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Building a competitive heat pump sector in Europe: industry insights and policy pathways

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Abstract

This paper presents the European Heat Pump Association's (EHPA) strategy to accelerate heat-pump deployment across Europe while safeguarding industrial competitiveness. Building on EHPA's competitiveness analysis and recent market evidence, the paper documents market trends, identifies key barriers to scaling (policy uncertainty, energy prices, financing gaps and installer capacity), and lays out a coordinated policy package of demand-creation, financing and regulatory measures intended to stabilise markets and mobilise manufacturing investment. The paper emphasises the need for EU-level coherence – to avoid fragmentation – coherent transition periods, and targeted financial instruments that convert announced capacity into operational plants. Interactions between heat-pump deployment and electricity systems are acknowledged as well in this paper, which will dedicate a chapter on the challenges and opportunities the impact of heat pump deployment will have on the electricity grid.

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1. Introduction

Nearly half of the European Union's (EU) energy consumption is used for heating and cooling, and 70% of this energy still comes from imported fossil fuels. Heat pumps are a clean and cost-efficient alternative for heating, cooling, and hot water production, significantly reducing energy use and emissions compared to traditional heating systems and avoiding energy imports. Recognized as a key clean technology in the Net Zero Industry Act (NZIA) [1], heat pumps not only contribute to climate and energy targets but also increase Europe's economic resilience and competitiveness.

From recent EHPA data, if 14 million homes today, so just 7% of the total, switched to heat pumps, there would be a cut on gas equivalent to the EU imports of gas from Russia [2]. Although the heat pump industry has seen sustained growth for a decade, in 2023 and 2024 sales have seen a stark decline, with a small recovery registered in first months of 2025. In order to ensure the competitiveness of the heat pump sector in Europe several elements are essential: (i) securing long-term and consistent policies; (ii) improving the electricity to gas price ratio; (iii) investing in skills and communications campaigns; (iv) the impact heat pump deployment will have on the electricity grids.

This paper pursues two interrelated objectives: to present EHPA's strategic proposals for accelerating heat pump deployment and strengthening European manufacturing, and to identify the policy choices that influence competitiveness, demand creation, price signals and financing. Accordingly, it focuses on demand-side, financing and regulatory measures that shape manufacturers' incentives to invest in production capacity in Europe.

1.1 Background: heat pump sector evolution

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The heat pump sector in Europe has experienced robust growth over the past decade, marked by continuous double-digit expansion. In 2022 alone, sales numbers surged by 38%, with over 3 million units sold, of which roughly 1.2 million air/water and 1.5 million air/air units. This resulted in over 28 GW of installed capacity, displacing approximately 4 bcm of gas and slashing CO2 emissions by 8 Mt.
The trends for the past years show that the market grew for a decade, hit a peak in 2022, and since then has come back down to previous levels. The record year of 2022 can be put down to Russia's invasion of Ukraine, which resulted in skyrocketing gas prices, making heat pumps a more competitive heating option, and governments ramped up support and subsidies for heat pumps to help consumers. The falling sales since then is due to changes and reductions in those support schemes, rocking consumer confidence; a sluggish economy with a cost-of-living crisis, and the price of subsidised gas coming back down, as well as considerable misinformation campaigns circulating about heat pumps. Low gas prices mean that heat pumps are less competitive to run, even though they are up to five times as efficient as gas boilers. The current slowing of heat pump market growth means Europe is likely to miss its energy security and climate ambitions. On current trends (based on 2015-2021 average sales growth), Europe will fall short of its 60 million heat pump target for 2030 (as explicitly mentioned in the REPowerEU [3]) by 15 million heat pumps – a 25% gap.

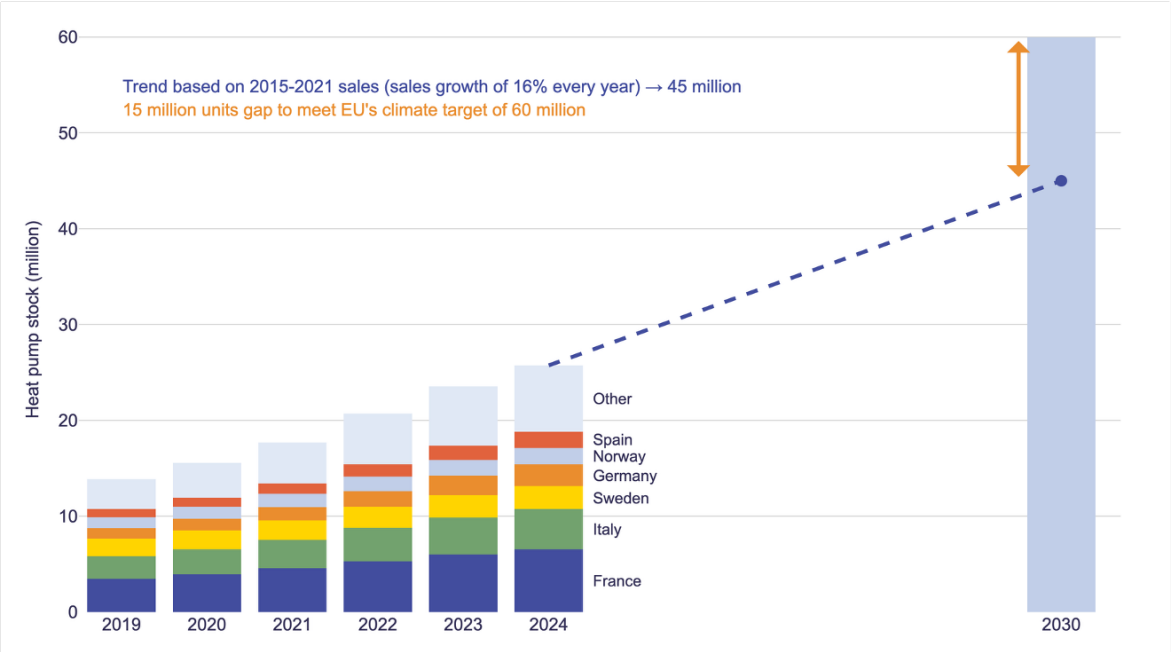

Figure 1. Potential stock growth scenario – based on 2015-2021 actuals, EHPA

1.2 Value chain of the heat pump sector in Europe

Although the decline in sales has brought uncertainty into the EU's heat pump sector, the European Union remains the sole global region where manufacturers have been announcing significant expansion plans, with over 30 GW of manufacturing capacity anticipated to become operational within this decade [4].
Heat pump manufacturing capacity can usually be scaled up quickly to meet rising demand by increasing the use of current production lines, adding new ones, or building new manufacturing facilities altogether. Any policies designed to support an expansion in heat pump manufacturing should therefore prioritise **action to stimulate a sustained market demand** [5]**.** As we mentioned, the trajectory of sales peaked in recent years, but 2023 and 2024 brought market corrections in several countries; sales and investment expectations were revised downwards in response to changing national subsidy schemes and energy cost pressures. At the same time, manufacturers continue to plan capacity expansions and investments in Europe, indicating industry readiness to scale up if predictable demand and supportive conditions are in place.
The heat pump industry in Europe operates in over 300 production facility sites across the continent [6]. These facilities, often situated in both urban and rural areas, play a vital role in providing employment: from EHPA

data, 433.000 people are directly and indirectly employed in the sector, empowering economic opportunity to local communities.
Europe also hosts a network of 25 well reputed universities and research instituions dedicated to advancing refrigerant cycle-based solutions and integrating them with the electric grid across various applications [7].
In terms of decarbonisation, heat pumps are doing the same as removing 50 million cars from the roads, a fifth of the 250 million registered passenger cars in the EU. Up to 73% of heat pumps sold in Europe are also produced here, and this is set to increase.
The importance of energy security and boosting domestic clean tech was seen in European and national legislation and actions last year. The EU's Net Zero Industry Act, adopted in June 2024, aims to boost net zero sectors. EU's plan to end Russian gas imports by 2027 published in May 2025 is a follow-up of 2022's REPowerEU package to boost energy security.

Two structural realities should guide policy. First, heat-pump value chains are highly integrated and global: components and subassemblies may cross borders several times during production. Second, Europe's comparative advantages lie in high quality, system integration and innovation. These advantages are valuable but fragile: they require scale, stable demand and predictable regulatory frameworks to flourish. Absent these conditions, investments risk stalling or relocating to lower-cost countries.

2. Methodology and analytical approach

The European Heat Pump Association (EHPA) is a membership-based association; thus, our work and analyses are grounded in constant engagement with the heat pump value chain. The findings and analyses in this paper are based on three strands of evidence: (1) quantitative market data and monitoring from EHPA and our members; (2) anonymised company-level information collected via targeted surveys and processed by third parties to respect confidentiality and competition rules; and (3) qualitative input from our task forces, bilateral meetings, and wider stakeholder consultations with manufacturers (final products and components), research centres, consultancies and installers. We cross-check our findings against public sources and EU institution inputs, and drafts are reviewed and approved by members of the different task forces before finalisation and publication. This pragmatic, engagement-driven approach ensures our policy recommendations are grounded in real-world industry dynamics and reflect the collective experience of Europe's heat-pump sector.

3. Results and discussion

This paper pursues two related objectives: (i) to present EHPA's strategic proposals to accelerate deployment while sustaining and growing manufacturing of heat pumps in Europe; and (ii) to identify the policy choices that influence competitiveness, demand creation, price signals, and financing. Accordingly, this paper concentrates on demand-creating, financing and regulatory measures that change the business case for manufacturers to build or expand production in Europe.

3.1 Barriers to scaling up heat pump uptake and EHPA's strategy

In order to ensure the competitiveness of the heat pump sector, stable **demand is needed**.
Manufacturers confirm that when demand is high, they are willing to invest in Europe. This is shown by the €7 billion of planned investments from 2022 to 2025 linked to the significant increase in heat pump manufacturing and deployment foreseen by REPowerEU [8].
To foster increased demand and ensure the competitiveness of the European heat pump sector, several elements are essential: stabel policy framework, better electricty to gas price ratio, reduced production costs in EU, prevention of relocation, investing in skills.

3.1.1 Policy uncertainty and fragmented demand

Implementing long-term, stable, and predictable policies and incentives is paramount. These policies should empower end-users to boost their confidence in the long-term viability of their investment in a clean technology, like heat pumps, while encouraging the industry to invest in efficient production equipment and skilled workforces. The swift implementation of the Fit for 55 framework (a set of laws aiming to reduce EU

greenhouse gas emissions by at least 55% by 2030) and a socially just introduction of the new Emission Trading System (ETS2) for heating and transport fuels is paramount to provide stability for consumers and manufacturers.

It is essential that the policy framework is clear, consistent, and supporting the sector and its achievements. The recent revision of the F-gas regulation, alongside the pending Ecodesign revision of Lot 1 and Lot 2 (water and space heaters), highlights a critical oversight in policy coordination. The F-gas Regulation has been finalized and approved without the finalization of the Ecodesign requirements, which will impose additional standards on heat pumps. As a result, manufacturers face the potential need to redesign and retest their products twice: first to comply with the newly approved F-gas regulation, and later to meet the forthcoming Ecodesign requirements. This disjointed approach not only increases the **regulatory burden** on manufacturers but also leads to increased costs that could have been mitigated by a more **synchronized regulatory process**. Ensuring that these significant regulatory changes are discussed and implemented in coordination would better support the industry's transition to sustainable practices while minimizing unnecessary disruptions.

3.1.2 Energy prices and affordability

The affordability of heat pumps is determined by both the **initial capital expenditure** (CAPEX) and the **ongoing operational expenditure** (OPEX). Together, these elements form the total cost of ownership (TCO), which serves as a key tool for households and businesses in evaluating and selecting heating and cooling technologies for residential, commercial and industrial applications.

i. OPEX

Although heat pumps are 3 to 5 times more efficient than fossil fuel-based alternatives, current energy prices, together with often favorable gas taxation, reduce their competitiveness. To see a rapid return on investment and incentivise adoption, **electricity prices should not be more than twice the price of gas**. This is currently not the case in many Member States, as shown in EHPA's publication "How's the electricity to gas price looking" (available on our website) [9]. A closer look of this issue shows two key contributing factors. First, electricity is subject to high taxation, which is reflected in the different components of the consumer bill. Second, fossil fuel prices do not fully reflect their true societal and environmental costs.

EHPA's policy recommendations are the following:

- Address the electricity to gas price ratio by implementing the measures announced under the Affordable Energy Action Plan, particularly the European Commission's recommendations on how to reduce electricity taxation and the review of the Energy Taxation Directive.
- Ensure swift implementation of the EU Emissions Trading System (ETS) 2 and Social Climate Fund.
- Ensure that long-term contracting instruments such as two-way Contracts for Difference and PPAs – i.e. through demand aggregation platforms - become standard in electricity markets to mitigate the impact of gas on prices.
- Conduct and disseminate analyses on economic benefits and cost savings to educate citizens, following examples such as Ireland.
- Promote further penetration of decarbonised energy sources.
- Enable and reward flexible consumption of electricity.
- Make operating expenses for industrial processes eligible for EU funding, at least in the initial phase, under the Clean Industrial Deal State Aid Framework (CISAF) and the Decarbonisation Bank. Since efficiency gains of 10-40% are insufficient to bridge the cost gap, OPEX support will be crucial in the medium term, until EU ETS 2 carbon pricing helps rebalance the electricity to gas price ratio.

ii. CAPEX

The cost of heat pump equipment varies considerably depending on the technology type, system capacity, manufacturing quality, and functionality. Prices also differ across countries and regions, partly reflecting the maturity of the local market [10].

When looking specifically at the residential level, installation costs also differ greatly from country to country [11], based on several factors including the different technical requirements, subsidy structures, taxation, among others. In addition, installing a heat pump in an existing home can involve additional expenses such as upgrades to the electrical system, replacement of existing radiators, among others [12].

Given these challenges, **financial support to reduce the initial investment barrier is essential.** At the national level, many Member States have introduced incentives like grants, low- or zero-interest loans, and tax deductions. At EU level, complementary targeted measures are also required to overcome this barrier.

EHPA's policy recommendations

- Reduce the **Value Added Tax (VAT) rate on heat pumps to 0%** like done for PV.
- Ensure EU funds (Recovery and Resilience Facility, Social Climate Fund, etc.) are used to **accelerate heat pump investments for low-income households**.
- Establish the **Innovation Fund Heat Auction for Industrial Decarbonisation** as a permanent instrument to support industrial heat pump deployment.
- **Coordinate qualitative support schemes for heat pumps at EU level, similar to the auctions as a service system**. By evaluating best practices and lessons learned from the different types of existing national subsidy schemes, the principles of a successful, well- functioning subsidy scheme for heat pumps should be identified. These should be used to coordinate and co-design national subsidy schemes from a central EU level in partnership with the national level.
- **Promote and support innovative models** like renewable energy communities, social leasing or subsidised low-or-zero interest loans for heat pumps with public guarantees, among others [13].
- **The European Investment Bank (EIB) should develop targeted financial products**, **including reduced-rate loans and risk-sharing** mechanisms to further support industrial electrification.
- **Support innovation and R&D** to develop new electrification solutions for sectors where alternatives are not yet mature.

3.1.3 Skills and communication campaigns

Scaling up heat pump deployment requires **installers**, **quality assurance frameworks and streamlined permitting**. A shortage of trained installers and burdensome local permit granting slow deployment even when demand exists. National and EU measures to scale training programmes, fast-track installer certification and align renovation incentives with heat-pump uptake will remove bottlenecks. Complementary public awareness and warranty/after-sales standards support consumer confidence and long-term market stability.

3.2 Impact of heat pump deployment on the electricity grid

The introduction of heat pumps in large numbers significantly reshapes electricity **demand profiles**. Unlike flat gas consumption for heating, electric heat pump load varies over the day and seasons, adding new peaks at certain hours. Empirical smart-meter data from homes equipped with air-to-water heat pumps show **elevated demand for electricity throughout the day** with *distinct daily peaks* in winter – for example, a pronounced spike in the early morning and a secondary rise in mid-day [14]. These peaks reflect typical operating patterns: many heat pumps perform pre-heating or hot-water heating during off-peak hours when electricity is cheaper, followed by reduced usage during high-price periods. The net effect is a **shift in peak electricity load**: morning and mid-day electricity loads increase due to heating, even as reliance on evening gas boiler usage declines.

Seasonal variability is important as well. Heat pumps drive much higher electrical demand in winter than in summer. On average, across the EU, meeting space-heating needs with heat pumps could raise annual electricity consumption by only a modest amount (~5% of EU electricity consumption), but winter months see a higher impact [15]. However, if efficient heat pumps are deployed alongside building insulation upgrades, the peak increase is much smaller (only~+3 GW) [16]. Indeed, improving a home's energy efficiency by two classes (e.g. from EPC D to B) roughly halves its heating needs, **reducing the required heat pump size and peak power by about one-third** [17].

Moreover, heat pumps are not only a source of **new** demand: they also represent a major untapped source of flexibility for the energy system. Heat pumps simultaneously improve energy efficiency, support direct electrification of heat, and can provide valuable demand-side flexibility when integrated into smart energy systems. By shifting consumption away from peak periods, responding to dynamic electricity prices, and making use of low-cost renewable electricity [18], **heat pumps can significantly reduce stress on local grids and avoid unnecessary infrastructure investments**. Crucially, this flexibility relies on thermal storage that already exists within buildings, such as the thermal storage capacity of homes and the storage capacity of hot-water tanks, offering flexibility without the need for additional electric batteries [19].

This flexibility is also highly relevant for cost-effective grid planning and investment. It helps optimise infrastructure use and reduce the need for costly physical reinforcements, which are ultimately recovered through network tariffs included in electricity bills. The Electricity Regulation requires that network tariffs be cost-reflective, promote efficient use of the existing grid, and recognise the role of flexibility [20]. Yet, TSOs and DSOs often continue to prioritise traditional grid reinforcement, while flexibility-based solutions remain underused [21].

In addition, incentives and enabling conditions to unlock this flexibility are often missing. In particular, most EU households (around 73%) remain on fixed-price electricity contracts and therefore do not encounter price signals that would encourage demand shifting [22]. In many Member States, access to dynamic tariffs or explicit flexibility services is limited, and consumers are frequently unaware of both their ability to participate in demand-response schemes and the associated financial benefits. Heat pumps reshape electricity demand, creating new daily and seasonal peaks. At the same time, they provide a valuable source of flexibility through existing thermal storage, which can ease peak loads, reduce grid stress, and support renewable integration.

4. Conclusions

Heat pumps offer a strong pathway to decarbonise heating while anchoring industrial capacity in Europe. However, capturing these benefits requires an integrated policy approach that prioritises predictable demand, improved electricity affordability, targeted industrial finance, and the soft infrastructure to scale deployment. Protecting the Single Market and avoiding fragmented national measures are central to sustaining economies of scale and converting industry announcements into domestic factories and jobs.

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