



EU Heating and Cooling Strategy

ECOS position paper

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Authors

- Rita Tedesco, Head of Energy Transition, rita.tedesco@ecostandard.org
- Luka De Bruyckere, Senior Programme Manager – Energy Transition, luka.debruyckere@ecostandard.org
- Thomas Trevisan, Programme Manager – Buildings & Industry, Thomas.trevisan@ecostandard.org

Executive summary

The EU Heating and Cooling Strategy should grasp and address several challenges that slow down the transition to clean heating and cooling – i.e. the necessary uptake of electric heat pumps in the residential and industrial sectors, their affordability and their flexibility potential in the EU grid, the role of biomass heating and waste heat recovery.

We believe that the Strategy would not only pave the way for the decarbonisation of the heating and cooling sector in the EU but also strengthen the **competitiveness of EU industry**. Most of the heat pumps installed in the EU (between 60% and 73%) are produced in Europe. The Strategy can therefore be a catalyser for a win-win situation that benefits the environment, citizens and EU industry.

The EU Heating and Cooling Strategy should:

1. **Make renewable, efficient, sustainable and affordable residential heating the norm** in the decades to come. Improved rules on energy and material efficiency, pollutant emissions, and flexibility potential are needed for this transition. Measures to tackle high upfront and operational costs, as well as clear guidance on public procurement to Member States are key.
2. **Support the uptake of large-scale heat pumps** to electrify the industrial sector by ensuring the Energy Efficiency 1st principle and by lowering high operational costs.
3. **Untap the potential of waste heat recovery without creating unsustainable dependencies** by clarifying the potential of excess heat in different sectors and by considering long-term impacts.

Introduction

Heating and cooling in residential and industrial buildings requires a lot of energy all year round. Almost 80% of the energy consumed by EU households is for heating and cooling¹, and most of it still comes from fossil fuels, while industrial heat demand accounts for about a third of heating and cooling needs.

Electric heat pumps are the most efficient solution as they can use electricity produced from renewable energy sources such as the sun or wind. Despite significant growth in the past decade, electric heat pumps still struggle to take over fossil fuel-based boilers which remain the dominant individual heating technology. In 2023, 21.5 million heat pumps were installed in the EU against over 90 million gas and oil boilers². Unlike heat pumps, boilers may be powered by gas from the piping system or a tank, or by oil stored in a deposit. Depending on the technology used and the conditions of the system, the efficiency of heaters directly converting fuel into heat can reach up to 92-94% for the most recent condensing gas and oil boilers. But efficiency rates are much lower for older appliances – which constitute most of the installations³. The remaining heat is lost in the process.

The difficult uptake of heat pumps can be attributed to a combination of factors that increase their upfront and operational costs, presenting a major barrier to adoption. These include a shift in energy prices, a challenging economic environment, and increasing uncertainty around future policy support. These challenges hinder the **affordability potential** of heat pumps as they often offer a more cost-effective solution than gas boilers in residential buildings, thanks to their high efficiency and resulting energy savings.

Unfortunately, switching to renewable energy sources in the domestic heating and cooling sector does not always mean using electricity produced from solar panels or wind turbines. On the contrary, it almost always translates into **burning solid biomass** – which accounts for more than 80% of all renewable energy used for heating and cooling in the EU. This poses serious risks on human health caused by air pollutants and worsens the climate crisis by emitting high-GWP pollutants in our atmosphere, not to mention major repercussions on biodiversity and land.

Industrial heat demand accounts for about a third of heating and cooling needs in the EU. Within the industrial sector, process heat represents 47% of industrial energy demand⁴. Sectors that consume most energy for heating and cooling processes are the metallurgical and ceramic industries, as well as food and textile. Industrial, large-scale heat pumps and solar thermal collectors are clean and efficient alternatives to fossil-fuel industrial heating and their deployment is increasing. Large-scale heat pumps are also being deployed in **district heating and cooling** (DHC) network, although they account for just 1% of total capacity⁵. Electrifying industrial heating and cooling e.g., process heating and cooling, with (high temperature) heat pumps can reduce substantially Europe's use of and dependence on fossil fuels.

With the electrification of our heating systems and the surge of air-conditioning in the EU, it is crucial that demand for electricity is synchronised with renewable energy production and available grid capacity. This can be achieved through **demand-side flexibility**, i.e. the ability to reduce, increase, or postpone electricity consumption in response to external signals that align with user needs – such as the availability

¹ EUROSTAT, [Energy use in EU households down second year in a row](#), June 2025

² TOLEIKYTE, A., LECOMTE, E., VOLT, J., LYONS, L., ROCA REINA, J.C., GEORGAKAKI, A., LETOUT, S., MOUNTRAKI, A., WEGENER, M. and SCHMITZ, A., [Clean Energy Technology Observatory: Heat Pumps in the European Union - 2024 Status Report on Technology Development, Trends, Value Chains and Markets](#), Publications Office of the European Union, Luxembourg, 2024

³ ECOS, [Five Years Left - How ecodesign and energy labelling can decarbonise heating](#), December 2020

⁴ Fraunhofer ISI (2024): [Direct electrification of industrial process heat. An assessment of technologies, potentials and future prospects for the EU. Study on behalf of Agora Industry](#), June 2024

⁵ Ibidem

of renewable energy and electricity prices. Tariffs that are designed to reward the flexible use of electricity would mean lower bills for consumers because appliances can be set up to consume the most when it costs the least. However, the potential of demand-side flexibility remains largely untapped. Incentives like dynamic electricity tariffs are only slowly emerging, and devices are generally not able to operate flexibly in an interoperable way.

Excess heat, often referred to as waste heat, is the thermal energy produced as a byproduct of industrial and energy processes that is not utilised. This unharvested heat is typically lost to the environment through exhaust gases, cooling systems, or inefficiencies in machinery, reducing the overall efficiency of energy systems. Properly understanding and managing excess heat in the EU is critical for improving energy sustainability, optimizing industrial processes, and reducing environmental impacts.

We strongly welcome the adoption of a EU Heating and Cooling Strategy that can grasp and address the above-mentioned challenges. Such a Strategy would not only pave the way for the decarbonisation of the heating and cooling sector in the EU but also strengthen the **competitiveness of EU industry** in the sector. Most of the heat pumps installed in the EU (between 60% and 73%) are produced in Europe. EU manufacturers lead the global hydronic and large-scale industrial heat pump markets⁶. The Strategy can therefore be a catalyser for a win-win situation that benefits the environment, citizens and EU industry.

Why do we need a Heating and Cooling Strategy and what should it do

Sustainable heating and cooling products, for both the residential and industrial sectors, must be able to compete on the EU market, which today is still dominated by fossil fuel-based appliances. Despite being the third largest market after China and the United States, the EU is seeing a steady decline in the sales of heat pumps.

Regulatory and political uncertainty is one of the main causes. Despite an extensive toolbox tackling heating and cooling in the EU, there is no coherent approach to this sector. The existing EU Heating and Cooling Strategy is almost 10 years old and no longer fit to address current challenges and needs.

A clear and forward-looking EU Heating and Cooling Strategy is therefore urgently needed to:

- Meet our climate goals – heating and cooling are a major source of GHG emissions and must decarbonise,
- Support and create a level playing field for sustainable and efficient heating technologies such as heat pumps, solar thermal and district heating,
- Enhance energy security by shifting the EU's dependency away from fossil fuels,
- Make sustainable heating and cooling affordable for EU households by targeting economic support to vulnerable households to reduce upfront costs and by levelling out the gas/electricity price ratio,
- Address health issues and poor air quality by disincentivising the transition to inefficient and polluting solutions such as solid biomass heating.

The Heating and Cooling Strategy should address the following points:

1. Make renewable, efficient, sustainable and affordable residential heating the norm

The Heating and Cooling Strategy should set a clear and coherent long-term vision that supports the renewable electrification of the building sector in line with the 2040 climate targets.

⁶ Ibidem

The Strategy should call for the swift implementation of already-existing policies and the adoption of ongoing regulatory revisions. One of these is **the Ecodesign and Energy Labelling rules for heating products**:

- New and revised measures for space and water heaters should replace the existing outdated ones from 2013 and align minimum efficiency requirements with the best available technology. This would not only bring substantial benefits in energy and resource efficiency of heating products, but it will be key to further support the uptake of residential heat pumps. Hydrogen-based technologies should by no means be supported.
- Requirements for heating products using solid biomass should also be revised to mitigate damage to air quality and climate.
- A merged energy label for central and local space heaters should come into force with no further delay to allow EU citizens to make informed decisions and be able to adequately compare among heating products.

Implementation of Ecodesign and Energy Labelling regulations must be followed by the **improvement or introduction of robust standardised testing methodologies**. It is imperative that methodologies to measure the energy consumption of heating products reflect real-life conditions. These methodologies, developed in the form of harmonised European standards by the European Standardisation Organisations CEN and CENELEC upon request from the European Commission to underpin specific legal obligations, give products the presumption of conformity with EU legal requirements. In the case of heat pumps, [ECOS has been long calling for the adoption of a new test method](#) (the so-called “compensation method”) that better measures the overall dynamic performance of heat pumps, in a laboratory setting, enabling to respond to real-life conditions. In the case of solid fuel heating, existing testing methodologies also underreport on the real emissions. As we claim in [our 2022 report](#), more representative measurement methods should be introduced, including ignition, real-life use patterns and the possibility to measure emissions happening when flue gas is mixed with outdoor air. Importantly, the method should also account for ultrafine particle emissions by requiring the number of particles to be counted.

In order to fully untap the potential of demand-side flexibility, heating and cooling products, together with other big electricity loads, should be able to support the grid. Ideally, these devices can communicate with a central **energy management system**. Using the same language, devices should be able to communicate their potential to adjust electricity use and when to do that best. It is impossible to unlock demand-side flexibility without this. The Heating and Cooling Strategy should set the way for the EU to ensure that all heating and cooling manufacturers implement a future-proof communication standard, such as EN 50491-12-2, as we state in our [2024 position paper](#). Importantly, if the energy label for heating products were to include a “smart appliance” icon, this should be underpinned by a robust methodology. The EU Code of Conduct on Interoperability of Energy Smart Appliances is set to be governed by manufacturers alone, which disqualifies this initiative to deliver an impartial method.

The Heating and Cooling Strategy should also set up a clear roadmap to solve one of the biggest obstacles to a transition to cleaner heating and cooling: **high upfront and operational costs** compared to more polluting alternatives. Alternative business models should be further promoted across Member States, such as social leasing for heat pumps where low-income households cover the cost of the heat pump, its installation and ongoing maintenance by paying a monthly fee⁷. The EU should ensure that the Social Climate Fund supports the lowest income households by trying to shield them from price rises when the ETS2 (EU Emissions Trading System) kicks off and in the form of non-refundable funds. The Strategy should also address the issue with high operating costs due to high electricity prices compared to fossil gas.

⁷ EHPA, [Position paper: Bridging the affordability gap: Social leasing for heat pumps](#), August 2025

Finally, public spending should be used to support the uptake of renewable and sustainable heating products. The Strategy should clarify and support **public procurement guidelines** for clean and efficient heating and cooling technologies, such as electric and F-gas free heat pumps. Public procurement is one of the EU's most important economic tools, amounting to a staggering 15% of the bloc's GDP. It can drive market transformation and behavioural changes on citizens and enterprises by leading by example and by stimulating demand. Green public procurement should incentivise the uptake of heat pumps. Many legislative files exist that give recommendations to public authorities (such as the Energy Efficiency Directive, Energy Labelling Regulation, Net-Zero Industry Act) but in a fragmented and incoherent way.

2. Support the uptake of large-scale heat pumps to electrify the industrial sector and to decarbonise district heating networks

The Heating and Cooling Strategy should give a clear signal to untap the potential of large-scale heat pumps in the industry sector and for district heating. According to a 2024 study⁸, direct electrification technologies including electric heat pumps expected to be available by 2035 could meet 90% of the energy demand not yet electrified by European industry.

First of all, while technological development is helping large-scale heat pumps achieve higher temperatures, it is important to ensure these products remain energy efficient and ultimately represent a cheaper alternative to fossil fuel or biomass-based technologies.

The Strategy should therefore call for a **swift revision of the ecodesign requirements for air heating and cooling products**, which also cover heat pumps with a rated heating capacity until 1 MW and cooling products high temperature process chillers with a rated cooling capacity not exceeding 2 MW.

Secondly, to further reduce operational costs of large-scale heat pumps, just like for residential heat pumps, **electricity needs to become competitive with fossil gas**. The implementation of the combination of RES-based physical delivery Power Purchase Agreements (PPAs) and Contracts for Difference (CfDs) as foreseen in the revised Electricity Market Design Regulation need to be swiftly implemented. This will make sure these two instruments yield the expected results to provide electricity intensive industries with stable and low electricity prices. Counter-guarantees by the European Investment Bank should also be swiftly put in place, to de-risk additional investments and support industrial off-takers uptake.

Thirdly, there is a need to **ramp up the production of industrial heat pumps**, which are currently mostly pilot projects or designed for specific industrial applications. Harmonisation of technical features through European standards could help manufacturers ensure the interoperability of products, reduce costs, improve safety and foster innovation. Support to the uptake of pilot technologies with the Innovation Fund dedicated call for industrial heat (IF25 Pilot) could also contribute to the scalability and further uptake of industrial heat pumps. The projects awarded should have the greatest scalability potential as well as the largest emissions savings to maximise the Innovation Fund pot of money.

3. Untap the potential of waste heat recovery without creating unsustainable dependencies

Waste heat can offer significant benefits, including improved system energy efficiency and economic savings. However, policy support to waste heat recovery should not create unintended and unsustainable consequences.

The Heating and Cooling Strategy should shed more **clarity on the utilisation of excess heat in the EU** and flag the sectors and applications where the capturing and the reuse of waste heat are in line with future trends. The potential of waste heat is expected to decrease with the development of more energy-efficient residential buildings and industries that will overall require fewer heating needs, and a more

⁸ Agora Industry, [Direct electrification of industrial process heat](#), 2024

enhanced circular economy that will minimise waste. For instance, new waste heat sources such as data centres and hydrogen production present some limitations in the longer term. Heat provided by data centres is at too low temperatures for direct use in most existing district heating networks, and new-generation electrolyzers are also becoming more efficient, thus leaving less space to the production excess heat.