

REGULATORY ASSISTANCE PROJECT

Fit for 55: Aligning European policy for decarbonised heat in buildings

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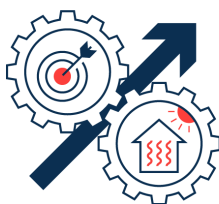


Summary

Heating is still largely fossil fuelled, and the decarbonisation of heat is lagging behind. The current European policy framework is not adequate to drive the decarbonisation of heat in line with 2030 and 2050 objectives.¹

Recommendations

To increase ambition and align objectives:



Significantly increase ambition to align heat decarbonisation framework with climate needs.



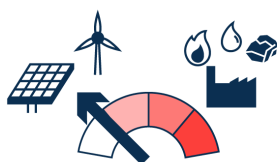
Swiftly phase out fossil fuels for heat.



Phase out inefficient buildings using climate-aligned buildings standards, requirements to renovate and targeted subsidies.



Make sector integration practical and tangible.



Align price signals and incentives with the objective of heat decarbonisation.

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Introduction

To meet European and national climate targets, greenhouse gas (GHG) emissions from buildings must be reduced to zero by 2050 or earlier. According to the European Commission, the building sector must reduce emissions by 60% compared to 2015 levels to meet the 55% emissions-reduction goal by 2030.² To put this challenge into context: Buildings emissions fell by just 18% between 2005 and 2017.³ Emissions will need to fall at almost three times this rate to deliver the 60% reduction in 2030.

Space and hot water heating account for most of the energy used and emissions from buildings – in residential buildings 68% of energy use is for space heating.⁴ There are two main approaches for reducing emissions from heating:

- Reducing energy demand for heating through thermal energy efficiency and increased heating system performance.
- Decarbonising the heat supply by switching away from fossil fuels to clean heating.

Success will require a combination of both.

To reach the 2030 target, the European Commission foresees final energy consumption in the residential sector falling by 22% to 25% and in the services sector by 6% to 7% by 2030, relative to 2005.⁵ This will necessitate changes to the fuels used for heating. In 2015, coal, oil and fossil gas accounted for 48% of final energy consumption in residential buildings. In the Commission's scenarios for reaching the 2030 target, this share is halved by 2030, with coal all but disappearing from the mix, oil consumption falling by 80% to 84% and fossil gas by 37% to 48%.⁶

Although this is a challenge, reducing emissions much more quickly provides an opportunity to create jobs and deliver air quality and comfort benefits. The technologies to fully decarbonise the building stock already exist and can be scaled today. Most existing buildings will need to undergo a renovation that reduces energy demand⁷ through fabric upgrades and system efficiency, and introduces heat storage and demand flexibility. These buildings will then be served with renewable forms of electricity and heat, with the heat largely supplied via individual heat pumps and district heating systems.⁸

² European Commission. (2020a, September). Impact assessment accompanying the document COM(2020) 562 final: Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – Stepping up Europe's 2030 climate ambition. Investing in a climate-neutral future for the benefit of our people [Commission staff working document]. SWD(2020) 176 final. Part 1. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52020SC0176>

³ European Environment Agency. (2019). Greenhouse gas emissions by aggregated sector [Data set]. <https://www.eea.europa.eu/data-and-maps/daviz/ghg-emissions-by-aggregated-sector-5#tab-dashboard-02>

⁴ European Commission. (n.d.). Energy use in buildings. https://ec.europa.eu/energy/eu-buildings-factsheets-topics-tree/energy-use-buildings_en#:~:text=Space%20heating%20is%20the%20most,50%25%20in%20Spain%20or%20Slovenia

⁵ European Commission, 2020a.

⁶ European Commission, 2020a.

⁷ By energy demand, we mean energy consumption, i.e., the units of energy consumed.

⁸ Paardekooper, S., Lund, R. S., Mathiesen, B. V., Chang, M., Petersen, U. R., Grundahl, L., David, A., Dahlbæk, J., Kapetanakis, I. A., Lund, H., Bertelsen, N., Hansen, K., Drysdale, D. W., & Persson, U. (2018). *Heat Roadmap Europe 4: Quantifying the Impact of Low-Carbon Heating and Cooling Roadmaps*. Aalborg Universitetsforlag. <https://vbn.aau.dk/en/publications/heat-roadmap-europe-4-quantifying-the-impact-of-low-carbon-heatin>

In the past, heat decarbonisation has been delivered within a fragmented European policy framework that operated in silos. As part of the ‘Fit for 55’ package under the European Green Deal, several key directives are currently under review. This offers a unique opportunity to align European policy on heat with the new climate goals and develop a coherent framework for heat decarbonisation.

The role of European policy is to set out the destination and provide the right framework and signals to the relevant decision-makers to broadly align the various and disparate plans, decisions and investments.

In this policy brief we set out key areas where revisions are both possible and needed. We start by reviewing the existing EU heat policy framework, before we provide a number of recommendations.

Current EU heat policy framework

The European policy framework as it currently stands fails to effectively support the ability of decision-makers to pursue integrated heat decarbonisation. This structure is a result of several decades of disjointed policymaking during which the different elements relevant for heat decarbonisation were addressed in isolation, an approach that is no longer fit for purpose.

The provisions relevant to heat decarbonisation are fragmented and distributed across a range of directives. The requirements on reducing energy demand and improving energy performance in buildings are not well integrated with those for promoting renewable heat. In addition, the framework is only beginning to address the interaction between buildings and the power system.

The main relevant elements of the EU policy framework reside in four directives:

- The **Energy Performance of Buildings Directive (EPBD)** sets technical calculation methods and standards for buildings and system performance.
- The **Ecodesign Directive** sets minimum efficiency standards for individual heating technologies.
- The **Energy Efficiency Directive (EED)** and the **Renewable Energy Directive (RED)**, in combination, require Member States to draw up heating and cooling strategies and indicative targets for renewable heating and district heating.

For each of the directives, we set out the provisions on heating:

Energy Performance of Buildings Directive

- Requires Member States to draw up long-term renovation strategies to support the renovation needed to achieve a highly energy-efficient and decarbonised building stock by 2050, facilitating the cost-effective transformation of existing buildings into nearly-zero-energy buildings. They must include indicative milestones for 2030 and 2040 (Article 2A).
- Establishes a methodology for calculating the performance of buildings (fabric and systems) (Article 3 and Annex 1).

- Requires minimum building performance levels to be set (Article 4) based on a cost-optimality calculation (Article 5). Also obliges Member States to set system requirements for technical systems in existing buildings: performance, installation, dimensioning, adjustment and control; and requires appropriate self-regulating thermostats (Article 8).
- Requires a minimum performance level to be achieved upon major renovation (Article 7).
- Requires new buildings to be nearly-zero-energy buildings from 2021 (Article 9).
- Introduces an optional European smart readiness rating scheme based on the capabilities of a building to adapt its operation to the needs of the occupant and the grid (Article 8).

Ecodesign Directive

- Requires energy-related products – including space and water heaters – to meet specified minimum levels of energy and environmental performance.

Energy Efficiency Directive

- Requires Member States to carry out an assessment of the potential for high-efficiency cogeneration and efficient district heating and cooling (Article 14).
- Requires Member States to deliver a minimum of 0.8% annual final energy savings through policy measures. Although this provision does not specifically target the buildings sector, 42% of savings reported by Member States are planned directly within it. This percentage is in effect an underestimation, given that the cross-cutting measures that make up a further 44% of savings will benefit the buildings sector at least in part (Article 7).⁹

Renewable Energy Directive

- Requires Member States to introduce measures in their building regulations and codes to increase the share of renewable energy in the buildings sector, and to require minimum levels of renewable energy in new buildings and in existing buildings that are subject to major renovation (Article 15).
- Sets an indicative target for Member States to increase the share of renewable energy for heating and cooling by 1.3% of final energy consumption annually from 2021 (Article 23).
- Requires information on the energy performance and the share of renewable energy in district heating and cooling systems to be made available to end users. End users must be allowed to disconnect from inefficient district heating systems that do not have a plan to modernise by 2025, to adopt more efficient or renewable sources (Article 24).

⁹ Forster, D., Kaar, A. L., Rosenow, J., Leguijt, C., & Pató, Z. (2016). *Study evaluating progress in the implementation of Article 7 of the Energy Efficiency Directive. Final Report for DG Energy*. Ricardo Energy & Environment.
https://ec.europa.eu/energy/sites/ener/files/documents/final_report_evaluation_on_implementation_art_7_eed.pdf

EU climate legislation also puts a cap on GHG emissions, which drives building decarbonisation:

- The EU Emissions Trading System covers emissions from large fossil-fuelled district heating and electric heating schemes, as well as from the electricity used by heat pumps. It sets a cap on these emissions and creates a carbon price in these sectors.
- Member States' 'effort sharing' targets cap the remaining buildings' emissions. This means that Member States are responsible for addressing emissions from domestic fossil-fuelled heating systems.

Energy market legislation (electricity and gas) also affects building decarbonisation. The Electricity Directive and Electricity Regulation include a number of provisions requiring market actors to enact the Efficiency First principle.¹⁰ The Commission will publish further implementation guidelines.¹¹ The Commission is planning to revise the Gas Directive and the Gas Regulation – a hydrogen and decarbonised gas market package – to enable a market for renewable and low-carbon hydrogen, and to facilitate the injection, transmission, distribution and trading of renewable and low-carbon gases in the gas grids.¹²

In addition to these existing provisions, the European Commission's Renovation Wave strategy, launched in the autumn of 2020, proposes to introduce provisions to strengthen measures to decarbonise heat. These include the introduction of mandatory minimum energy performance standards for existing buildings (in the EPBD), strengthened renewable heating and cooling targets (in the RED), and a reinforced requirement to use a minimum level of renewable energy in buildings (RED).¹³ Separately, the Commission is also considering the introduction of a carbon price on heating fuels in the buildings sector via an extension of emissions trading in this sector.¹⁴

Viewed collectively, the provisions are far from ambitious enough, and are not aligned with climate and emissions targets for either 2030 or 2050. The renewable heat provisions are very limited: Relying on the indicative target of a 1.3% annual increase of renewable energy in heating, it would take 77 years to achieve decarbonisation.¹⁵ Compounded by the fact that the target is not mandatory, it is unclear whether it will be met at all. At the same time, fossil-fuel-based heating systems are supported by Member State policies for which energy savings are being claimed under Article 7 of

¹⁰ Pató, Z., Cowart, R., & Rosenow, J. (2019). *Efficiency first in Europe's new electricity market design – how are we doing?* eceee Summer Study 2019 proceedings. https://www.eceee.org/library/conference_proceedings/eceee_Summer_Studies/2019/3-policy-and-governance/efficiency-first-in-europes-new-electricity-market-design-how-are-we-doing/

¹¹ European Commission. (2020, July). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Powering a climate-neutral economy: An EU strategy for energy system integration. COM(2020) 299 final. <https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=COM:2020:299:FIN>

¹² European Commission. (n.d.). *Hydrogen and decarbonised gas market package*. https://ec.europa.eu/energy/topics/markets-and-consumers/market-legislation/hydrogen-and-decarbonised-gas-market-package_en

¹³ European Commission. (2020, October). Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. A Renovation Wave for Europe – greening our buildings, creating jobs, improving lives. COM(2020) 662 final. <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0662>

¹⁴ European Commission, 2020a.

¹⁵ Kruit, K., Vendrik, J., van Berkel, P., van der Poll, F., Rooijers, F., Jossen, Q., & de Meulemeester, H. (2020). *Zero carbon buildings 2050*. CE Delft. <https://www.cedelft.eu/en/publications/2474/net-zero-buildings-2050%20>

the EED. As many of those heating systems have lifetimes of 20 years or more, their retention is deeply problematic and locks in new carbon-intensive heating infrastructure.

Furthermore, the current building performance standards do not aim for the stock to be renovated into highly energy-efficient and decarbonised buildings by 2050 (Article 2A EPBD), but to bring them to cost-optimal levels, i.e., the energy performance level which leads to the lowest cost during the estimated economic lifecycle. There is also very little in the existing framework to *ensure* buildings are renovated. The coverage of existing minimum energy performance standards (in Article 5 EED and Article 7 EPBD), for example, is far from sufficient because they apply to only a small subsector of the stock or to major renovation of buildings.¹⁶ Finally, the provisions on decarbonising heat are almost entirely silent on the interaction between buildings and the grid.

The relevant directives clearly need revision so each can play its role in a coordinated strategy to enable optimal decisions on heat decarbonisation.

Recommendations for aligned EU heat policy

To achieve a 60% emissions reduction in the buildings sector this decade, we will need to fully exploit all of the solutions that we can deliver now, rather than structure policies for future technologies or fuels that will likely only deliver in the next decade, if at all. Past experience with policies to enable the future potential of biofuels and carbon capture and storage has taught us that essential time and policy space can be lost on fuels and technologies that fail to deliver.

Climate change is cumulative. Persistent carbon savings we make today are more valuable than those we make tomorrow. They also mitigate disastrous impacts in the next decades that would make future decarbonisation more challenging. Therefore, we must design policies for certain and available solutions, and we cannot bank on future uncertainties. For the majority of buildings, the solution will be energy efficiency and electrification, coupled with district heating where already available or more economic. The European policy framework should be modified to deliver on these options during this decade.

More specifically, the European policy framework should promote the following priorities:

- **Significantly increase ambition to align the heat decarbonisation framework with climate needs.** This includes:
 - Much stronger heat planning and increased and mandatory targets for decarbonised heat (Article 23 RED).¹⁷

¹⁶ It should be noted that the trigger point of 'major renovation' is poorly defined to the extent that the requirements are often not fully enforced or can be circumvented.

¹⁷ For more detail on the design of mandatory renewable heating and cooling targets, see Thomas, S., Scott, D., & Rosenow, J. (2021). *Making renewable heating 'Fit for 55'*. Regulatory Assistance Project. <https://www.raponline.org/knowledge-center/making-renewable-heating-fit-for-55/>

- Scale-up of support schemes by reinforcing energy savings obligations (Article 7 EED).¹⁸
- Designing heat decarbonisation targets to consider the environmental, economic and social impacts of adopting the different technical solutions; for example, the limited availability of sustainable biomass.
- **Swiftly phase out fossil fuels for heat.** EU-level policies that allow support for using fossil fuels in buildings must be redesigned. Under Article 7 of the EED, for example, Member States can support the installation of fossil-gas boilers based on their efficiency compared to the replaced system. Ecodesign standards for new heating systems should also be aligned with climate neutrality and support the phase-out of fossil-fuel boilers. Fossil fuels for heat can be phased out through a combination of preventing new gas connections, replacing boilers at end of life with decarbonised heating systems, and mandatory retirement. This requires a mix of EU and national measures.
- **Phase out inefficient buildings using climate-aligned buildings standards, requirements to renovate and targeted subsidies.** The minimum energy performance requirements in the EPBD are currently guided by cost-optimality priorities (Article 4 EPBD), calculated using a limited set of parameters that do not serve full decarbonisation. Furthermore, these standards only apply to a limited number of buildings. EU policies should significantly strengthen the framework for renovating the existing stock by covering more buildings and providing for their full decarbonisation. Minimum energy performance standards provide an opportunity to regulate for a trajectory that phases out the worst-performing buildings first and moves the stock towards full decarbonisation by 2050.¹⁹ The new standards should be underpinned by dedicated funds and practical support for renovation that specifically target those least able to invest. A new renovation standard that defines a deep, renewable renovation is needed to align the priorities of fabric efficiency, renewable heat and demand-side flexibility. Such a standard should inform all building users about the destination for their buildings. The energy performance certificate framework and Building Renovation Passports can help communicate how to achieve this final destination to building owners. They should incorporate the decarbonisation of the heating system as an objective.
- **Make sector integration practical and tangible.** Integration between buildings and the electricity sector is vital to a balanced decarbonisation pathway.²⁰ At the buildings level, building codes for both new buildings and renovation must consider demand-side flexibility and storage, for example by ensuring the readiness of technologies to interact with the grid. At the product level, smartness

¹⁸ For more detail on the rationale for increasing the contribution on EED Article 7, see Santini, M., & Thomas, S. (2020). *Article 7 of the Energy Efficiency Directive 3.0: How to maximise the energy efficiency opportunity for climate neutrality*. Regulatory Assistance Project. <https://www.raponline.org/knowledge-center/article-7-energy-efficiency-directive-3-0-how-maximise-energy-efficiency-opportunity-climate-neutrality/>

¹⁹ Sunderland, L., & Santini, M. (2021). *Next steps for MEPS: Designing minimum energy performance standards for European buildings*. Regulatory Assistance Project. <https://www.raponline.org/knowledge-center/next-steps-for-meps-designing-minimum-energy-performance-standards-for-european-buildings/>

²⁰ Rosenow, J., & Lowes, R. (2020). *Heating without the hot air: Principles for smart heat electrification*. Regulatory Assistance Project. <https://www.raponline.org/knowledge-center/heating-without-hot-air-principles-smart-heat-electrification/>

must be guaranteed by product standards. This is particularly relevant for heat pumps, which already have the technical ability to follow a range of factors such as wholesale energy prices, tariffs and carbon emissions intensities.²¹ In turn, energy markets must fully recognise the value of distributed energy resources, both distributed renewable generation and demand-side response.²² Demand-side resources widen the pool of energy system resources, are usually cheaper than supply-side resources and can tackle grid congestion at the local level. Access to energy markets for renewable energy and aggregators must be improved.

- **Align price signals and incentives with the objective of heat decarbonisation.** Currently, Europeans pay on average 3.3 times more for electricity than gas.²³ This price disparity, which does not reflect the carbon content of fuels, is perpetuated by the design of taxes and levies that add to electricity prices rather than the price of gas. Electricity is currently included in the EU Emissions Trading System, which adds a price of carbon to electricity prices, whereas other heating fuels are not. Member States also attribute the majority of levy-funded climate policy costs to electricity.²⁴ The EU and Member States should look at how to rebalance these incentives while making sure that any additional carbon pricing is introduced in a way that enables households to adapt before being burdened by the price.²⁵

²¹ Delta Energy & Environment. (2014). *IEA HPP Annex 42: Heat pumps in smart grids. Review of smart ready products, United Kingdom*. https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/341743/Delta-ee_Smart_Ready_Heat_Pumps_in_UK_22_Jan_14_FINAL.pdf

²² Shenot, J., Linvill, C., Dupuy, M., & Brutkoski, D. (2019). *Capturing more value from combinations of PV and other distributed energy resources*. Regulatory Assistance Project. <https://www.raonline.org/knowledge-center/capturing-more-value-from-combinations-of-pv-and-other-distributed-energy-resources/>

²³ European Commission. (n.d). *Energy prices and costs in Europe*. https://ec.europa.eu/energy/data-analysis/energy-prices-and-costs_en

²⁴ Grave, K., Breitschopf, B., Ordonez, J., Wachsmuth, J., Boeve, S., Smith, M., Schubert, T., Friedrichsen, N., Herbst, A., Eckartz, K., Pudlik, M., Bons, M., Ragwitz, M., & Schleich, J. (2016). *Prices and costs of EU energy*. https://ec.europa.eu/energy/sites/ener/files/documents/report_ecofys2016.pdf

²⁵ Thomas, S., Sunderland, L., & Santini, M. (2021). *Pricing is just the icing: The role of carbon pricing in a comprehensive policy framework to decarbonise the EU buildings sector*. <https://www.raonline.org/knowledge-center/pricing-just-icing-role-carbon-pricing-comprehensive-policy-framework-decarbonise-eu-buildings-sector/>



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