From Plan to Action:
Reducing Electricity Taxes to Support Industrial Heat Pumps

Introduction

Nowadays, industrial heat pumps have the potential to significantly boost the energy efficiency of processes operating at temperatures up to 180–200°C. At the same time, they support the shift from fossil fuels to electricity as a primary energy source.
In European industry today, process heating is a major energy driver, accounting for two thirds of total final energy demand. A large portion of this still relies on fossil fuels like gas, coal, and oil and only about 3% currently comes from electricity.[1]

However, there is growing potential for electrification in sectors that mainly rely on steam and hot water for heating—such as food and beverage, pulp and paper, textiles and chemicals. In fact, up to 62% of current fossil fuel used in these areas could be replaced with technologies already available on the market. Industrial heat pumps stand out as a reliable solution for slashing both energy use and CO_2 emissions.[2]

Following the publication of the Action Plan for Affordable Energy by the European Commission in February 2025, this policy brief highlights how high electricity prices represent one of the most significant obstacles to the deployment of a key and mature technology for industrial decarbonisation: high-temperature industrial heat pumps.

Implementing the actions outlined in the EU Plan is crucial to encourage the uptake of industrial heat pumps— the low-hanging fruit to decarbonise the European process industry and strengthen EU competitiveness, sustainability, and energy security.

[1] de Boer, R., Marina, A., Zühlsdorf, B., Arpagaus, C., Bantle, M., Wilk, V., Elmegaard, B., Corberán, J., & Benson, J. (2020). Strengthening Industrial Heat Pump Innovation: Decarbonizing Industrial Heat.
[2] 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.

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What are industrial heat pumps—and what can they do?

Industrial heat pumps are energy-efficient devices that upgrade waste heat to higher temperatures with the input of electrical energy, making them a key technology for low-carbon heating. Their efficiency is measured by the Coefficient of Performance (COP) which is defined as the ratio of heat output to electricity input. For example, a COP of 3 means that the heat pump delivers three units of heat for every unit of electricity consumed.

Assuming a COP of 3, this efficiency advantage translates into energy cost savings only when the price of electricity is less than three times the price of fossil fuels (e.g., gas or oil). If electricity prices are too high compared to fossil fuel prices, the operating costs of heat pumps may exceed those of conventional heating systems, despite their higher efficiency. If electricity prices are relatively low, heat pump applications with a lower COP also become economically attractive.

In this scenario, to fully unlock the cost-saving and climate benefits of industrial heat pumps, the electricity price must align to ensure that high-COP heat pumps remain economically attractive. Such alignment is essential to an increased adoption of this technology, which can bring strategic benefits, as described below:

Accelerating decarbonisation

By replacing fossil-fuel-based heat with clean electricity, industrial heat pumps can play a key role in helping the EU meet its climate goals under the Green Deal and Fit for 55 packages.

Boosting the European cleantech sector

Investing in industrial heat pumps strengthens the EU's manufacturing base and supports a robust local value chain. With 60–73% of all heat pumps installed in Europe being manufactured locally, the sector drives job creation and economic growth across member states.

Enhancing EU industrial competitiveness

Industrial heat pumps' high efficiency—delivering up to 3–4 units of heat per unit of electricity—translates into lower production costs. This helps European industries remain competitive in an increasingly global market

Increasing energy security

Shifting to heat pumps helps reduce reliance on imported fossil fuels. This strengthens energy sovereignty, lowers geopolitical risk, and supports the EU's REPowerEU strategy.

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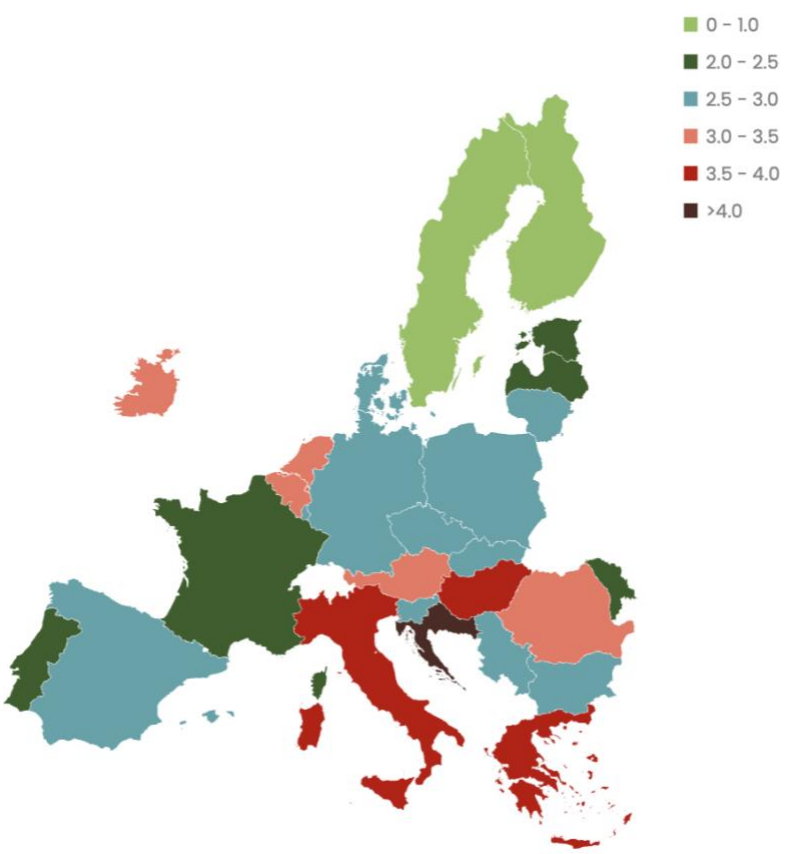
High electricity prices: a key challenge for the industrial heat pump market – some numbers

Since industrial heat pumps usually operate on electricity to function, ensuring competitively priced electricity is critical to unlocking their full potential.

Currently, the widespread adoption of industrial heat pumps is being held back by the considerable cost advantage of fossil fuel alternatives such as natural gas. Figure 1 shows the gas-to-electricity price ratio for non-household consumers in the second half of 2024.



Except for a few cases—namely Finland and Sweden—where the price of electricity is even inferior to that of gas, electricity is significantly more expensive in most countries.

In 17 countries, the price of electricity is 2 to 3 times higher than that of natural gas.

In 8 Member States, industrial players pay 3 to 4 times more for 1 unit of electricity compared to 1 unit of gas, while in Croatia, this ratio exceeds 4 to 1.

Figure 1: gas-to-electricity price ratio for non-household consumers in 2024-2 including all levies and taxes (source: Eurostat and own calculations)

It's relevant to clarify that the final electricity price for industrial end-users, which is presented in the map, consists of several components: the actual cost of electricity, network charges and taxes and levies. Crucially, the electricity cost itself represents only

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a fraction of the total price and a substantial share of the final bill is driven by taxes and levies, which in many countries remain disproportionately high.

These additional charges vary across Member States and can significantly undermine the cost-competitiveness of electrification technologies.

Looking at the second half of 2024, as shown in the Figure 2 below, the share of taxes and levies paid by non-household consumers for electricity remains significantly high in many EU countries. With an average of over 15% of the final electricity price in the EU and Euro area, this share peaks at almost 40% in Poland, surpasses 20% in Italy and Cyprus, and accounts for 10% to 20% of the total bill in nine other EU countries.

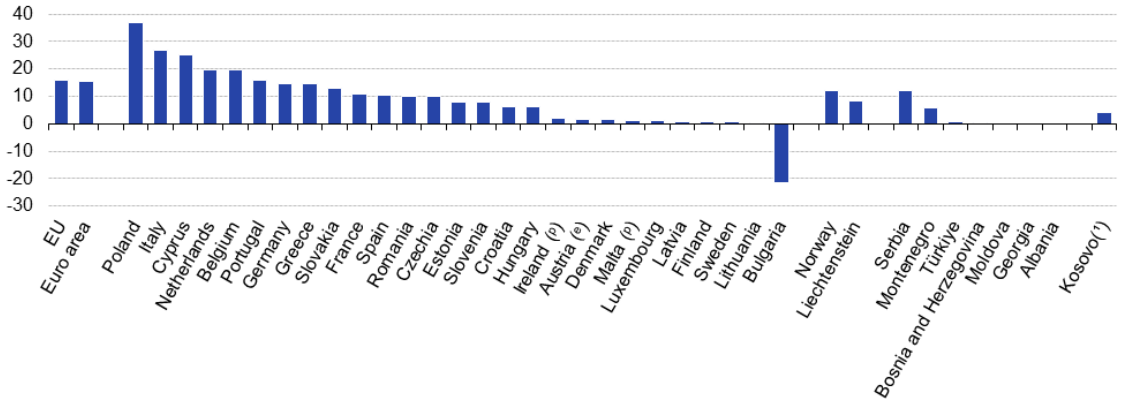

Figure 2: Shares of taxes and levies paid by non-household consumers for electricity, second half 2024 (%) - Source: Eurostat

The issue becomes even more evident when comparing the tax burden on electricity and natural gas for non-household consumers.

Across the EU, electricity is, on average, taxed at a rate three times higher than natural gas, as illustrated in Figure 3 for the second half of 2024. This highlights the disproportionate impact of taxation on electricity bills. Reducing the tax component is the most immediate and effective lever for lowering electricity prices and promoting the uptake of clean technologies.

In a context where electricity costs three times as much as fossil fuels, the performance advantage of a COP of 3 is offset by the higher cost of the electricity needed to run the heat pump.

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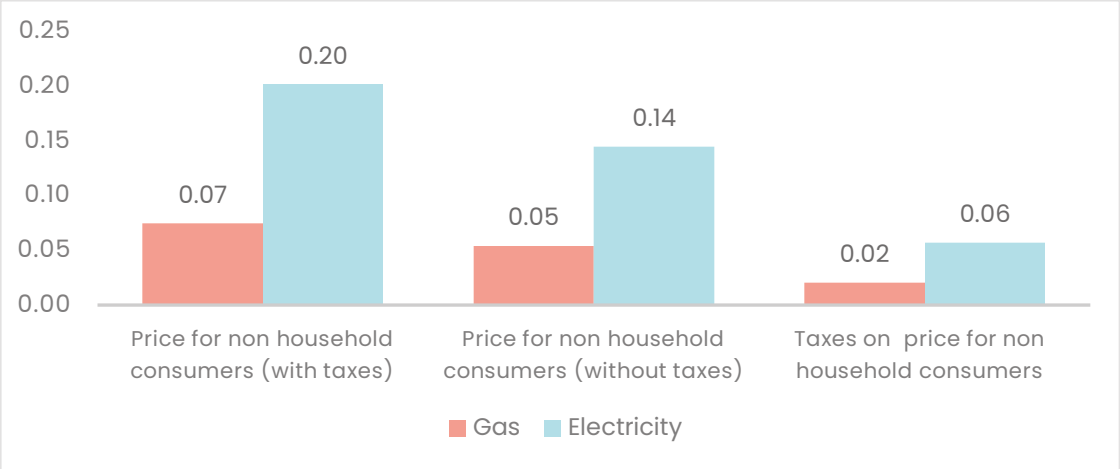

Figure 3: share of taxes on electricity and gas prices for non-household consumers - Source: Eurostat and own calculations

High electricity prices: a barrier to industrial heat pumps – insights from providers and end-users

Given this situation, it is easy to understand how high running costs of the technology can shape the perceptions of key actors in the industrial heat pump value chain.

As part of the activities of the SPIRIT Project, field research was conducted to identify the main non-technical barriers to the wider uptake of industrial heat pumps. Respondents to the interviews and surveys included EU end-user associations and industrial companies in the food and beverage, textile, chemical and paper and pulp sectors, as well as industrial heat pump manufacturers—capturing the views of two key segments of the industrial heat pump value chain: the process industry and technology providers.

When asked whether specific economic challenges or uncertainties might deter them from investing in industrial heat pump technology, over 70% of end-user companies in the chemical and food sectors responded affirmatively. Among the key concerns cited were the unfavourable price ratio of electricity compared to natural gas, as well as the high costs associated with electricity transmission, distribution, and grid connection. One heat pump manufacturer emphasised the significance of electricity prices, stating that *"Electricity prices are crucial when competing with natural gas".*

Similarly, during the event *"The Road to Sustainable Industrial Heat,"* organised on the 22nd of May 2025 by the European Heat Pump Association as part of the SPIRIT and

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PUSH2Heat projects, a poll was conducted to identify the main non-technical barriers to the deployment of this technology. In response to the question, *"What is the primary non-technical challenge preventing a stronger uptake of heat pumps in industry?"* more than half of the attendees that responded (>50% industrial players) cited the electricity-to-gas price ratio — followed by a significant 41% mentioning the high initial investment and installation costs (see Figure 4).

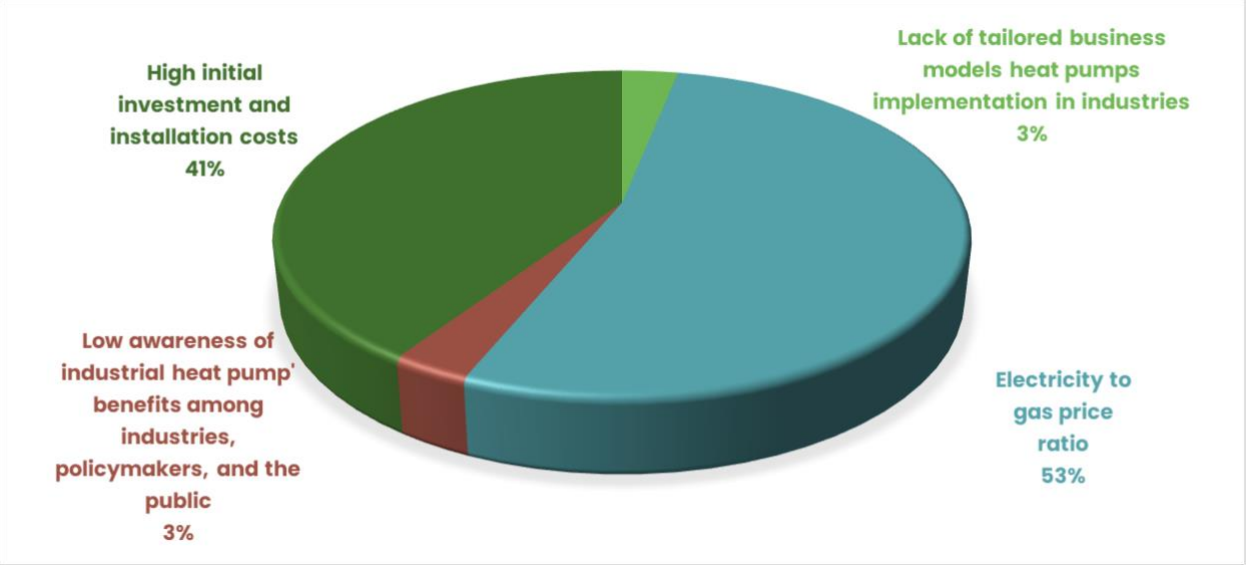

Figure 4: main non-technical barriers according to attendees to the SPIRIT and PUSH2Heat webinar on 22 May 2025

These findings demonstrate that high electricity prices are a critical concern influencing businesses' decisions to electrify their production processes. The cost of electricity significantly affects the economic feasibility of adopting electrification technologies, potentially slowing down the transition to cleaner industrial practices.

Increasing the share of green electricity can help lower electricity prices. In countries with a high share of renewable energy sources, wholesale prices often drop significantly during sunny or windy periods when abundant renewable power pushes more expensive fossil fuel plants out of the market. However, for these lower prices to benefit end users, effective energy storage solutions are needed to manage supply fluctuations, and taxes and levies on the final electricity bill must be decreased to pass on these savings.

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Lowering taxes and levies on electricity to start a virtuous circle

Given these findings, it is clear that lowering taxes and levies on the industry's electricity bills will be key to enable the scale-up of this technology. Doing so would not only remove a major barrier but could also initiate a broader virtuous transformation across the energy and industrial landscape.

As illustrated in Figure 5, cheaper electricity would encourage wider adoption of industrial heat pumps, which, thanks to their high COP would enable businesses to produce heat more efficiently and at lower operating costs.

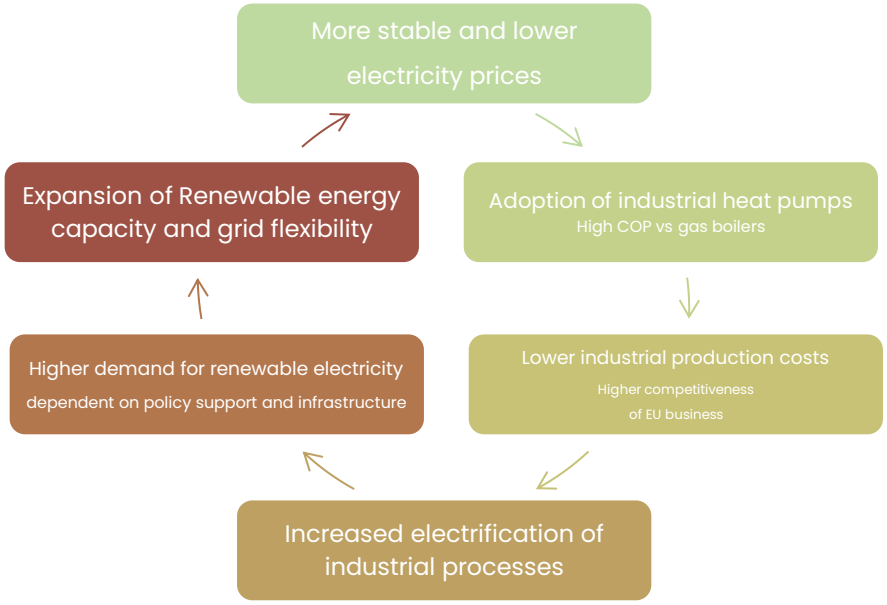

Figure 5 - Virtuous circle that could be triggered by low electricity prices

This efficiency gain can reduce industrial production costs, enhancing the global competitiveness of European businesses and accelerating the transition to greener technologies.

However, adoption rates will also depend on supportive policies.

As industries electrify their heat processes, electricity demand will rise, thus incentivising further investment in renewable projects, provided there is a stable policy and regulatory framework.

This positive feedback loop - where growing renewable supply meets increasing demand - can gradually reduce the EU's dependence on fossil fuels' volatile prices, contributing to greater energy security and sustainability.

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Policy recommendations

Given the preliminary considerations, the SPIRIT Consortium positively welcomes the publication of the EU Commission's Action Plan on Affordable Energy and advocates for the swift implementation of the proposed measures.

Based on the surveys conducted and the shared position of the main associations in the sector, it is important to implement the following recommendations to ensure that electricity becomes a viable alternative to fossil fuel-based heating in the industrial sector. This involves establishing a level playing field between electricity and gas prices, particularly in terms of taxation. Accordingly, the SPIRIT project recommends implementing the following measures:

Rebalance energy taxation across carriers by lowering electricity taxes and removing non-energy cost components from electricity bills.

This is essential to enable industrial electrification and reduce dependence on volatile fossil fuel prices. In line with the Affordable Energy Action Plan, this should be pursued:

At the EU level, through the **revision of the Energy Taxation Directive** (ETD). The SPIRIT consortium urges the Council to complete the revision process, which was put on hold by Member States following the Commission's 2021 proposal. The revised ETD should:

- Allow or mandate lower minimum tax rates for electricity, especially when produced from renewable sources;
- Enable Member States to shift taxes and levies away from electricity;
- Introduce climate-aligned tax structures that level the playing field between energy carriers based on environmental performance.

At the national level, Member States should reduce electricity taxes and levies toward the minimum excise duty for businesses set by the 2003 ETD (EUR 0.5/MWh). In parallel, and guided by Commission-issued recommendations to prevent transnational imbalances, Member States should:

- Reduce or remove non-energy-related charges (e.g., public service obligations, historical debts, or unrelated infrastructure costs) from electricity bills, shifting them to general taxation where possible;
- Pursue national tax reforms to better align energy pricing with climate objectives;
- Monitor and report progress on taxation rebalancing to avoid competitive distortions across the EU.

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Going beyond cutting taxes and levies on electricity, further actions needed to create a sustainable and financially attractive ecosystem for industrial heat pumps include:

Enhancing energy system efficiency and flexibility

- Design **more efficient and dynamic network charges**, to reflect the value of flexibility and reward demand-side resources. The flexibility potential of heat pumps can reduce costs for the energy system and for consumers. Grid operators need to be aware of this and recognise it in regulatory planning.
- **Accelerate grid expansion, modernisation and digitalisation** by supporting the implementation of the upcoming European Grid Package that will help ensure that industries that wish to electrify their production can do so affordably and securely.
- Increase **cross-border access to low-cost electricity** through expansions of transmission capacity. This would enhance market flexibility and help prevent price spikes, particularly benefiting end users such as those operating industrial heat pumps.

Supporting EU heat pump value chain growth and electrification through policy

- **Strengthen EU industrial policy** to foster a competitive, resilient European sector and protect it against unfair international competition
- Advance EU strategies to prioritise electrification and waste heat recovery. The upcoming **Electrification Action Plan** and revised **Heating & Cooling Strategy** must contain **dedicated support for industrial electrification** and measures to scale up waste heat recovery

Attract and foster investments

- Attract private capital by **de-risking investments** in market interconnectedness and in renewable energy generation **through state aid and support guarantees** for high-risk projects
- Set **guidelines for Member States to ensure market stability and predictability**, allowing a more standardized and de-risked environment for private investments
- Implement a **tripartite contract for affordable energy** between public sector, financial institutions, clean energy developers and energy-consuming industry. This will allow energy intensive industry to plan their investment decisions more safely
- Decouple retail electricity bills from volatile gas prices by promoting long-term **Power Purchase Agreements**. These contracts would facilitate the adoption of technologies like industrial heat pumps while minimizing cost uncertainty.

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