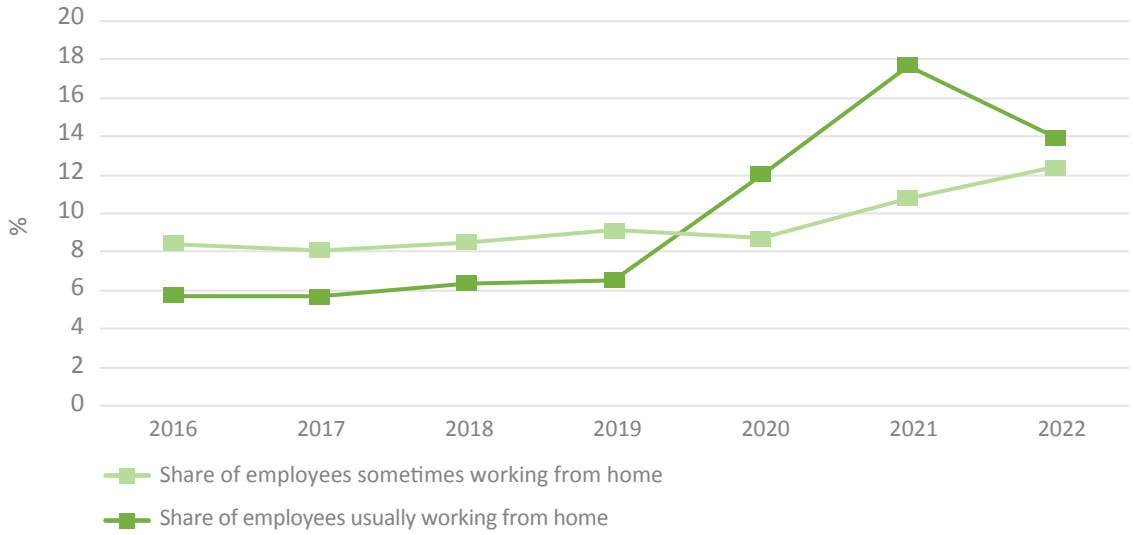
- **BUILDING DECARBONISATION CAN DRIVE ECONOMIC GROWTH AND ENHANCE GLOBAL COMPETITIVENESS**

  The Renovation Wave could create up to 160,000 green jobs by 2030, while also boosting EU competitiveness in the global green economy. This will position the EU as a leader in innovation, particularly in construction, clean tech, and finance.

I. BUILDING DECARBONISATION: A PATH TO HEALTH AND WELL-BEING

The quality of buildings directly impacts our health and well-being. From homes and workplaces to schools and hospitals, buildings shape the spaces where we live, learn, work and heal. The COVID-19 pandemic underscored this reality as people spent unprecedented amounts of time indoors. For instance, as shown in Figure 30,67 the share of employees working from home across the EU rose sharply from around 6–8.5% pre-pandemic to 17.7% in 2021, remaining significantly above prior levels even in 2022. The shift placed greater focus on the importance of healthy, efficient indoor environments, especially in the residential sector.

Figure 30: Share of employees usually or sometimes working from home



Poor building conditions can contribute to a wide range of health issues, including respiratory problems, skin irritations, headaches, allergies, mental health challenges, and even life-threatening conditions from extreme temperatures.[68] Studies highlight how poor indoor air quality and high indoor temperatures during summer have resulted in increased mortality rates across the EU.[69] Living in apartments with poor outdoor views and low indoor environmental quality during lockdowns[70] was associated with up to more than twice the risk of moderate-severe and severe depressive symptoms. Furthermore, as many as 15.5% of EU residents live in homes with structural issues, such as leaking roofs, damp walls or rot,[71] while approximately 10% live in overcrowded spaces.[72] The EU also faces a critical shortage of buildings adapted for diverse physical needs, affecting accessibility and comfort.[73]

[67] Based on Eurostat database
[68] Indoor Environmental Quality related risk factors with energy-efficient retrofitting of housing: a literature review, Green Buildings and Health, The Healthy Indoor Environment How to assess occupants' wellbeing in buildings
[69] Around 117,000 people died due to indoor air pollution in 2012, and 15,000 people from heatwaves in 2022.
[70] https://pubmed.ncbi.nlm.nih.gov/32824594/
[71] According to data from Eurostat database in 2023
[72] According to data from Eurostat database. A person is considered as living in an overcrowded household if the household does not have at its disposal a minimum number of rooms equal to: one room for the household; one room per couple in the household; one room for each single person aged 18 or more; one room per pair of single people of the same gender between 12 and 17 years of age; one room for each single person between 12 and 17 years of age and not included in the previous category; one room per pair of children under 12 years of age.
[73] Book: Universal design: creating inclusive environments, E. Steinfeld and J. Maisel

Recent EU policies recognise the importance of considering these elements when decarbonising the building stock. The "energy efficiency first" guidelines[74] mention indoor environmental quality and health impacts as co-benefits of energy efficiency measures. Meanwhile, the EPBD recast requires Member States to "*set requirements for the implementation of adequate indoor environmental quality standards in buildings in order to maintain a healthy indoor climate*" (Art. 13§4). It also encourages them to consider environmental and health externalities in the cost-optimality methodology (Annex I), to include information about wider benefits related to health and comfort in the National Building Renovation Plan (Art. 3), and to inform building users about the indoor environmental quality and the improved adaptive capacity of the building to climate change within renovation passports (Annex VIII). The EPBD recast also requires Member States to address in new buildings and buildings undergoing major renovations the issues of optimal indoor environmental quality, adaptation to climate change, fire safety, risks related to intense seismic activity and accessibility for people with disabilities (Art. 7 and 8).

These requirements should be extended to the entire building stock to guarantee equitable access to spaces that support well-being and accommodate diverse needs for living, working and learning.

A comprehensive and health-oriented approach to building design and renovation has been long overdue. The recently published Healthy Buildings Barometer framework[75] is the first to consider all the health-related dimensions in the construction and renovation of buildings. The Healthy Buildings Barometer includes five dimensions to achieve healthy and sustainable buildings: 1) Improving mental and physical health, 2) Designed for human needs, 3) Sustainably built and managed, 4) Resilient and adaptive, and 5) Empowering people.

Aligning building decarbonisation action with these kinds of integrated and comprehensive approaches can maximise benefits for individuals and society.

Evidence shows that building decarbonisation delivers far-reaching health and economic benefits beyond lower energy bills.[76,77] These include improved mental health at home, faster recovery times for hospital patients, reduced employee turnover in healthcare, lower medical costs and decreased mortality rates. Additionally, workplaces and schools see enhanced performance from employees and students, contributing to greater economic value added annually across the EU economy. The low level of accumulated investment observed in 2015-2022 (39.4% lower than the required value as presented by the EU BCT) represents lost opportunities to leverage all these benefits.

While the EU BCT monitors progress toward energy and climate goals, decarbonising the building stock is also an opportunity to achieve transformative health and social benefits.

To fully capitalise on these gains, policymakers should integrate health and well-being into decarbonisation policies, budget allocations, technical support and financial mechanisms, ensuring a healthier and more resilient built environment for all.

[74] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021H1749&qid=1643799901520%20#d1e39-14-1
[75] https://www.velux.com/what-we-do/healthy-buildings-focus/healthy-homes-barometer
[76] https://www.velux.com/what-we-do/healthy-buildings-focus/healthy-homes-barometer
[77] https://www.bpie.eu/publication/building-4-people-valorising-the-benefits-of-energy-renovation-investments-in-schools-offices-and-hospitals/

II. ENHANCING FINANCIAL STABILITY AND ENERGY SECURITY FOR HOUSEHOLDS

Better buildings offer a powerful way to lower household energy costs, protecting families from the volatility of global energy markets. Decarbonising the building stock is therefore a strategic pathway to reduce energy poverty by safeguarding households from fluctuating energy prices and lowering reliance on fossil fuels. This approach is essential for both economic stability and energy security.

The slow pace of building decarbonisation has significant implications for financial stability, energy equity and social progress. Transforming the building stock is critical to reducing energy poverty and achieving genuine energy security for all citizens – a need that has only intensified with recent challenges:

- **Economic disruptions of COVID-19:** The pandemic brought about income instability, impacting people's ability to afford essential energy services.[78]
- **Increasingly unpredictable temperature fluctuations:** 2020 had the lowest heating degree days since 1979, followed by 2021 with the highest number of heating degree days since 2014,[79] while 2022 was much warmer and had the highest cooling degree days since 2014.[80]
- **The recent energy crisis,** during which building users have faced electricity and gas prices rising to more than four or five times pre-crisis levels.[81]

Slow progress in building decarbonisation keeps a substantial share of the population in a state of energy poverty. Energy poverty is a complex issue, linking financial stability to health, comfort and quality of life. Recognising this, the 2023 recast of the EED defines energy poverty as: "a household's lack of access to essential energy services, where such services provide basic levels and decent standards of living and health, including adequate heating, hot water, cooling, lighting, and energy to power appliances, in the relevant national context, existing national social policy and other relevant national policies, caused by a combination of factors, including at least non-affordability, insufficient disposable income, high energy expenditure and poor energy efficiency of homes."[82]

Insufficient progress in decarbonising the building stock, as shown in EU BCT, continues to deepen one of the core drivers of energy poverty: the poor energy performance of buildings. Addressing this is essential to stabilising household costs, improving living conditions, and advancing equity and resilience across the EU.

[78] https://www.sciencedirect.com/science/Art./pii/S221462962030236X
[79] According to the Eurostat database, which has records for heating degree days since 1979
[80] According to Eurostat database
[81] Based on the comparison of the prices on the second semester of 2019 and the second semester of 2022 from the data available in Eurostart for gas prices, and electricity prices
[82] See EED Art. 2§52 https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=OJ%3AJOL_2023_231_R_0001&qid=1695186598766

- The EU BCT shows that the final energy consumption in households should have been reduced by 8.3% during 2015-2022, instead of only by 1.4% (see 2. Final energy consumption in households and services).

  Failing to decrease household energy consumption is a missed opportunity to reduce household expenditure on energy, and therefore to reduce energy poverty.

- The EU BCT also shows that the cumulative investment in renovation up to 2022 was 39.4% lower than needed (see 4. Cumulative investment in renovation).

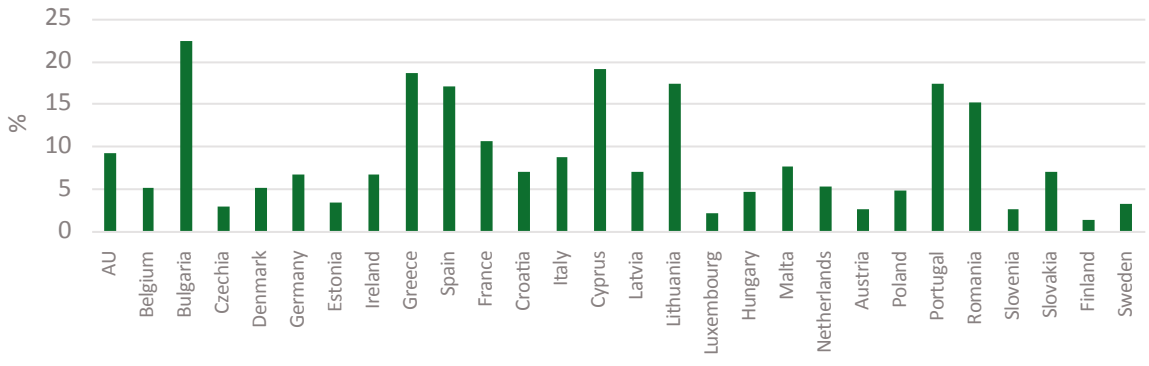
  Not investing enough to improve the performance of buildings, especially those used by vulnerable groups, is contributing to the low performance (and in some cases continuous deterioration) of buildings, which is one of the root causes of energy poverty.

- The share of renewable energies for heating and cooling has increased by only 4.6% instead of the required 19.7% (see 3(a) Share of energy from renewable sources for heating and cooling).

  This has prolonged the use of fossil fuels, leaving building users highly exposed to fluctuating energy prices, often affected by geopolitical circumstances, such as the Russian invasion of Ukraine.

A recent study from the Joint Research Centre[83] shows that nearly half of the individuals classified as energy-poor in the EU in 2020 had been persistently so over the 2017-2020 period. The study also shows that the duration of time that individuals spend in conditions of energy poverty is closely linked to their financial and housing stability. These findings are especially relevant considering that in 2022, 9.3% of the EU population declared that they were not able to keep their home adequately warm. The highest shares were registered in Bulgaria (22.5%), Cyprus (19.2%), Greece (18.7%), Lithuania (17.5%), Portugal (17.5%), Spain (17.1%) and Romania (15.2%), as shown in Figure 31.[84] **Even though heating needs in 2022 were considerably lower than 2021, the proportion of people unable to keep their home adequately warm was 2.4 percentage points higher. This is likely a consequence of households being exposed to high energy prices from the energy crisis.**

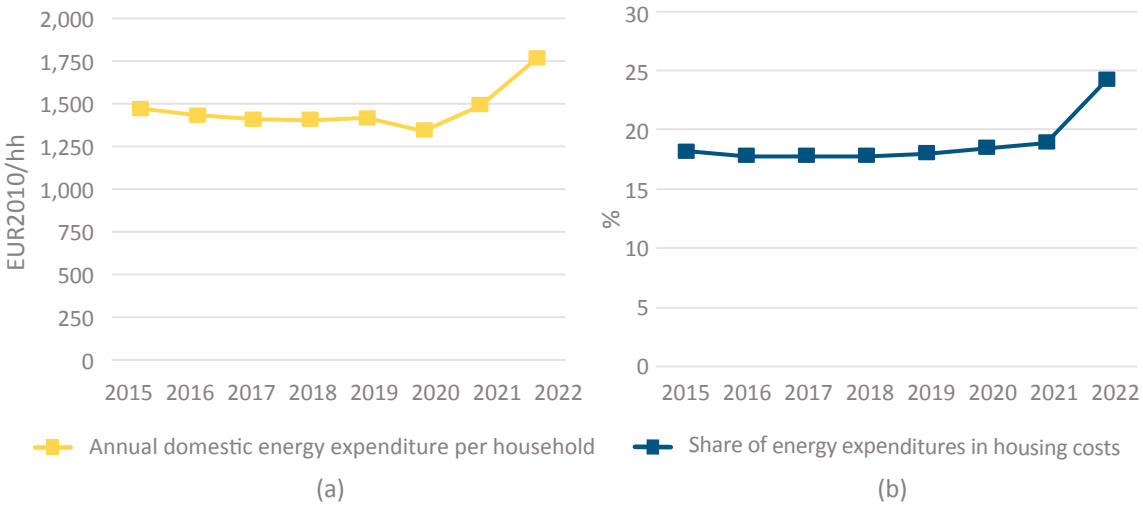
Figure 31: Proportion of the population unable to keep their home adequately warm



[83] https://publications.jrc.ec.europa.eu/repository/handle/JRC138409
[84] https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20230911-1

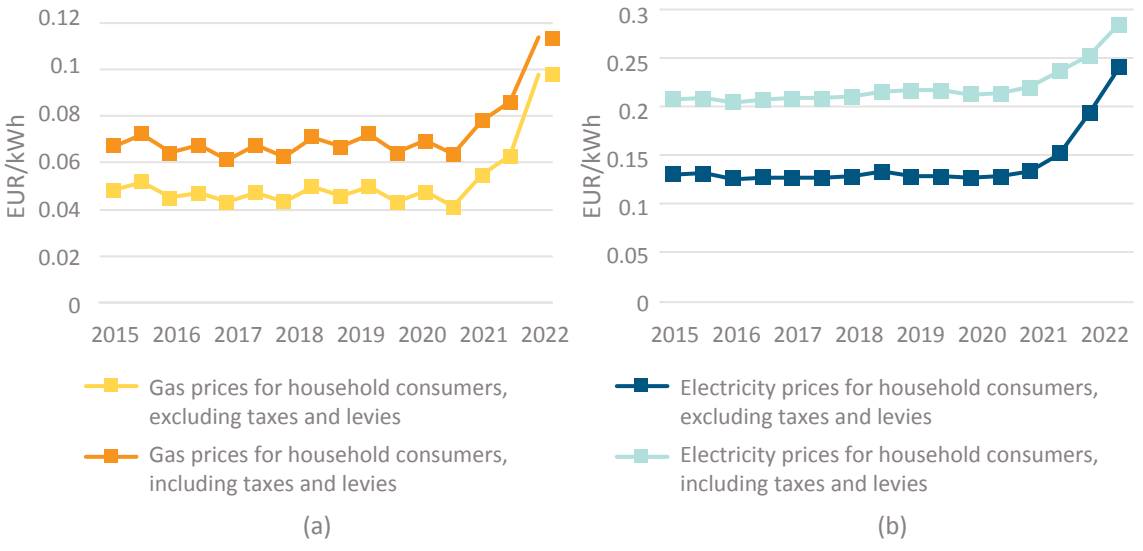
As shown in Figure 32(a), energy expenditure in households[85] in the EU reduced slightly during 2015-2018. However, in 2021 and 2022, it increased by 10% and 15.5% respectively, in comparison to the previous year. **Even though 2022 experienced the second lowest number of heating degree days since 2014, people spent around 24% more on their energy bills compared to the average in 2015-2019.** This trend can also be observed in the portion of housing costs that energy bills represent, as shown in Figure 32(b). In 2022, energy expenditures represented around 24% of housing costs, which is 6 percentage points more than the average in 2015-2019.

Figure 32: (a) Energy expenditure in households 2015-2022 (b) Share of energy expenditure in housing costs



This increase in energy expenditure is associated with the increase in gas and electricity prices experienced since the second half of 2021, as a result of the COVID-19 pandemic and the geopolitical conflicts caused by the Russian invasion of Ukraine. As can be observed in Figure 33, prices were largely stable until the beginning of 2021.

Figure 33: (a) Gas prices for household consumers 2015-2022 (b) Electricity prices for household consumers 2015-2022



[85] The data source for the two indicators is the ODYSSEE database. Values for all the countries using the total floor area of the residential building stock in each country are aggregated as weights to obtain the EU value.

As of mid-2021, energy prices have risen sharply. By the end of **2022**, households were paying around **69% more per kWh of gas**, including taxes and levies, than the average from 2015-2019. Since electricity prices are closely tied to natural gas, the primary marginal fuel,[86] the cost of electricity rose as well – about **35% higher per kWh** than the **2015-2019 average**.

Insufficient progress in building decarbonisation is significantly straining household budgets, making it increasingly difficult for families to manage their energy expenses and undermining their financial stability. As a result, many households struggle to afford to keep their homes comfortably warm.

These impacts could have been mitigated if building decarbonisation had progressed in previous years at the required and agreed pace. Energy efficiency measures and energy performance improvements reduce the impact of rising prices. However, as the EU BCT shows, renovation investments up to 2022 were 39.4% lower than they needed to be, **leading to missed opportunities to reduce energy consumption.** Adopting the energy efficiency first principle is vital for reducing energy demand and accelerating the growth of renewable energy in the energy mix.[87] This is particularly important given the slow progress in increasing the share of renewable energy for heating and cooling, which could have reduced the dependency on gas.

In Member States such as the Netherlands, Italy and Luxembourg, energy consumption in households decreased by -8%, -3.7% and -1.2%[88] respectively during 2019-2020. However, since these countries rely highly on gas for meeting their residential heating needs (Netherlands 66.2%, Italy 49.8%, Luxembourg 46.8%[89]), households spent more on energy in 2022 – around 33% more in Italy, 15% in the Netherlands and 26% in Luxembourg compared to the average during 2015-2019. This increases the risk of energy poverty and other negative impacts.

In response to the crisis, by early 2022 more than €540 billion of public money had been spent on support measures to help households cope with rising energy prices and living costs.[90] However, the vast majority went to direct income support to pay energy bills, instead of more mid-to-long-term building renovation and decarbonisation measures. While providing direct compensation may be necessary to meet people's immediate needs and prevent hardship, it is not a sustainable solution.[91] Investment in energy efficiency and renewable energy is urgently needed to decrease energy bills while maintaining comfort, and to protect building users from fluctuations in the energy market.

Building decarbonisation policies should ensure that available and new financial resources are fairly distributed, especially towards vulnerable groups and people living in energy poverty.

Lessons from past renovation programmes show that, when provided in a non-targeted manner, subsidies for energy performance improvements are very often taken up by households that do not fall in the lowest income groups.[92] This is because accessing such funding often requires co-financing and/or upfront financing, as well as complex administrative procedures, giving an advantage to better-off households that often have a higher educational level.

[86] https://ec.europa.eu/eurostat/web/products-eurostat-news/w/ddn-20231026-1
[87] https://www.bpie.eu/wp-content/uploads/2022/05/BPIE_Briefing-EU-Energy-Savings-Plan_Final_HQ.pdf
[88] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Energy_consumption_in_households
[89] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Energy_consumption_in_households
[90] https://www.bruegel.org/dataset/national-policies-shield-consumers-rising-energy-prices
[91] https://www.oeko.de//fileadmin/oekodoc/Targeted_measures_final_report_web.pdf
[92] https://europeanclimate.org/wp-content/uploads/2022/05/ieecp-socially-just-homes-summary-report-may-2022.pdf

III. SOCIETAL RESILIENCE AND ENERGY SECURITY: A NEW APPROACH TO BUILDING INVESTMENT

Amid rising energy prices and economic uncertainty, the decarbonisation of buildings offers a strategic path to enhancing societal resilience and energy security. Despite these urgent needs, progress in building decarbonisation slowed in 2021-2022, leaving critical potential untapped. However, there are numerous examples of the positive impacts of building renovation projects, low-carbon and energy-efficient construction and installation of renewable energy systems in buildings. Details of the multiple health, safety, resilience and other socioeconomic benefits derived from renovation projects and decarbonisation actions in historical buildings, large building blocks, single family houses, schools, other buildings and entire neighbourhoods across the EU can be found in BPIE's social channels,[93] the 12 case studies featured in the Healthy Buildings Barometer,[94] multiple exemplary projects[95] and many other successful cases documented in other projects.

Quantifying the broader benefits of building renovations – such as health improvements, community resilience and enhanced public safety – presents challenges but is essential to ensuring these outcomes are systematically considered in policy and investment decisions. Tools like the MBx platform[96] are helping bridge this gap by enabling policymakers, investors and urban planners to identify, quantify and even monetise the societal, economic and environmental benefits of renovation and energy-efficiency measures.

Showcasing these tangible benefits in decision-making processes and providing quantitative data – especially in monetary terms – can help scale impactful initiatives, but visibility alone is not enough.

For lasting impact, these broader advantages must be embedded in regulatory policies, funding mechanisms, and industry standards. For example, policies should be designed to encourage renovations that not only reduce emissions but also directly benefit energy-vulnerable populations, address energy poverty and reinforce resilience against future energy price volatility.

Price signals alone have proven ineffective as a driver of renovation policy, as shown by rising energy prices in 2021–2022 alongside limited progress in building decarbonisation. By rethinking building policies, standards, and investments through the broader lens of resilience and energy security—and by valuing the additional benefits of building decarbonisation—policymakers can catalyse real progress in this sector, strengthening both communities and economies.

[93] https://www.linkedin.com/posts/buildings-performance-institute-europe-bpie-_epbd-worstfirst-activity-7137733134879490050-Jk4Q?utm_source=share&utm_medium=member_desktop
[94] https://www.velux.com/what-we-do/healthy-buildings-focus/healthy-homes-barometer
[95] https://www.synikia.eu/neighbourhoods/
[96] https://mbxtool.synikia.eu/

IV. DRIVING INNOVATION AND COMPETITIVENESS THROUGH BUILDING DECARBONISATION

Transforming Europe's building stock offers a unique opportunity to drive economic growth, spur innovation and boost productivity, positioning the EU as a global leader in green technologies. Renovation of buildings is a top job creator, with 12-18 local jobs generated for every million euros invested.[97] The European Commission estimates that the construction sector in the EU could see an additional 160,000 green jobs by 2030.[98] Zero emission buildings also reduce energy costs for businesses and households, yielding broader economic benefits. Every euro invested in energy efficiency can generate up to three euros in economic returns, including job creation, increased productivity and lower energy costs.[99]

Building decarbonisation presents significant innovation potential. The EU has the opportunity to become a leader in the development of new technologies and solutions to overcome the challenges of decarbonising its building stock. Key areas of innovation include:

KEY AREAS OF INNOVATION

- **Industrial processes and technologies** to speed up renovations, enhance compatibility of new technologies with existing buildings and maximise energy savings per renovation.
- **Business models and financing solutions** for renovation and the rapid deployment of clean heating and cooling technologies.
- **Data-driven tools** to capture, monitor and assess technical, social and environmental impacts, improving decision-making and policy effectiveness.
- **Low-carbon and circular materials** to reduce emissions throughout the building life cycle, including increased use of secondary materials and advancing sustainable construction practices.

Capitalising on these opportunities will not only help the EU achieve its climate targets, but also advance its competitiveness in the global green economy. By fostering innovation, the EU can create a resilient, zero-emission building stock, while ensuring inclusive and equitable outcomes for all communities.

However, delaying action comes at a high cost. Without immediate and comprehensive renovations, the EU risks missing out on substantial economic opportunities and the potential to lead in global energy efficiency markets, low-carbon construction and renewable heating. A failure to act now will not only compromise Europe's climate goals but also jeopardise its competitive position, increasing energy dependency and stifling job creation and productivity growth. The time to act is now, to ensure the EU remains at the forefront of global innovation and reaps the full economic and environmental benefits of building decarbonisation.

[97] https://iea.blob.core.windows.net/assets/c3de5e13-26e8-4e52-8a67-b97aba17f0a2/Sustainable_Recovery.pdf
[98] https://ec.europa.eu/commission/presscorner/detail/en/qanda_20_1836
[99] https://euase.net/the-biggest-innovation-in-energy-is-efficiency/

EPBD IMPLEMENTATION:

A STRATEGIC PATHWAY TO ADVANCE BUILDING DECARBONISATION AND SOCIAL EQUITY

RIGOROUS EPBD IMPLEMENTATION IS CRUCIAL TO DRIVE TRANSFORMATION

Timely and effective implementation of the EPBD is critical to meet the EU's climate goals, driving the transition to zero-emission buildings and decarbonising the buildings sector by 2050.

FOCUS ON WORST-PERFORMING BUILDINGS FIRST

Renovating the least energy-efficient buildings is crucial to achieving the largest energy savings. The renovation of the 43% worst-performing residential buildings must account for at least 55% of the required reductions in primary energy use by 2030.

PRIORITISE VULNERABLE COMMUNITIES

Successful EPBD implementation hinges on ensuring that vulnerable communities, including those facing energy poverty, benefit from accessible financial support and protections throughout the decarbonisation process.

RENEWABLE ENERGY AND ENERGY EFFICIENCY GO HAND-IN-HAND

The share of renewable energy in heating and cooling in the EU is growing at only a quarter of the required pace, and the reduction of the final energy is happening at less than half of the required pace. A combined approach of boosting renewables and improving energy efficiency is key to meeting the EPBD's decarbonisation targets.

INVESTMENT MUST RAMP UP IMMEDIATELY

Investment in renovation was only 65% of what was needed between 2015 and 2022 to stay on track for climate neutrality. To catch up, renovation investment must increase substantially, prioritising deep renovations and providing financial support for vulnerable households.

THE RECAST OF THE EPBD PRESENTS A CRITICAL OPPORTUNITY FOR THE EUROPEAN UNION TO ACCELERATE ITS BUILDING DECARBONISATION AGENDA, LAYING OUT A FRAMEWORK FOR ACHIEVING CARBON NEUTRALITY BY 2050.

Key updates in the recast address whole-life carbon standards, minimum energy performance standards (MEPS), a trajectory for the progressive renovation of the residential building stock and incentives to decarbonise the heating and cooling sectors. If these provisions are implemented with a dual focus on environmental and social impact, the EPBD can support an inclusive transition that benefits vulnerable communities, mitigates energy poverty, and promotes resilience and prosperity across Europe.

This chapter breaks down key provisions of the EPBD recast, aligning them with the EU BCT indicators to outline priority actions. Each section provides insights on:

- **Closing the decarbonisation gap** through accelerated CO_2 emissions reduction, final energy savings and renewable energy integration.
- **Increasing investments in renovation** to meet climate and social goals, ensuring that benefits reach all EU citizens.
- **Promoting social fairness**, ensuring that ambitious building standards support health, comfort and energy affordability across all demographics.

The following sections provide an in-depth look at the EPBD provisions and strategic recommendations to enhance national implementation efforts and maximise the directive's impact on both climate and social equity outcomes.

I. WHAT IS IN THE EPBD RECAST AND WHY IS THE EU BCT RELEVANT?

The EPBD recast officially published in May 2024 introduced and modified multiple provisions addressing building decarbonisation in the EU.[100] Key elements include:

- An updated standard for new buildings, including whole-life carbon emissions provisions
- Minimum energy performance standards to renovate the worst-performing non-residential buildings
- A mandatory trajectory for the progressive renovation of the residential building stock
- A zero-emission 2050 vision for the building stock, underpinned by strong national building renovation plans and provisions to decarbonise heating and cooling
- A more strategic and impactful information, advisory and financial framework
- A focus on social fairness, for both mandatory requirements and incentives.

Timely and strong EPBD implementation will accelerate building decarbonisation in the EU. For maximum effectiveness in planning EPBD implementation, it is important to have a clear picture of the building stock starting point, as shown by the EU BCT. This will help prioritise provisions which will bring results in areas where they are most needed, and understand the scale of the measures needed to get back on track, going beyond legal minimum requirements to compensate for the unrealised progress (as summarised in Table 7).

Table 7: Summary of the status of the EU BCT main indicators

		Indicator	Assessment
1		**CO_2 emissions from energy use in buildings for households and services**	**OFF TRACK**
2		**Final energy consumption in households and services**	**FAR OFF TRACK**
3		**Renewable energy share**	**FAR OFF TRACK**
4		**Cumulative investment in renovation**	**OFF TRACK**

[100] See our previous publication The EPBD decrypted for a detailed analysis and description of the provisions and opportunities

II. OPPORTUNITIES IN THE EPBD TO CLOSE THE DECARBONISATION GAP

Table 8 summarises the provisions from the EPBD recast that relate directly to the EU BCT indicators.

Table 8: Provisions identified in the EPBD recast linked to the EU BCT indicators

Art.	Provisions
Art. 7 New buildings	• New buildings to be zero-emission as of 2030 • Life-cycle global warming potential (GWP) to be calculated and disclosed in EPCs • Roadmaps introducing limit values on life-cycle GWP of all new buildings and targets for new buildings from 2030
Art. 9 Minimum energy performance standards for non-residential buildings and trajectories for progressive renovation of the residential building stock	• Minimum energy performance standards for non-residential buildings • A trajectory for the progressive renovation of residential buildings to reduce the average primary energy use of the entire residential building stock, including a sub-target of at least 55% of the reduction coming from the 43% worst-performing buildings • Removal of non-economic barriers, including split incentives • Assessing and addressing barriers related to upfront costs of renovations • Incentivising deep renovation and staged deep renovation with higher financial, fiscal, administrative and technical support
Art. 10 Solar energy in buildings	• Ensuring the deployment of suitable solar energy installations • Technical and financial support for the deployment of solar energy in buildings
Art. 11 Zero-emission buildings	• Maximum threshold for operational greenhouse gas emissions of zero-emission buildings • Maximum threshold for energy demand of zero-emission buildings • New or renovated zero-emission buildings must be supplied by energy from renewable sources generated on-site or nearby, from a renewable energy community, an efficient district heating and cooling system, or from carbon-free sources
Art. 13 Technical building systems	• New incentives and funding to encourage the switch from fossil-fuel-based heating and cooling systems to non-fossil-fuel-based heating and cooling systems
Art. 17 Financial incentives, skills and market barriers	• Main requirements for Member States to provide financing, support measures and other instruments to deliver the necessary investments to transform their buildings into a zero-emission stock by 2050 • From 1 January 2025, Member States shall not provide any financial incentives for the installation of stand-alone boilers powered by fossil fuels
Annex II Template for the national building renovation plans	• Template for the national building renovation plans including targets for different provisions, expected wider benefits, policy and measures to fulfil diverse provisions, and many other cross-cutting details • Policies for the phasing out of fossil fuels in heating and cooling with a view to phase-out fossil fuel boilers by 2040 to be described in the national building renovation plans

HOW TO REDUCE CO_2 EMISSIONS FROM ENERGY USE IN BUILDINGS

During 2015-2022, the reduction of CO_2 emissions in buildings in the EU occurred at only half of the required pace. Comparing the progress against the reference path towards climate neutrality, during 2015-2022 around 367 Mt of additional CO_2 was released due to slow progress. The rate at which CO_2 emissions decrease should at least double to get this indicator back on track.

To quickly reduce CO_2 emissions in buildings, Member States should accelerate the adoption of zero-emission standards across all buildings, leverage renovation to cut emissions, and set clear life-cycle carbon limits to support national climate goals.

Diverse provisions introduced in EPBD Articles 7, 9 and 11 bring opportunities to speed up progress. Related EPBD provisions and additional recommendations are summarised in Table 9.

Table 9: EPBD provisions and recommendations for effective implementation to reduce CO_2 emissions from energy use in buildings for households and services

EPBD provisions	Recommendations for effective implementation
Articles 7 and 11 introduce the concept of zero-emission buildings to become the standard for new buildings.	Member States should adopt the Zero-Emission Building standard for new buildings early in the transposition process to ensure it is communicated effectively to stakeholders. This will enable smooth compliance for buildings constructed as of 2028/2030, allowing them to meet ZEB standardss with ease. To maximise impact, these standards should be extended to existing buildings being renovated. This approach will broaden CO_2 emissions reductions beyond new builds.
Under provisions in Article 9 for the renovation of the building stock, Member States have the possibility to use indicators related to operational greenhouse gas emissions in $kgCO_2eq/(m^2y)$.	This option should be leveraged to ensure that renovation activities are explicitly linked to reducing emissions and achieving national climate targets.
The national roadmaps under Article 7(5)[101] require setting limit values for the total cumulative life-cycle GWP of new buildings, aiming to progressively reduce the environmental impact of buildings.	Member States should establish clear guidelines for measuring, disclosing and limiting the life-cycle GWP of new buildings , strictly adhering to the EPBD schedule of 01/01/2027. Member States should take inspiration from proven approaches of frontrunner countries and base their guidelines on the EU methodological framework as much as possible to ensure rapid up take, consistent impact reduction and comparability across the EU.

[101] The EU BCT monitors only emissions related to the operation of buildings due to the lack of availability of data for emissions in other stages of the life cycle of the building stock in the EU. We include the provisions related to EPBD Art.7 since these can lead to better monitoring of life-cycle GWP and emissions.

HOW TO REDUCE FINAL ENERGY CONSUMPTION IN HOUSEHOLDS AND SERVICES

During 2015-2022, the final energy consumption in households and services was reduced at less than half of the required pace, decreasing by only 2.8% during that period. This indicator is far off track.

Member States should ensure robust MEPS for the non-residential sector, and that the trajectory for the progressive renovation of residential buildings prioritises the worst-performing buildings and vulnerable groups, notably through national MEPS.

EPBD Articles 7, 9 and 11 bring opportunities to accelerate the reduction of final energy consumption of the building stock in the EU, as summarised in Table 10.

Table 10: EPBD provisions and recommendations for effective implementation to reduce the final energy consumption in households and services

EPBD provisions	Recommendations for effective implementation
Provisions in Article 9(1) require a MEPS scheme for non-residential buildings.	Member States should carefully consider the implications of exempting certain buildings from the MEPS obligation. Neglecting a large portion of the building stock would jeopardise the energy savings potential of this provision.
Provisions in Article 9(2) require the definition of a trajectory for the progressive renovation of the residential building stock.	The improvement of the energy performance of the residential building stock is much delayed compared to existing objectives. The EU BCT shows that, to get back on track towards climate neutrality, final energy consumption in households should decrease by 16.7% by 2030 compared to 2022. Member States should consider this alongside the milestones defined by the EPBD in terms of average primary energy use.
The trajectory for the progressive renovation of the residential building stock in Article 9(2) is based on an average primary energy use metric.	Besides switching the energy supply of buildings from fossil fuel to renewable options, Member States should deploy the right renovation mechanisms to ensure that energy efficiency measures are prioritised, in order to avoid cases where renewable energy systems are installed in inefficient buildings.
Under provisions in Article 9(2), Member States must achieve at least 55% of the decrease of the average primary energy use of the residential building stock through the renovation of the 43% worst-performing buildings.	To tap into the biggest energy savings potential, Member States should prioritise the renovation of very worst-performing buildings. The renovation of very worst-performing buildings has critical social repercussions, since very often these buildings are occupied by vulnerable groups and people in energy poverty. Prioritising the renovation of these buildings can translate not only into significant reduction in the final energy consumption but also into multiple social benefits. Member States should aim to achieve more than 55% of savings through these renovations.

HOW TO INCREASE THE RENEWABLE ENERGY SHARE

During 2015-2022, the renewable energy share indicator increased by 6.3 percentage points, only a third of the required value. This is mainly due to the lack of progress in renewable energy for heating and cooling: the share of renewables for this sector is growing at only a quarter of the required pace.

Member States should focus on decarbonising heating and cooling and put Energy Efficiency First to accelerate fossil fuel phase-out by 2040.

The EPBD recast brings opportunities to increase the use of renewable energies for buildings in diverse ways in Articles 9, 10, 13, 17, and Annex II. EPBD provisions and additional recommendations are summarised in Table 11.

Table 11: EPBD provisions and recommendations for effective implementation to increase the renewable energy share

EPBD provisions	Recommendations for effective implementation
In Article 9, average primary energy use is the indicator used to express the requirement on the trajectory for the progressive renovation of the residential building stock. This means both decarbonisation of the energy supply and improvement to the building envelope are possible actions contributing to achieving the Article 9 objective. For non-residential buildings, Member States can opt to use primary energy use as the indicator for the MEPS scheme as well.	In both cases, Member States should consider using complementary indicators, besides primary energy use, to monitor the non-renewable and renewable share of the building energy supply, especially for heating and cooling which need a boost to bridge the gap towards climate neutrality.
Article 10 requires Member States to ensure the deployment of suitable solar energy installations.	Given that the growth rate of renewable for heating and cooling must quadruple to get on track with climate neutrality, Member States should provide technical and financial support for other renewable energy technologies when technically, economically and practically feasible. Prioritising renewables other than biofuel technologies, which currently dominate renewable space heating.
Different provisions in Article 13, Article 17 and Annex II focus on the energy supply for heating and cooling.	These provisions should be leveraged but their implementation should be combined with the application of the "energy efficiency first" principle to prevent sub-optimal renewable installations in inefficient buildings, optimising investments.

According to the template for the national roadmaps under Annex II, Member States should consider the objective of a phase-out of fossil fuel boilers by 2040.	Member States should make full use of the possibility given by the EPBD to not allow the installation of new fossil fuel heating systems, whether in new buildings or as replacements in existing buildings, by setting requirements on heat generators based on either emissions or the type of fuel used.
Member States shall describe the policies to achieve the phase-out of fossil fuels by 2040, with "a view to a complete phasing out of fossil fuel boilers by 2040".	The MIX scenario includes total coverage of heating and cooling by renewables by 2050. The growth of renewables for heating and cooling needs to more than quadruple to fulfil the objectives of the EPBD. It's also important to consider that primary solid biofuels make up most of the renewable energy for space heating, representing 86% of renewables for space heating in households in the EU.[102]

[102] https://www.bpie.eu/publication/eu-buildings-climate-tracker-a-call-for-faster-and-bolder-action/

HOW TO INCREASE THE INVESTMENT IN RENOVATION

During 2015-2022, investment in renovation was less than two thirds of what's required to be on track towards climate neutrality.

To get back on track, investment in renovation should increase not only to cover the EPBD requirements but also to balance the unrealised investment until 2022.

Member States should promote specific financial support for deep renovations, monitor social impacts and prioritise accessible funding for vulnerable groups to drive equitable progress toward zero-emission buildings.

EPBD Article 17 introduces the main provisions in relation to the financing framework to support the decarbonisation of the building stock. Related EPBD provisions and additional recommendations are summarised in Table 12.

Table 12: EPBD provisions and recommendations for effective implementation to increase investment in renovation

EPBD provisions	Recommendations for effective implementation
The EPBD highlights the role of deep renovation and staged deep renovation by requiring Member States to incentivise these through specific financial mechanisms.	Member States should align the higher financial support supporting (staged) deep renovations to the execution of renovation requirements (e.g. MEPS, trajectory) in order to incentivise renovation projects to go beyond minimum requirements, avoid lock-in effects and make best use of the financial resources available.
Article 9(4e) requires the monitoring of social impacts of financial tools.	Even though this provision is outlined in the context of MEPS, Member States should monitor social impacts and other benefits of the financial support in a broader range of activities (e.g. the renovation of the worst-performing buildings as part of the trajectory for the residential sector). This can enable the collection of data to support strategies to quantify and integrate these benefits into improved renovation policies and funding mechanisms. The data collected can also be a starting point to understand better how to address energy poverty issues, how to improve the health of the building stock and its users, and how to harness the full potential of the investments in renovation.
Member States must implement financial mechanisms that remove barriers such as upfront costs and split incentives. This is also linked to the provision on ensuring that information about funding and financial tools is available and easily accessible. Member States must pay special attention to financial support for vulnerable households and people affected by energy poverty.	Member States should ensure that available and new financial resources are fairly distributed. This is crucial to achieve the objective of zero-emission buildings while ensuring benefits reach all communities.

III. IMPLEMENTING THE EPBD: THE SOCIAL IMPACT OF BUILDING DECARBONISATION

The slow progress in decarbonising buildings in the EU is not only obstructing climate goals but also negatively impacting the people who use and occupy buildings.

Actions to accelerate decarbonisation under the EPBD recast or other initiatives should take a holistic approach while considering the consequences of delays on each dimension (climate, economy, society).

The EPBD recast pays attention to social aspects through multiple provisions, as summarised below:

- The mandatory enabling framework to provide financial support and technical assistance especially to vulnerable households, people affected by energy poverty and people living in social housing presented in the context of MEPS, if applied to the residential sector (Art. 9)
- The requirement to monitor social impacts in the context of MEPS (Art. 9)
- The emphasis on renovating the worst-performing residential buildings, which are often occupied by people in energy poverty (Art. 9)
- The recommendation to consider environmental and health externalities in the cost-optimality methodology and to include information in renovation passports about wider benefits related to health and comfort, indoor environmental quality and the improved adaptive capacity of the building to climate change (Annexes VII, VIII)
- The requirement to address in new buildings and buildings undergoing major renovations the issues of optimal indoor environmental quality, adaptation to climate change, fire safety, risks related to intense seismic activity and accessibility for people with disabilities (Recital 45, Art. 7)
- The requirement to assess and address barriers related to upfront costs of renovations (Art. 17)
- The requirement to ensure that information about available funding and financial tools is made available to the public in an easily accessible and transparent manner, which could enable vulnerable groups to access information and the respective tools (Art. 17)
- Specific safeguards to protect citizens, particularly tenants, such as imposing caps on excessive rent increases or providing rent support (Art. 17)
- The inclusion of key indicators related to energy poverty in the national building renovation plans (Annex II)
- The requirement to ensure that EPCs and renovation passports are affordable for all, especially vulnerable households (Art. 12, Art. 19).

Even though some of the key socially fair provisions of the EPBD recast are presented in the context of specific mechanisms such as MEPS schemes, Member States should pursue its recommendations and requirements in the context of other renovation and decarbonisation measures. For example, monitoring the social impacts should not be limited to MEPS schemes, and information on benefits like health, comfort and climate resilience should not be confined to renovation passports. Extending these elements and approaches across all national policies transposing the EPBD will unlock the full social potential of decarbonisation actions.

Moreover, some crucial social aspects, like social inclusion, affordable housing and gender equality, may not be explicitly addressed in the EPBD recast but are essential for ensuring an equitable transition. Cities across the EU prioritise social inclusion and affordable housing,[103] while recent research[104] recommends gender-responsive strategies and explicit gender equality goals in the implementation of the Directive.

[103] https://monitor.eurocities.eu/eurocities-pulse-mayors-survey/
[104] https://www.eceee.org/library/conference_proceedings/eceee_Summer_Studies/2024/3-policy-finance-and-governance/towards-gender-responsive-eu-energy-legislative-acts-for-the-buildings-sector-transformation-by-a-structured-gender-impact-assessment/

CONCLUSION & CALL TO ACTION

IT'S TIME FOR EUROPE TO ADVANCE TRANSFORMATION OF THE BUILDING STOCK FOR A RESILIENT AND EQUITABLE SOCIETY.

The decarbonisation of Europe's building stock is not just a technical challenge; it is an urgent opportunity to unlock long-term social, economic and environmental benefits. However, the latest results from the European Buildings Climate Tracker show that the EU is significantly off track to meet its climate neutrality goals. Key indicators reveal a troubling reality:

- **CO_2 emissions** from building energy use have decreased by just **14.7%** since 2015, far below the required **27.9%** reduction by 2022. This shortfall has resulted in an additional **367 million tonnes of CO_2** being emitted into the atmosphere, equivalent to nearly a year's worth of emissions from the entire EU building stock.
- **Final energy consumption** in buildings has dropped by only **2.8%**, while the target was a **6.5%** reduction. **The reduction is happening at less than half of the required pace.**
- **Renewable energy share** has increased by only **6.3%,** far below the target of an **18% increase** by 2022, primarily due to slow adoption of renewable heating and cooling systems. Share of renewables for heating and cooling must quadruple.
- **Investment in building renovation** remains a major barrier, with investments reaching only **60.6%** of the required target for 2015-2022. This underinvestment will make future renovations more challenging and likely more expensive.

At this pace, the EU will fail to meet its 2030 and 2050 climate goals, and the decarbonisation gap continues to widen. Alarmingly, this gap has more than doubled since 2016, reflecting a lack of consistent and strategic action. These figures paint a stark picture of inadequate progress, underscoring the urgency for transformative action in the buildings sector.

The consequences of inaction are not only environmental but also deeply social. Buildings that emit fewer greenhouse gases improve health outcomes, reduce energy poverty and enhance economic resilience. Yet, as of 2022:

9.3% **of the EU population** is affected by energy poverty

+

15.5% **of EU residents** live in poor building conditions that increase the risk of respiratory issues, heat stress and mental health challenges.

Efficient, carbon neutral buildings can significantly reduce healthcare costs and improve overall quality of life. Moreover, the green building sector could create significant employment opportunities, driving innovation and economic growth.

SLOW TRANSFORMATION OF BUILDINGS IS NOT JUST A CLIMATE PROBLEM; IT'S A PEOPLE PROBLEM

Decarbonising buildings provides a direct avenue to improve public health, reduce financial stress and foster social equity, particularly for vulnerable communities. Rising energy costs have put immense pressure on low-income households. Households now face:

Energy bills

24%

higher than pre-2020 averages, making it even more crucial to improve energy performance in buildings.

Building decarbonisation represents a unique opportunity to address these challenges, improve public health outcomes and drive sustainable job creation.

MEMBER STATES: IMPLEMENT THE EPBD QUICKLY AND EFFECTIVELY

Recent legislative milestones, especially the **2024 recast of the EPBD**, provide the tools necessary for Member States to accelerate building decarbonisation and reduce emissions. The EPBD sets out an updated standard for the construction of new buildings, as well as requirements for the renovation of the worst performing buildings, with a view to achieve a zero emission building stock by 2050. However, these policies need strong, rapid implementation.

To fully leverage the potential of the EPBD, Member States must prioritise effective action, focusing on upgrading the energy performance of buildings and addressing social impacts by prioritising vulnerable communities. By using and improving existing building inventories and data, Member States can direct investments where they are most needed, ensuring that the transition to decarbonised buildings benefits everyone, especially those most affected by energy poverty.

THE EUROPEAN COMMISSION: TAKE BOLD LEADERSHIP ON BUILDINGS

With a new EU policy cycle approaching, the **European Commission** must take bold leadership to ensure that decarbonisation of the buildings sector becomes central to Europe's strategic agenda. Too often, the potential of building decarbonisation to address multiple challenges – climate change, energy security, public health, and job creation – has been underestimated. As Europe navigates complex geopolitical and environmental challenges, the Commission has the opportunity to foster resilience, inclusivity and prosperity by embedding building decarbonisation into its long-term economic strategy.

The Commission must ensure that the EPBD is fully implemented and supported with the necessary resources, innovation incentives and enforcement mechanisms. Strong leadership will accelerate the transition, helping Europe secure its position as a global leader in sustainable and inclusive growth.

THE EU CANNOT AFFORD TO DELAY ACTION ANY LONGER

The evidence is overwhelming: the EU cannot afford to delay action any longer. With buildings representing one of the largest sources of emissions, rapid transformation of this sector is essential to meet EU climate targets and deliver wide-reaching societal benefits. From reducing energy poverty to creating millions of green jobs, the opportunities for positive change are vast. Inaction or delays in decarbonising buildings not only hinder our progress on climate but also undermine broader strategic objectives, preventing us from fully realising the potential of our climate, economic, and social goals.

By committing to urgent action now, the EU can achieve its climate targets, enhance public health, and strengthen its competitiveness on the global stage.

ANNEXES

ANNEX I – INDICATORS IN NORMALISED VALUES

Figure 34 to Figure 44 present the indicators on the normalised scale. For each, an assessment is given for the gap between the 2022 status (last year of normalised values so far) and the reference path. The assessment is based on the criteria summarised in Table 13. **This analysis help identify critical indicators with the least progress until 2022, for which dedicated efforts are required to bridge the gap and bring them back on track.**

Table 13: EU BCT indicators status assessment

Assessment	Indicator	Gap between the last year of observations and the target value for that year on the normalised scale
ON TRACK		less than 5%
ALMOST ON TRACK		between 5 and 15%
OFF TRACK		between 15 and 50%
FAR OFF TRACK		more than 50%

Figure 34: CO_2 emissions from energy use in buildings for households and services 2015-2022, normalised

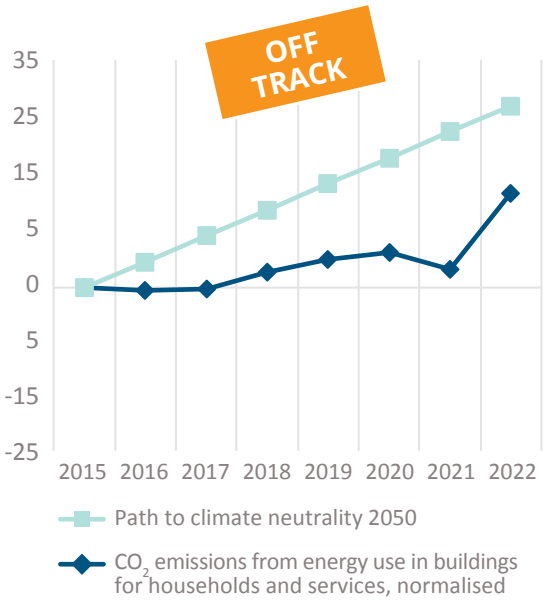


Figure 35: CO_2 emissions from energy use in households 2015-2022, normalised

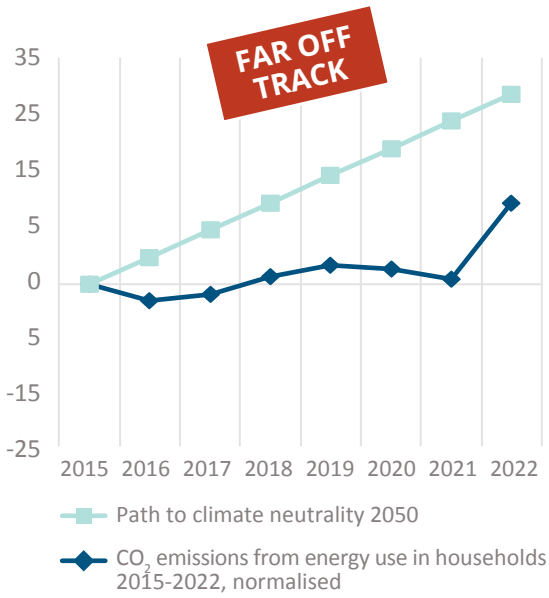


Figure 36: CO_2 emissions from energy use in service-sector buildings 2015-2022, normalised

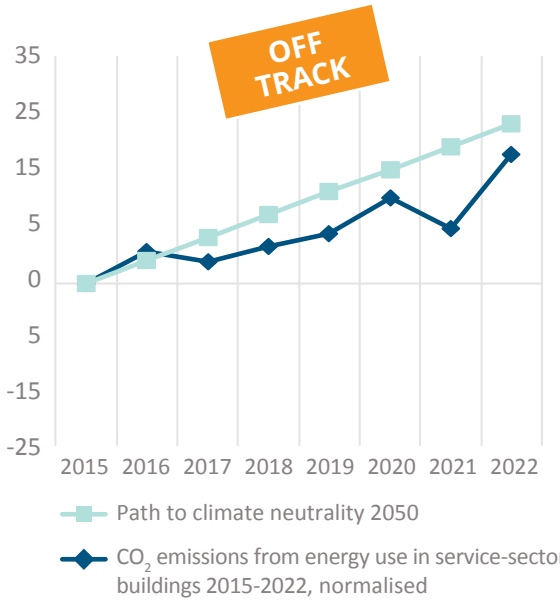


Figure 37: Final energy consumption in households and services 2015-2022, normalised

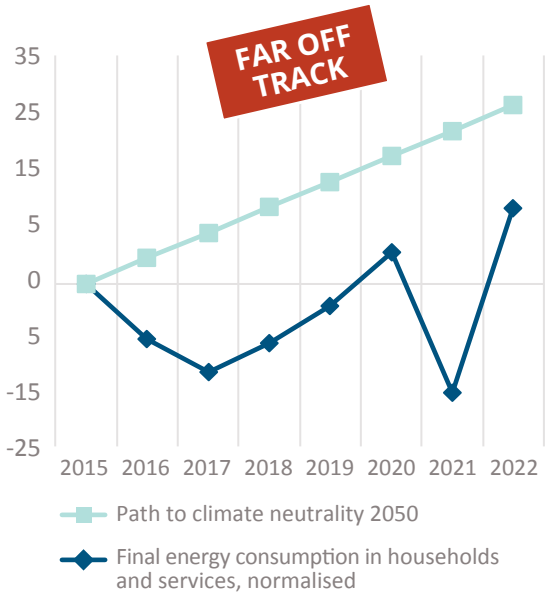


Figure 38: Final energy consumption in households 2015-2022, normalised

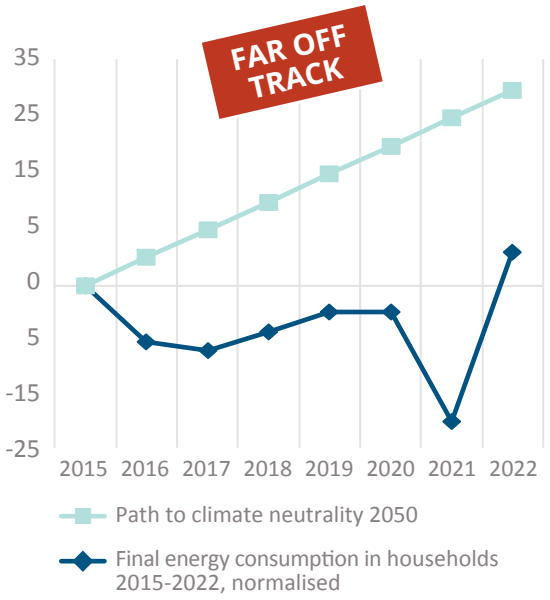


Figure 39: Final energy consumption in service-sector buildings 2015-2022, normalised

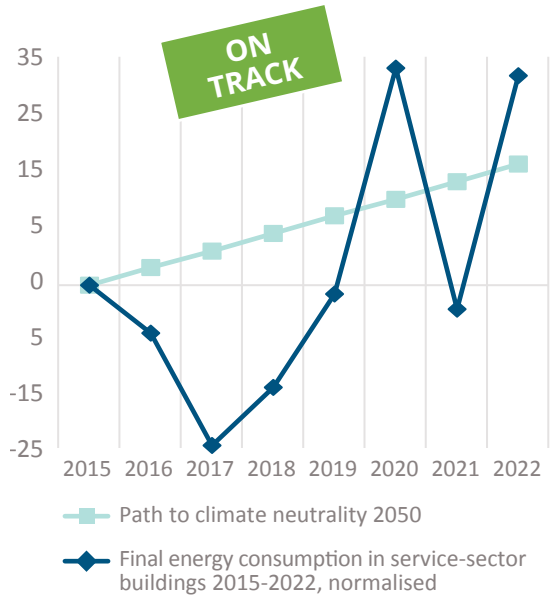


Figure 40: Renewable energy share 2015-2022, normalised

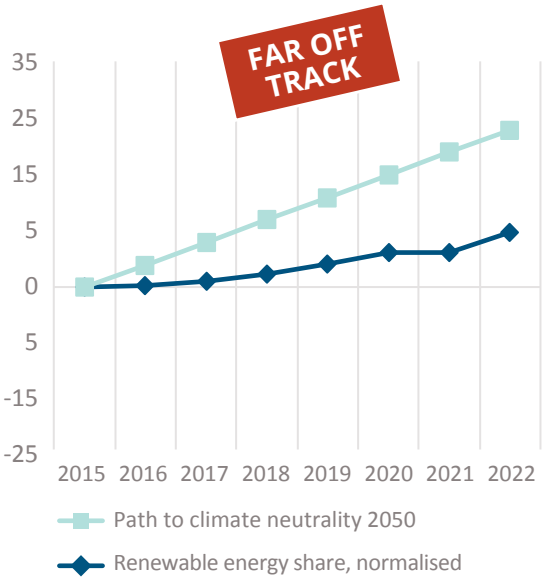


Figure 41: Share of energy from renewable sources for heating and cooling 2015-2022, normalised

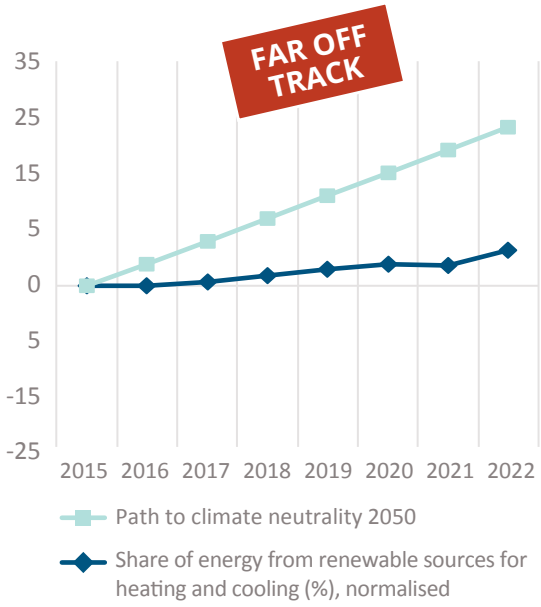


Figure 42: Share of energy from renewable sources in gross electricity consumption 2015-2022, normalised

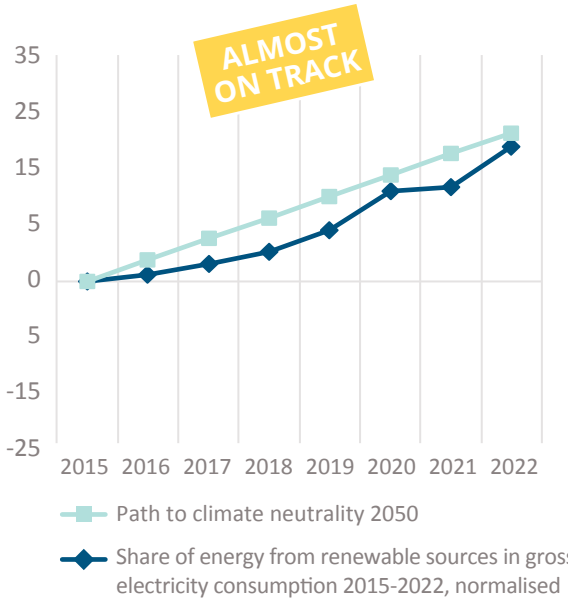
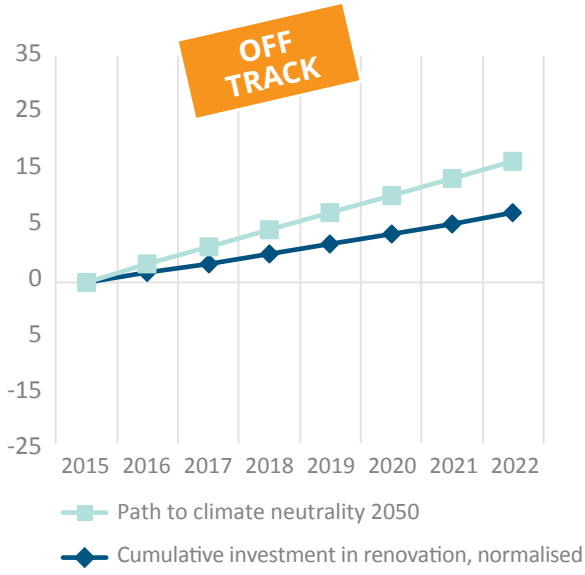


Figure 43: Cumulative investment in renovation 2015-2022, normalised



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