Heat Pumps in Europe

Key Facts & Figures

Brussels, November 2023

Heat Pumps in Europe

Before you begin...

Dear reader,

This text provides an overview of the latest trends and developments in the heat pump sector in Europe.

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We hope you'll find this overview helpful and informative. Enjoy it!

– EHPA

Contents

01.

A GLOBAL TREND

A global trend

- The **world heat pump market grew at an average rate of 10% per year between 2014 and 2020** to around 8 million units. Sales fell 3% in 2020 due to the pandemic but rose by 11% in 2022 (ext. EC, *Heat Pumps in the European Union*, 2023, p.15).

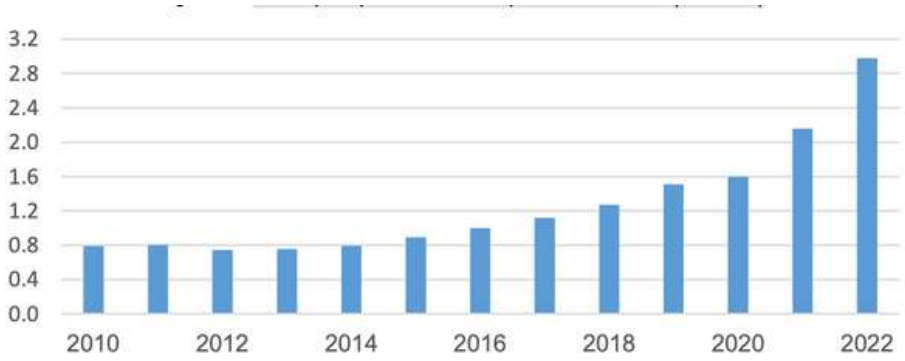
- **In 2022, global heat pump sales grew by 11% compared to the previous year**. **In 2021, the increase was 13% over 2020** (ext. IEA, *The Future of Heat Pumps*, 2022, p.25).

- At the same time, **sales of residential gas boilers have been trending downwards** and are now **outnumbered by sales of heat pumps in many countries in Europe and the United States**. (ext. IEA, *World Energy Outlook 2023*, p.18).

- **In Europe**, figures collected by the European Heat Pump Association indicated a **sales growth of almost 39% in 2022 over the previous year** (int. EHPA, *European Heat Pump Market and Statics Report 2023*, p.5).

- This resulted in **almost 20 million heat pumps installed in Europe by the end of 2022**, according to EHPA data (int. EHPA, *European Heat Pump Market and Statics Report 2023*, p.5).

Figure 1. Heat pump sales in Europe, 2010-2022 (millions):



Source: EHPA data in ext. EC, *Heat Pumps in the European Union*, 2023, p.15.

- In other words, **Europe accounts for about 34% of all heat pumps**, compared to about 15% of the world GDP and 10% of the global population (ext. EC, *Heat Pumps in the European Union*, 2023, p.15).

- **Worldwide**, the 1.5°C Scenario of the International Renewable Energy Agency (IRENA) will require **793 million heat pumps in operation by 2050. The EU market is projected to account for 20-30% of the world heat pump market during 2020- 2030** (ext. EC, *Heat Pumps in the European Union*, 2023, p.17).

Sources

- EHPA, *European Heat Pump Market and Statics Report 2023.**
- IEA, *The Future of Heat Pumps*, 2022.
- IEA, *World Energy Outlook 2023*.
- Joint Research Centre of the European Commission, *Heat Pumps in the European Union*, 2023.

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02.

THE EUROPEAN MARKET AT A GLANCE

The European market at a glance

- **Sales data from 21 European countries (18 EU Member States, plus Norway, the U.K and Switzerland) collected by EHPA show a 38.9% increase in heat pump sales in 2022,** outpacing the 34% rise in annual sales of 2021 (int. EHPA, *European Heat Pump Market and Statics Report 2023*, p.7).

- **There are now around 20 million connected heating heat pumps** (both air-to-air and 'hydronic' or water-based) and hot water heat pumps in Europe. **They heat approximately 16% of Europe's residential and commercial buildings** (int. EHPA, *European Heat Pump Market and Statics Report 2023, p.7).*

Figure 2. EU heat pump sales development 2005-2022:

	Sales	Stock
2005	446 037	1.10 million
2006	502 965	1.60 million
2007	572 840	2.17 million
2008	804 457	2.98 million
2009	731 482	3.71 million
2010	788 605	4.50 million
2011	802 660	5.30 million
2012	743 883	6.03 million
2013	757 142	6.78 million
2014	791 538	7.55 million
2015	892 809	8.43 million
2016	999 682	9.41 million
2017	1.12 million	10.50 million
2018	1.27 million	11.74 million
2019	1.51 million	13.21 million
2020	1.60 million	14.77 million
2021	2.16 million	16.87 million
2022	3.00 million	19.79 million

Source: int. EHPA, *European Heat Pump Market and Statics Report 2023*.

- With around 3 million units sold, markets across Europe experienced substantial growth. **The strongest relative gains were achieved in Belgium (+118.0%), Poland (+112.0%), and the Czech Republic (+105.9%** – int. EHPA, *European Heat Pump Market and Statics Report 2023,* p.8).

- **87% of the European market volume was sold in only ten countries.** The five biggest European heat pump markets in 2022 were France (621 776 units sold; +15.8% growth vs. 2022), Italy (513 535; +35.2%), Germany (275 697; +59.0%), Sweden (215 373; +61.3%), and Poland (207 992; +112.0% – int. EHPA, *European Heat Pump Market and Statics Report 2023*, p.8).

- The biggest absolute gains were achieved in Italy (133 564), Poland (109 890), Germany (102 310), France (84 665), Sweden (81 875) and Finland (66 984 – int. EHPA, *European Heat Pump Market and Statics Report 2023,* p.8).

- **Nordic countries** (Finland, Sweden and Norway) **continue to have the highest heat pump market penetration per capita** (int. EHPA, *European Heat Pump Market and Statics Report* 2023, p.8).

- However, **heat pump sales in the first half of 2023 decreased compared to 2022 in some countries, like Italy, Finland and Poland**. This is due to policy changes in national support schemes and unfavourable electricity-gas price ratios (int. EHPA, *As sales dip, heat pump sector warns EU goals at risk without supportive policies,* 2023).

Sources

- EHPA, *European Heat Pump Market and Statics Report 2023.**
- EHPA, *As sales dip, heat pump sector warns EU goals at risk without supportive policies*, 2023.

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03.

EU HEAT PUMP MARKETS BY TYPE

EU heat pump markets by type

- While **air-to-air devices remain dominant in the market, air-to-water systems showed the highest growth in 2022**, both in absolute and relative terms and in line with 2021 trends (int. EHPA, *European Heat Pump Market and Statics Report 2023*, p.8).

- Meanwhile, sales of hot water and water-to-water systems have slightly declined, whereas sales of geothermal and hydrothermal heat pumps are stable (int. EHPA, *European Heat Pump Market and Statics Report 2023*, p.8).

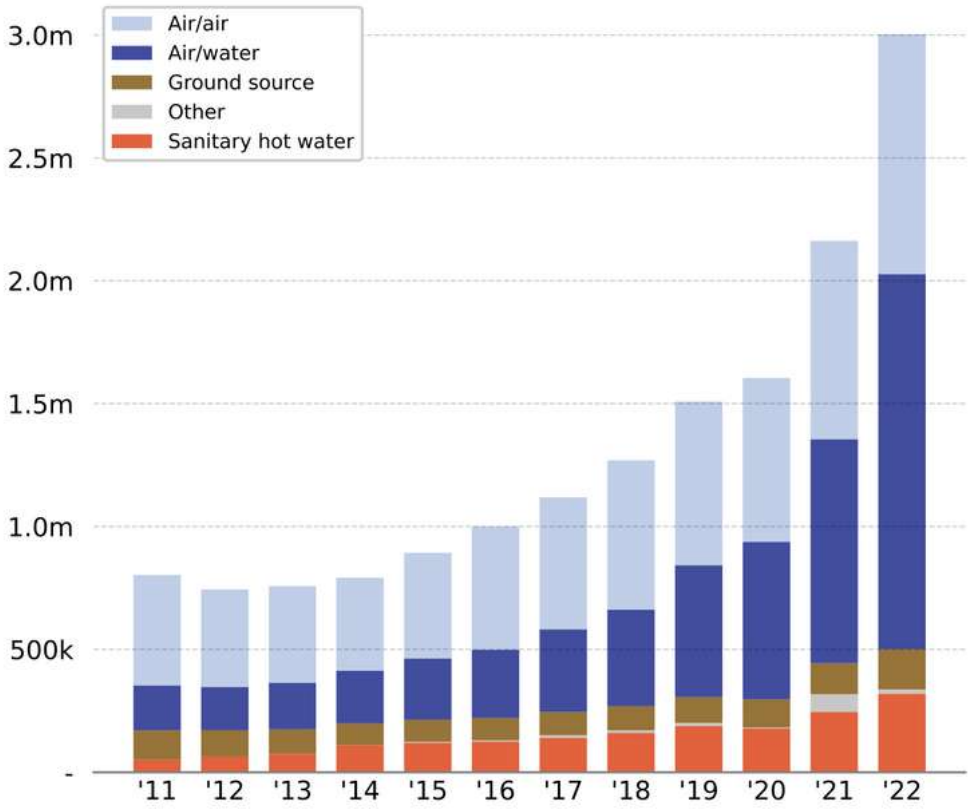

Figure 4. Development of sales by category, 2010-2022:

Source: int. EHPA, *European Heat Pump Market and Statics Report 2023*, p.8).

Sources

- EHPA, *European Heat Pump Market and Statics Report 2023.**

*Market reports are based on data gathered the year before (i.e. the '2023 market report' will contain market data from 2022).

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04.

HEAT PUMPS IN RENOVATION & MULTI-FAMILY BUILDINGS

Heat pumps in renovation and multi-family buildings

- **Heat pumps are and can be implemented in multi-family buildings**. This is the case for new or retrofitted buildings, and even for buildings where no energy savings measures have been taken (int. EHPA, *Heat pumps in high rise homes*, 2023, p.4).

- **Despite the positive trend overall, there are still several obstacles** to overcome to fully implement heat pumps in multi-family buildings. These obstacles are **both technical and non-technical in nature** (int. EHPA, *Heat pumps in high rise homes*, 2023, p.7).

- **On the technical side, it can be difficult to provide the required heating capacity and supplied temperature or access the source of heat**. **Investment costs and a complex ownership structure in some apartment buildings are an example of non-technical obstacles** (int. EHPA, *Heat pumps in high rise homes, 2023*, p.7).

- To enable a broader implementation of heat pumps in multi-family buildings **there is a need for more standardisation**. Building owners and the housing sector want **reliable, tested solutions to lower investment costs and shift from fossil fuel technologies to heat pump technology** (int. EHPA, *Heat pumps in high rise homes,* 2023, p.7).

Sources

- EHPA, *Heat pumps in high rise homes*, 2023.

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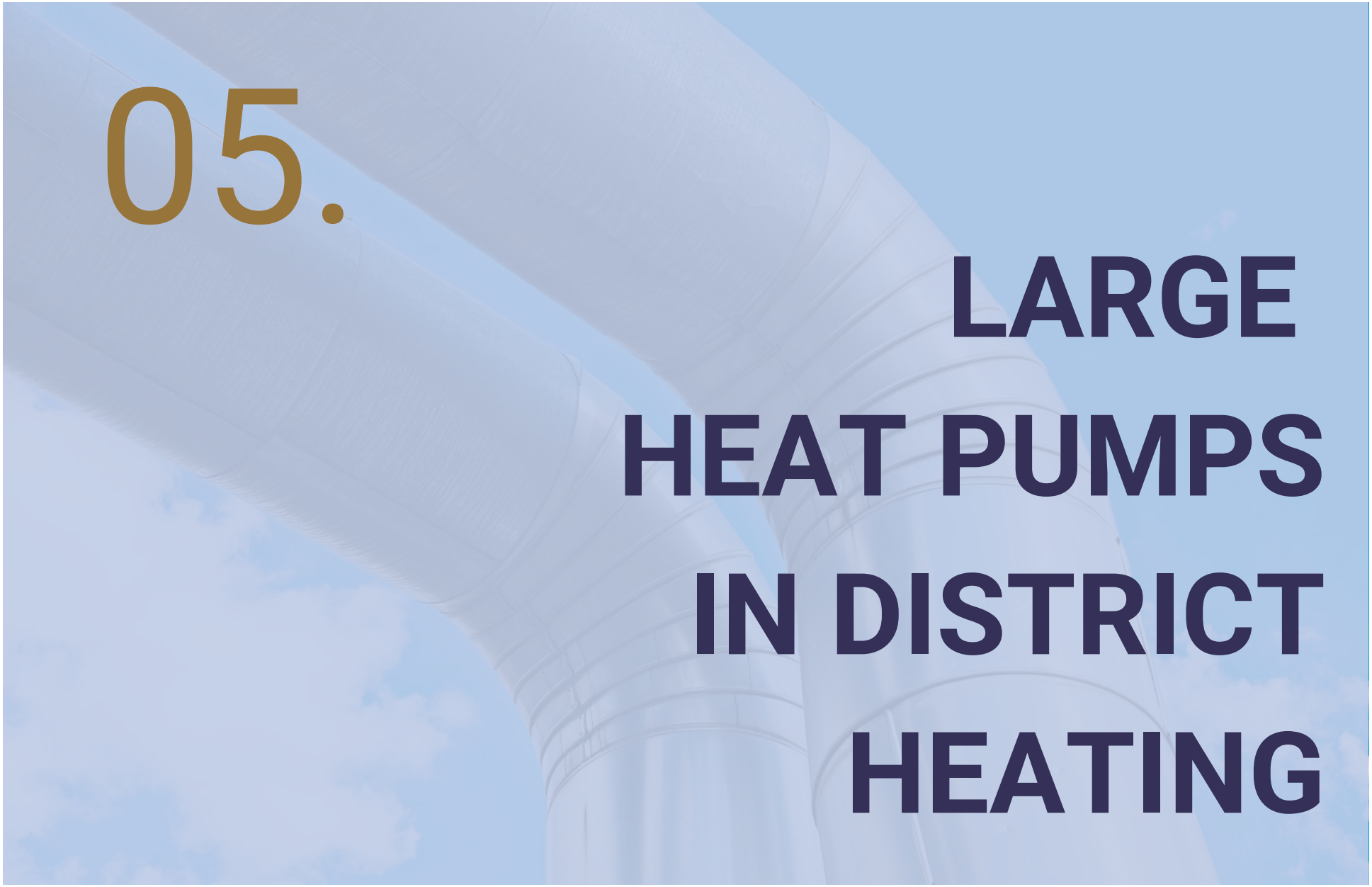


05.

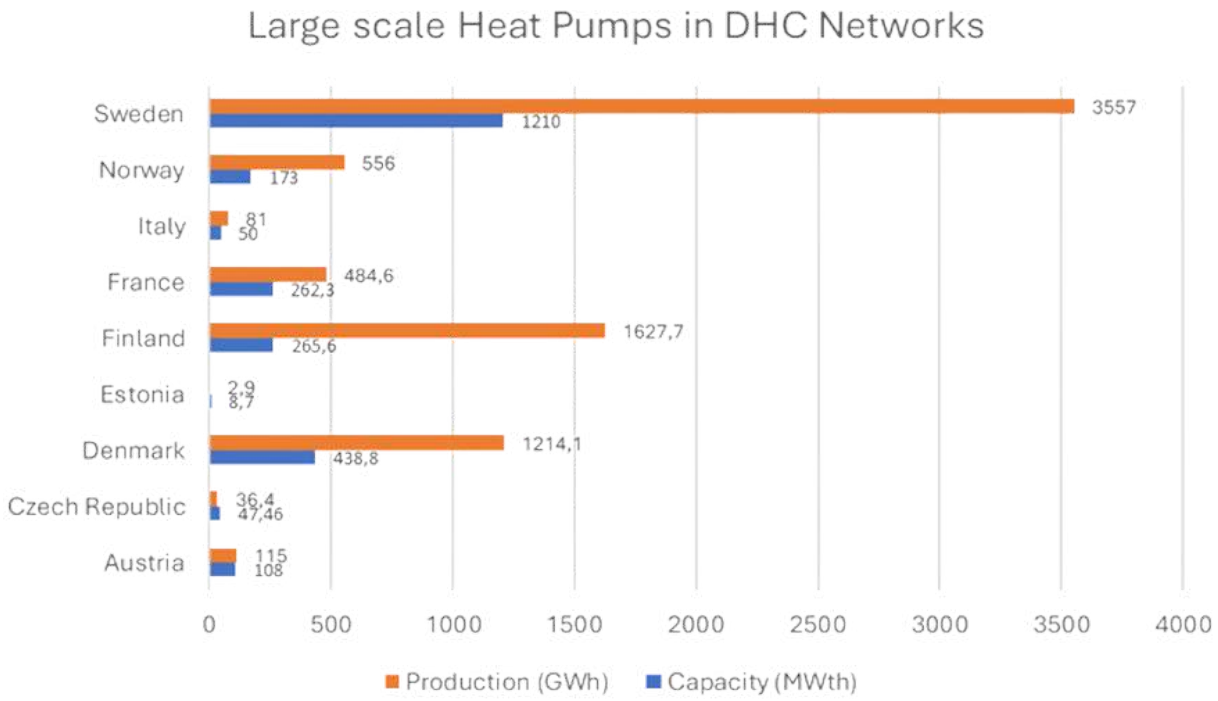
LARGE HEAT PUMPS IN DISTRICT HEATING

Large heat pumps in district heating

- **Large heat pumps represent an installed capacity of 2.5 GWth in heating and cooling networks, which is around 1% of the total capacity.** Based on investment plans of some of the largest heating and cooling networks in Europe, the installed capacity for large heat pumps will increase by at least 80% by 2030, triggering profound changes in the generation portfolio and growth of networks (ext. EHP, *Large Heat Pumps in District Heating and Cooling Systems,* 2022, p.5).

- Large heat pumps used in district heating and cooling (DHC) systems are not new. **In Sweden, heat pumps coupled with District Heating were installed in the 1980-90s to provide sustainable heat and balance the grid** (ext. EHP, *Large Heat Pumps in District Heating and Cooling Systems*, 2022, p.9).

Figure 5. Large heat pumps in District Heating - state of play:



Source: ext. EHP, *Large Heat Pumps in District Heating and Cooling Systems*, 2022, p.10.

Sources

- EHP, *Large Heat Pumps in District Heating and Cooling Systems*, 2022.

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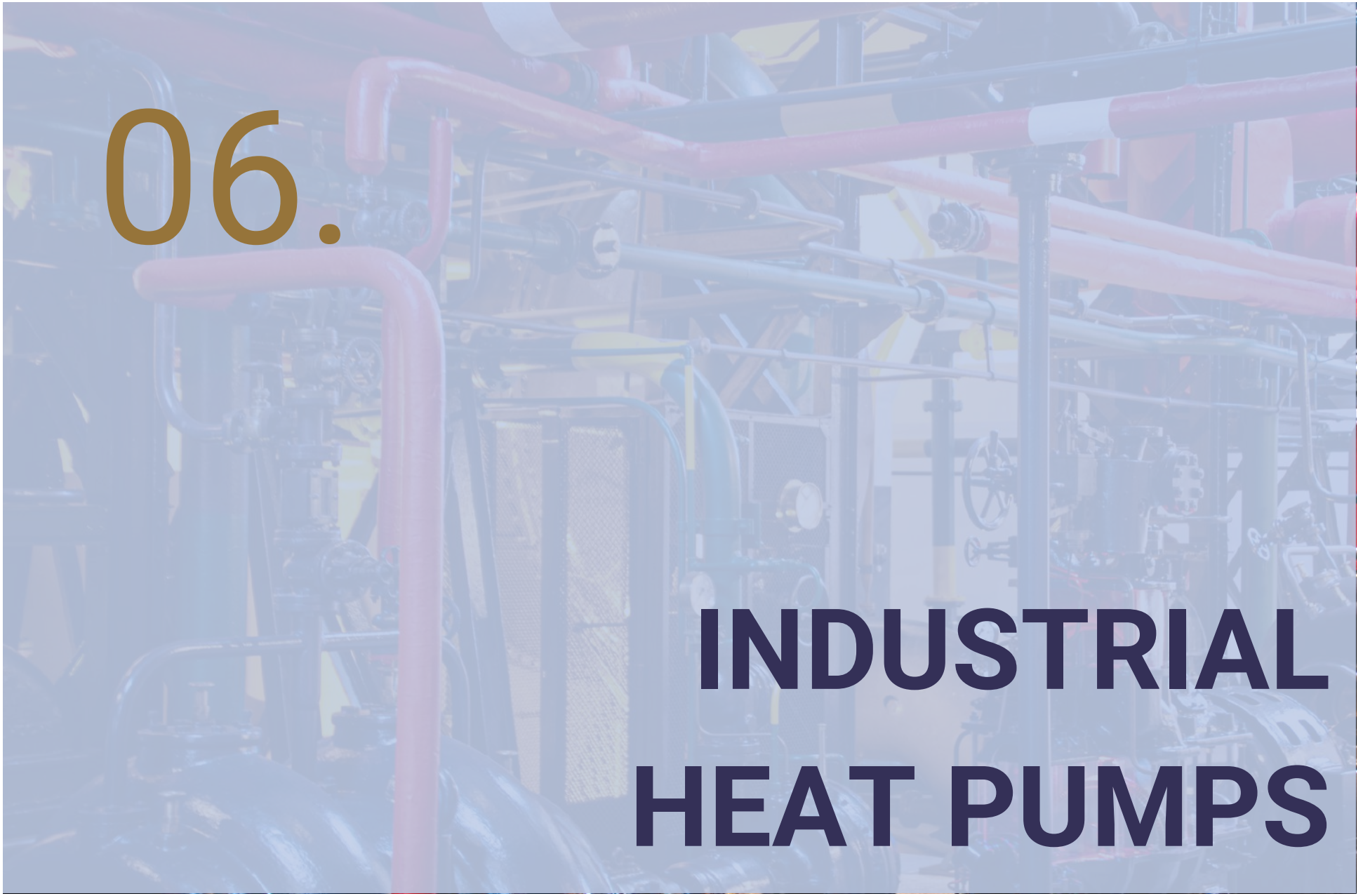

06.

INDUSTRIAL HEAT PUMPS

Industrial heat pumps

- **Heat accounts for more than 60% of energy use in industries.** By using renewable energy from the air, water, sewage and ground, exhaust air from buildings (hospitals, hotels, offices) or waste heat from processes and infrastructure, industrial heat pumps can contribute to the decarbonisation of low-temperature heat supply within companies (int. EHPA, *Industrial Heat Pumps Can Deliver*, 2022, p.1) .

- **Industrial heat pumps are a significant contributor to Europe's energy and climate ambitions. With current technology, they can deliver around 10% of the total final energy consumption of the industrial sector** (about 2000 TWh) and this can go up massively (int. EHPA, *Industrial Heat Pumps Can Deliver*, 2022, p.1).

- But industry is made up of a **variety of subsectors**, **from those that require extremely high temperatures** to be supplied directly to the process (such as steel, cement, glass, and non-ferrous metals) **to those that use direct heat and steam** (such as chemicals) **to lower temperature sectors** (such as pulp and paper, food, and beverages) where heat is mostly delivered to the process via steam. **Because of this diversity, deep emissions reductions can only be achieved by deploying a multitude of solutions, including waste heat recovery and heat pumps** (ext. EC, *Heat Pumps in the European Union*, 2023, p.14).

- **37% of the industrial process heat is currently below 200°C.** If you want to adapt all of that to industrial heat pumps you would need 105 GW of capacity, which would mean adding 300MW every month until 2050. Each installed MW of cooling capacity results in 1,2 MW of waste heat capacity. At 3000 operating hours/year, this means 3,6 GWh of excess heat that is discharged into the environment. (int. EHPA, *Industrial Heat Pumps Can Deliver*, 2022, p.1).

- **Today, industrial heat pumps are mainly used for low-temperature processes below 100 °C, notably in the paper, food and chemicals industries** (ext. IEA, *The Future of Heat Pumps*, 2022, p.36).

Temperature range	Technology readiness level (TRL)	Example process
<80 °C	TRL 11: Proof of market stability	Paper: De-inking Food: Concentration Chemical: Bio-reactions
80 °C to 100 °C	TRL 10: Commercial and competitive, but large-scale deployment not yet achieved	Paper: Bleaching Food: Pasteurisation Chemical: Boiling
100 °C to 140 °C	TRL 8-9: First-of-a-kind commercial applications in relevant environment	Paper: Drying Food: Evaporation Chemical: Concentration
140 °C to 160 °C	TRL 6-7: Pre-commercial demonstration	Paper: Pulp boiling Food: Drying Chemical: Distillation Various industries: Steam production
160 °C to 200 °C	TRL 8-9: First-of-a-kind commercial applications for small-scale MVR systems and heat transformers TRL 4-5: Early to large prototype	Various industries: High-temperature steam production
>200 °C	TRL 4: Early prototype	Various industries: High-temperature processes

Readiness level: TRL 1 to 5 | TRL 6 to 7 | TRL 8 to 11

Notes: MVR = mechanical vapour recompression. TRLs can vary for specific processes or different heat pump capacities.

Sources: Representation using the IEA extended TRLs (IEA, 2020b) based on Maruf et al. (2022).

- However, they can provide **energy at temperature levels of up to 160°C.** Prototypes are operating at around 180°C and industry experts expect temperatures of 200°C and beyond in this decade (int. EHPA, *Industrial Heat Pumps Can Deliver*, 2022, p.1).

Figure 6. Industrial heat pump technology readiness by temperature range:

Source: ext. IEA, *The Future of Heat Pumps*, 2022, p.36.

- **The industrial heat pump market would benefit from more standardised components,** in particular compressors and heat exchangers, **a boost in manufacturing capacity**, as well as **communications to raise awareness of the feasibility and opportunities** (ext. EC, *Heat Pumps in the European Union*, 2023, p.14).

- **If an industrial heat pump market can be established in Europe** with a market rollout of 37 TWh per year, **14,500 new jobs would be created** (ext. EC, *Heat Pumps in the European Union*, 2023, p.32).

Sources

- EHPA, *Industrial Heat Pumps Can Deliver*, 2022.
- IEA, *The Future of Heat Pumps*, 2022.
- Joint Research Centre of the European Commission, *Heat Pumps in the European Union,* 2023.

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07.

ELECTRIFICATION & RENEWABLE ENERGY: REDEFINING HEAT

Electrification and renewable energy: redefining heat

- **In the EU**, where **space and water heating in buildings account for 12% of GHG emissions** (int. EHPA, *Carbon pricing for buildings and industry*, 2022, p.2), **installing heat pumps instead of fossil-fuel-based boilers significantly reduces greenhouse gas emissions in all major heating markets**, even with the current electricity generation mix— an advantage that will increase further as electricity systems decarbonise (ext. IEA, The Future of Heat Pumps, 2022, p.11).

- **In 2022, the number of heat pumps sold replaced roughly 4 billion cubic metres (bcm) of natural gas, avoiding about 8 million tonnes (Mt) of CO2 emissions** (int. EHPA, *European Heat Pump Market and Statics Report 2023*).

- **Today, Europe's entire heat pump stock avoids 54 Mt of CO2 – roughly equivalent to the annual emissions of Greece** (int. EHPA, *European Heat Pump Market and Statics Report 2023*, p.5).

- **In 2022, the European Union saw a 2.5% or 70 Mt reduction in CO2 emissions** (ext. IEA, *CO2 Emissions in 2022*, 2023, p.4).

- **Data from Cambridge Analytics shows that CO2 emissions from EU residential buildings can be lowered by 46% in comparison to 2022** if the REPowerEU's target of having a total of 60 million heat pumps

- installed in Europe by 2030 is met (around 30 million more hydronic heat pumps to be added to the current stock of 20 million heat pumps present today). In this scenario, **NOx emissions from household heating by almost 40% by 2030 compared to 2022** (int./ext. ECF, EHPA, *Europe's leap to heat pumps,* 2023, p.4).

- Worldwide, CO2 emissions from space and water heating, including indirect emissions from power generation, are expected to fall by more than 1.2 Gt, or more than a quarter, by 2030. Heat pumps account for nearly 40% of this reduction, which is roughly equivalent to Canada's emissions in 2021 (ext. IEA, *The Future of Heat Pumps*, 2022, p.28).

- Advanced economies, **primarily the European Union and the United States, can reduce by three-quarters their heating-related emissions due to heat pumps** by 2030 (ext. IEA, *The Future of Heat Pumps*, 2022, p.28)

- The impressive growth of solar PV and wind generation helped prevent around 465 Mt CO2 in power sector emissions. Other clean energy technologies, including other renewables, electric vehicles, and heat pumps, helped prevent an additional roughly 85 Mt CO2 last year worldwide (ext. IEA, *CO2 Emissions in 2022,* 2023, p.6).

- **Globally, renewables represent almost 30% of global electricity use**. This figure could be more than doubled, reaching over 60% in the Net Zero Emissions (NZE) scenario (ext. *IEA, Energy Technology Perspectives, 2023*, p.36).

- **Electric technologies** such as heat pumps and EVs **provide energy services more efficiently than rival technologies based on the direct combustion of fossil fuels** (ext. IEA, World Energy Outlook 2023, p.107).

- **Grid capacity needs to be considered**, at the level of the transmission grid and also locally in distribution when an entire apartment building or neighbourhood switches to heat pumps. **Utilities say that a roll-out of 50 million heat pumps by 2030 in Europe will not jeopardise grid stability if grids are upgraded and demand-side flexibility is exploited** (ext. EC, H*eat Pumps in the European Union,* 2023, p.41).

- **The tax treatment of electricity relative to gas is still a key policy area affecting heat pump economics**. This is currently being re-examined at both national and EU levels (ext. EC, *Heat Pumps in the European Union*, 2023, p.21).

- In 2021, a **revision of the Energy Taxation Directive** was proposed that would help level the playing field between electricity and gas. **There is also a proposal in the Electricity Market Design for dual electricity tariffs for heat pump users** (ext. EC, *Heat Pumps in the European Union*, 2023, p.21).

Sources

- ECF, EHPA, *Europe's leap to heat pumps*, 2023.
- EHPA, *European Heat Pump Market and Statics Report 2023.**
- IEA, *CO2 Emissions in 2022*, 2023.
- IEA, *Energy Technology Perspectives*, 2023.
- IEA, *The Future of Heat Pumps*, 2022.
- IEA, *World Energy Outlook 2023*.
- Joint Research Centre of the European Commission, *Heat Pumps in the European Union*, 2023.

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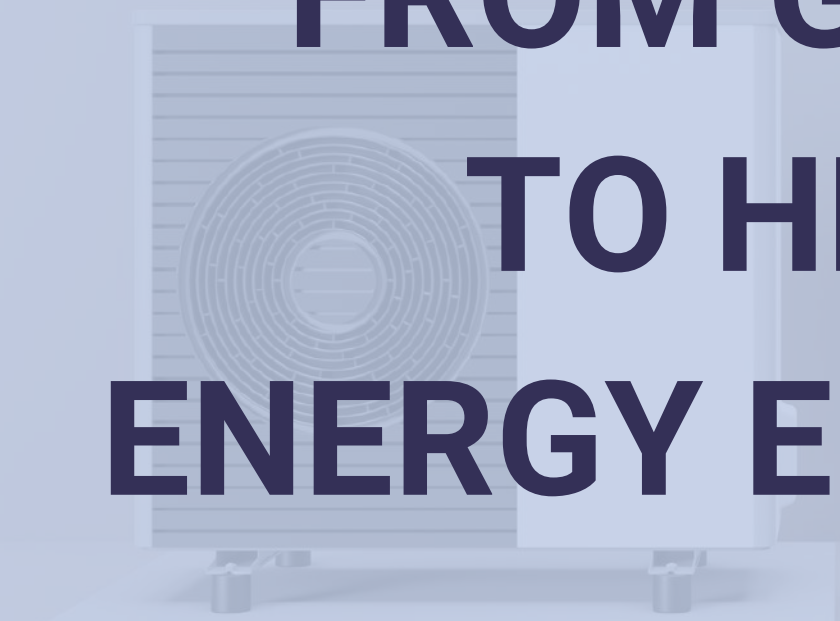
08.

FROM GAS BOILERS TO HEAT PUMPS: ENERGY EFFICIENCY & SECURITY



From gas boilers to heat pumps: energy efficiency and security

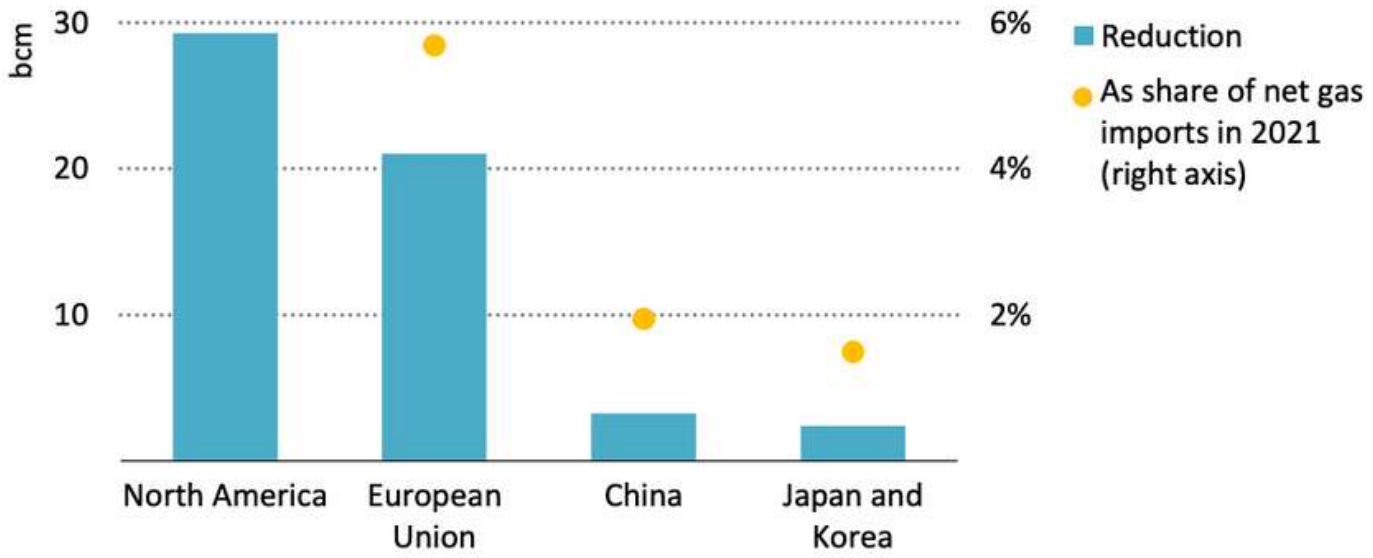
- Heat pumps play a major role in reducing fossil fuel use in buildings by 2030. **The direct use of fossil heating for space and water is expected to drop by 29% between 2021 and 2030 globally according to the IEA**, almost half of which is due to heat pumps (ext. IEA, *The Future of Heat Pumps*, 2022, p.p. 26-27).

- **Heat pumps currently available on the market are three-to-five times more energy efficient than natural gas boilers (**ext. IEA, The Future of Heat Pumps, 2022, p.11).

- **Gas accounts for the biggest share of the total fossil energy sources, with its use expected to drop by over 160 billion cubic metres (bcm), or 21%, by 2030, around half due to heat pumps.** The European Union contributes the biggest gas savings in the advanced pledged scenario (APS – ext. IEA, *The Future of Heat Pumps*, 2022, p.p. 26-27).

- Ramping up the installation of heat pumps reduces gas demand in the buildings sector by 80 billion cubic meters (bcm) globally by 2030 compared with today, including 21 bcm in the European Union (ext. IEA, *The Future of Heat Pumps*, 2022, p.47).

Figure 7. Prospective reduction in natural gas demand in buildings associated with heat pump deployment in selected regions/countries in 2021-30:



Source: ext. IEA, *The Future of Heat Pumps*, 2022, p.47.

- The transition from fossil fuels to electric heat pumps contributes significantly to the decarbonisation of building heating. **Advanced economies, primarily the European Union and the United States, can reduce by three-quarters their heating-related emissions due to heat pumps** (ext. IEA, *The Future of Heat Pumps,* 2022, p.28).

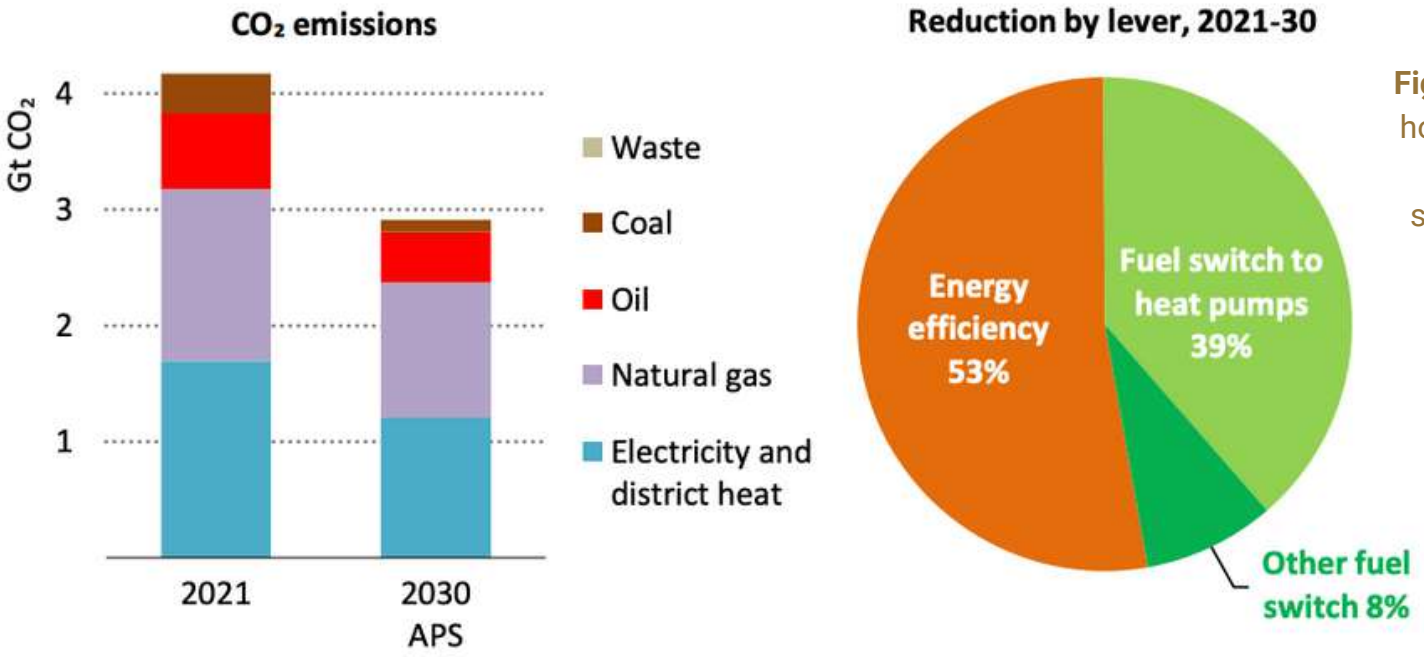


Figure 8. Energy bill savings for households switching to a heat pump from a gas boiler in selected regions/countries in 2021-30:

Source: ext. IEA, *The Future of Heat Pumps*, 2022, p.28.

- **The war in Ukraine prompted the EU to take measures to rapidly wean its economy off imported gas.** A fast heat pump roll-out could make Europe less dependent on foreign energy imports by **reducing the EU's gas demand in buildings by 40% by 2030 compared to 2022** and a**llowing the EU to reduce its energy import bill by €60 billion between now and 2030**, according to Cambridge Analytics (int./ext. ECF, EHPA, Europe's leap to heat pumps, 2023, p.4).

- **There are still over 90 million gas and oil boilers in the EU and a new boiler is installed every 8 seconds**. Only by accelerating the transition to clean heating technologies like heat pumps, will the EU be able to meet its climate commitments: **CO2 emissions from EU residential buildings can be lowered by 46% between 2022 and 2030 if heat pumps are deployed in line with REPowerEU's ambition** (int./ext. ECF, EHPA, Europe's leap to heat pumps, 2023, p.4).

Sources

- ECF, EHPA, *Europe's leap to heat pumps*, 2023.
- IEA, *The Future of Heat Pumps*, 2022.

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09.

MAKING THE SWITCH: COSTS & SAVINGS

Making the switch: costs and savings

- With current fossil fuel prices, **heat pumps** will be cost-competitive options for consumers as they are **on average 30% cheaper to run than gas boilers over their lifetime.** More heat pumps and energy renovations also help protect consumers from future energy price shocks, **by cutting average heating bills by 20% by 2030 compared to a business-as-usual scenario,** according to recent research by Cambridge Econometrics (int./ext. ECF, EHPA, Europe's leap to heat pumps, 2023, p.4).

- **Electric heat pumps are the most affordable option for consumers to decarbonise their heating.** In high-density areas, district heating powered by heat pumps is also competitive. In the period 2025-2040, the European Consumer Organisation (BEUC) estimates that **hydrogen will be far more expensive than gas is today** (ext. BEUC, *Goodby Gas: why your next boiler should be a heat pump*, 2022 p.3).

- **However, high upfront costs are among the major deterrents that prevent households from replacing their gas boilers with heat pumps.** Household energy bills have risen sharply around the world, in some cases doubling. Governments have responded to rising prices by enforcing price support systems such as caps on household energy bills (e.g., France and the United Kingdom), direct cash transfers (e.g., Germany), and long-term supply contracts to ensure gas demand (e.g. China and Korea) (ext. IEA, *The Future of Heat Pumps*, 2022, p.52).

- **In total, governments around the world have set aside approximately USD550 billion to protect consumers and businesses from rising energy prices as of September 2022** (ext. IEA, *The Future of Heat Pumps*, 2022, p.52).

- Some governments offer targeted subsidies for energy efficiency retrofits and heat pumps. Several countries, **mostly in Europe, have such policies, covering roughly one-third of global heating demand** (ext. IEA, *The Future of Heat Pumps*, 2022, p.53).

- The **upfront costs** of purchasing and installing a heat pump **vary significantly on the region and the type of pump installed** (ext. IEA, *Energy Technology Perspectives*, 2023, p.p. 46-47).

- **Many EU countries have introduced policies and incentives** to encourage the use of clean energy technologies. In the European Union, Value Added Tax (VAT) is a tax on the consumption of goods and services. **The VAT rate for renewable energy products in the EU can vary depending on the type of product and the country where it is sold** (int. EHPA, *VAT on electricity and heat pumps in Europe*, 2023, p. 2).

- **The VAT Directive (EU 2022/542) allows EU Member States to lower taxes on certain goods and services that are considered necessities**. This includes the supply and installation of low-emission, high-efficiency heating systems – such as heat pumps. Taxes can be lowered through reduced rates or exemptions and the possibility of claiming back VAT (int. EHPA, *VAT on electricity and heat pumps in Europe*, 2023, p. 2).

- **There are 16 EU Member States, plus Switzerland and the UK, which set a lower VAT rate on heat pumps**. It is one way of reducing the investment cost. In the future, this should be complemented by a lower tax rate on electricity, including VAT. **The overall aim should be to lower the electricity-to-gas price ratio**. This will allow end-users not only to save energy but also cost over the lifetime of heating and cooling equipment. (int. EHPA, *VAT on electricity and heat pumps in Europe*, 2023, p.2).

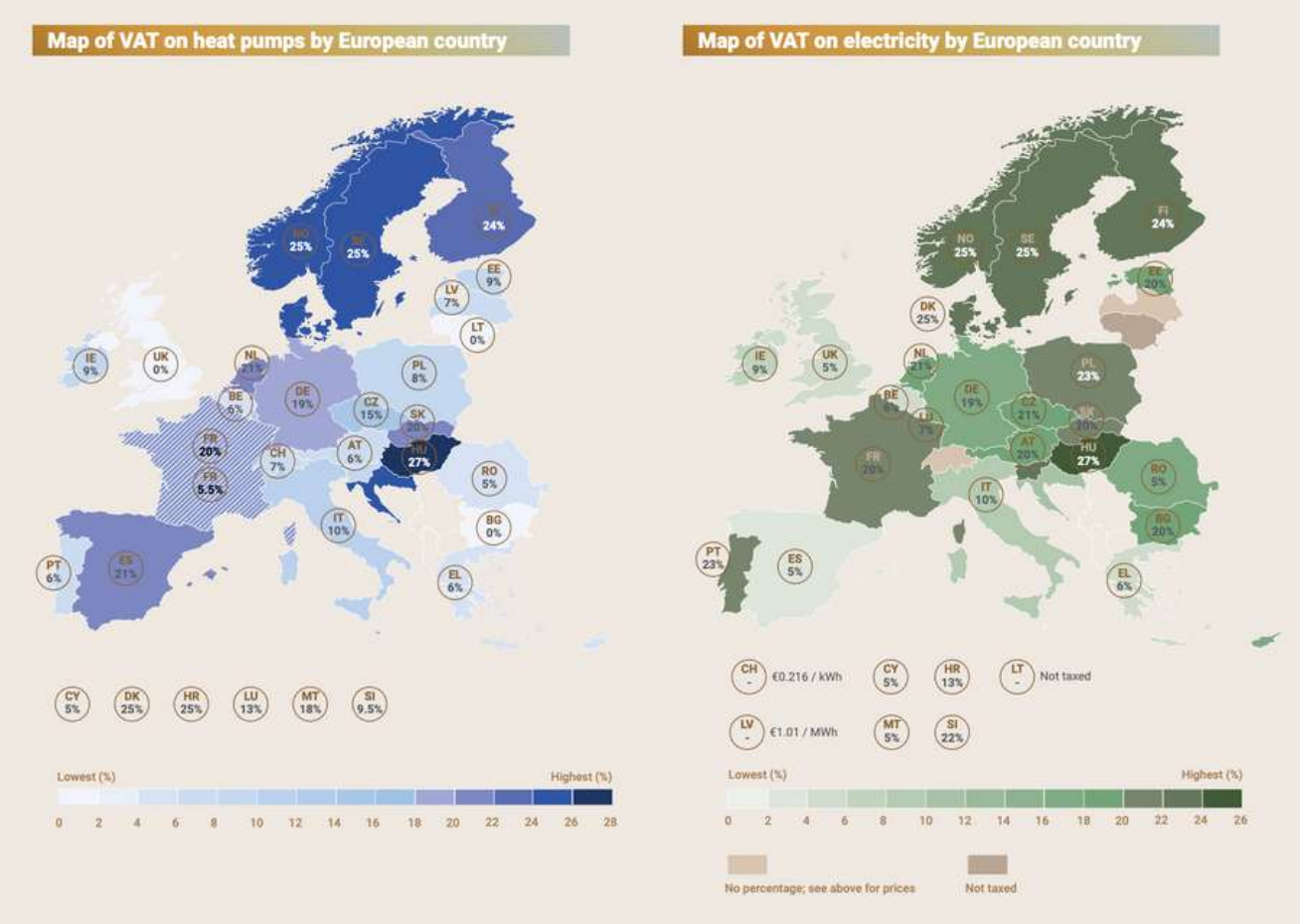
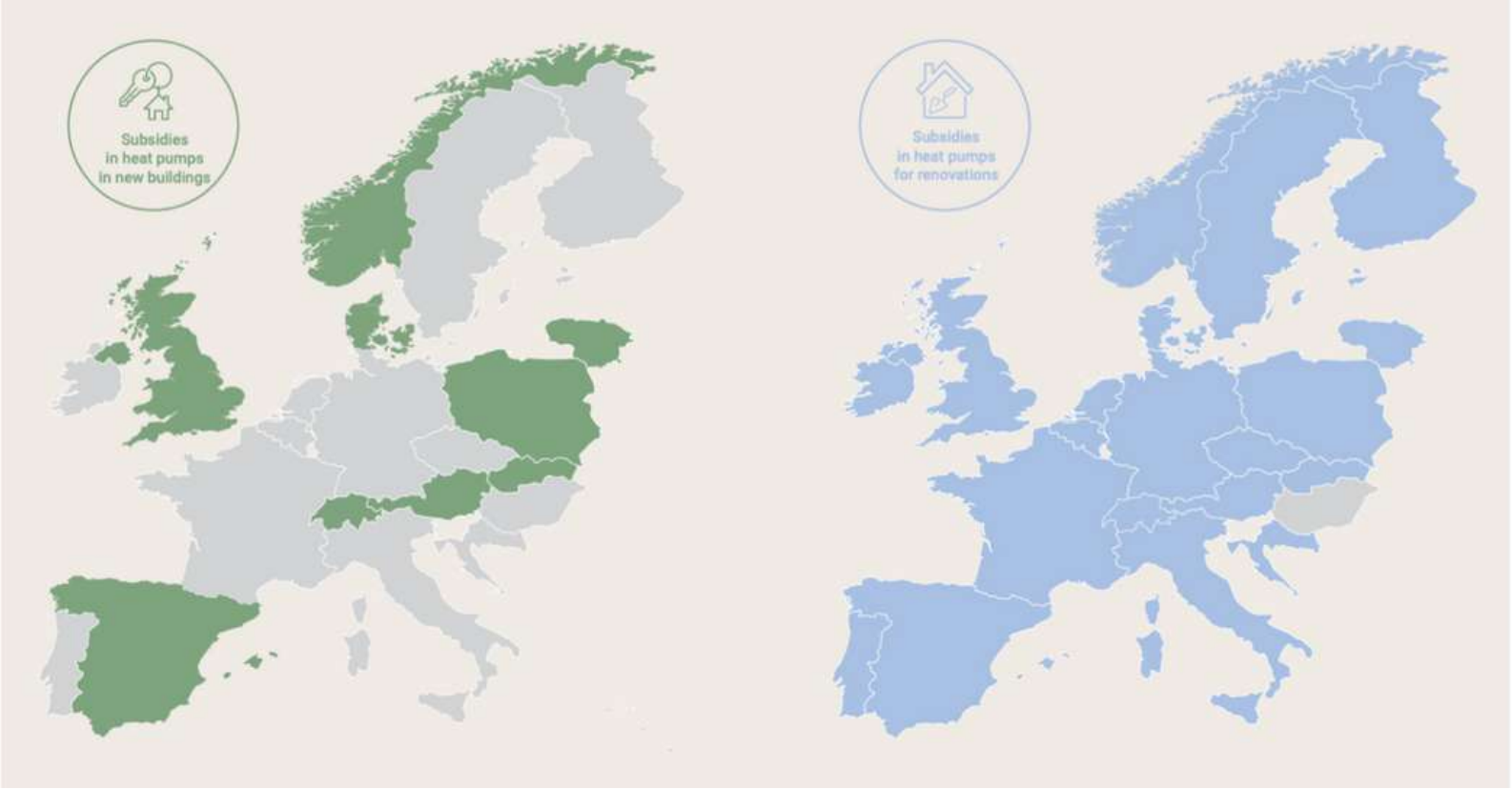


Figure 9. Maps of VAT on heat pumps and electricity in Europe:

Source: int. EHPA, *VAT on electricity and heat pumps in Europe, 2023, p.3*.

- **Other financial incentives can cover measures such as low-interest loans, grant programs, and tax rebates.** They are often different for lower and higher-income households (int. EHPA, *Subsidies for Residential Heat Pumps*, 2023, p.2).

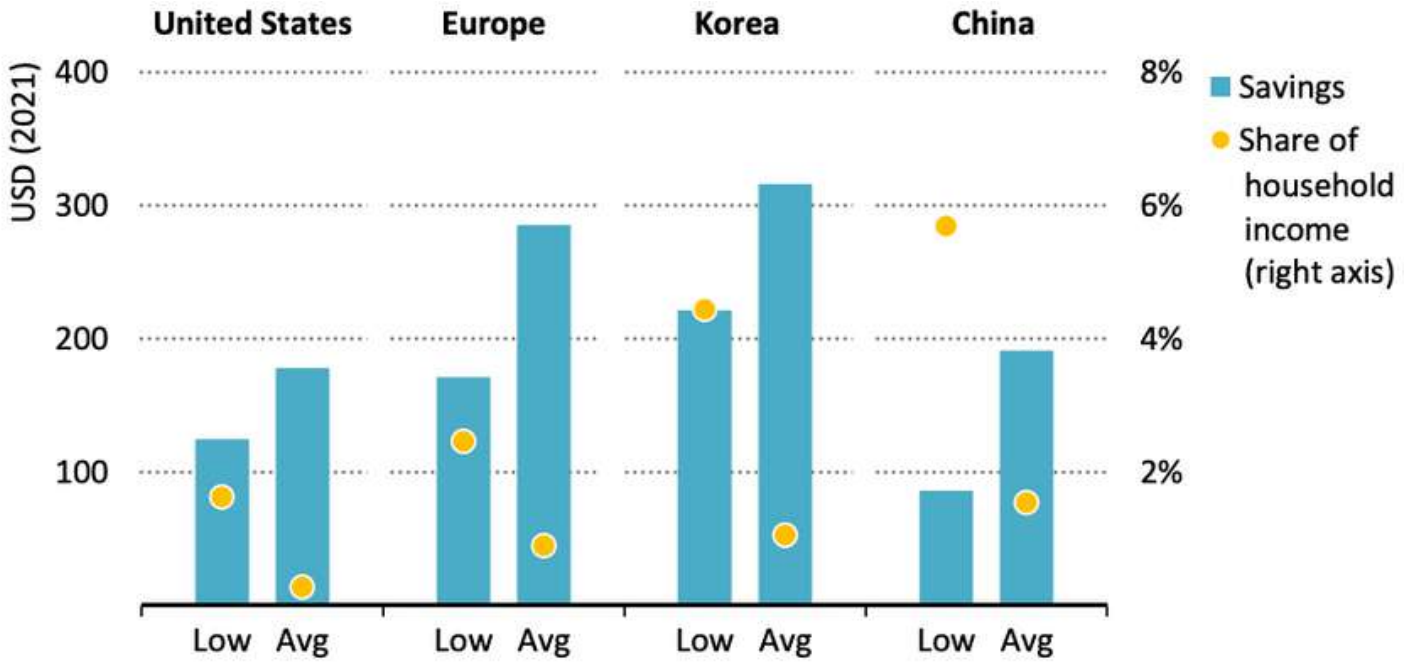
Figure 10. Subsidies for residential heat pumps – overview map:



Source: int. *EHPA*, *Subsidies for Residential Heat Pumps*, 2023.

- In 2021, households that switched from a gas boiler to a heat pump saved significantly on their energy bills, with average savings ranging from USD 180 in the United States to nearly USD 300 in Europe. **Under 2022 energy price increases, these savings are even more conspicuous, ranging from USD 300 per year in the United States to USD 900 in Europe** (ext. IEA, *The Future of Heat Pumps*, 2022, p.53).

Figure 11. Energy bill savings for households switching to a heat pump from a gas boiler in selected regions/countries, 2021:



Source: ext. IEA, *The Future of Heat Pumps*, 2022, p.53.

- **Taxes and tariffs need to be carefully designed to ensure they do not discourage consumers from installing a heat pump**. On the policy level, both energy taxes and carbon pricing schemes need to be designed so as not to penalise low-emissions electricity over fossil fuel use (ext. IEA, *The Future of Heat Pumps,* 2022, p.53).

- **'Smart heating' (e.g. when it's cheaper at off-peak times) with heat pumps will reduce consumers' heating costs by up to 31% compared to conventional heating.** This is because consumers using electricity smartly reduces the need for investments in electricity grids. The savings have the potential to reduce grid charges on consumers' energy bills (ext. BEUC, *Goodbye Gas: why your next boiler should be a heat pump*, 2022 p.3).

Sources

- BEUC, *Goodby Gas: why your next boiler should be a heat pump*, 2022.
- ECF, EHPA, *Europe's leap to heat pumps,* 2023.
- EHPA, *Subsidies for Residential Heat Pumps*, 2023.
- EHPA, *VAT on electricity and heat pumps in Europe*, 2023.
- IEA, *Energy Technology Perspectives*, 2023.
- IEA, *The Future of Heat Pumps*, 2022.

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10. THE EU HEAT PUMP ACCELERATOR AND THE FUTURE OF CLEAN HEAT

The EU heat pump accelerator and the future of clean heat

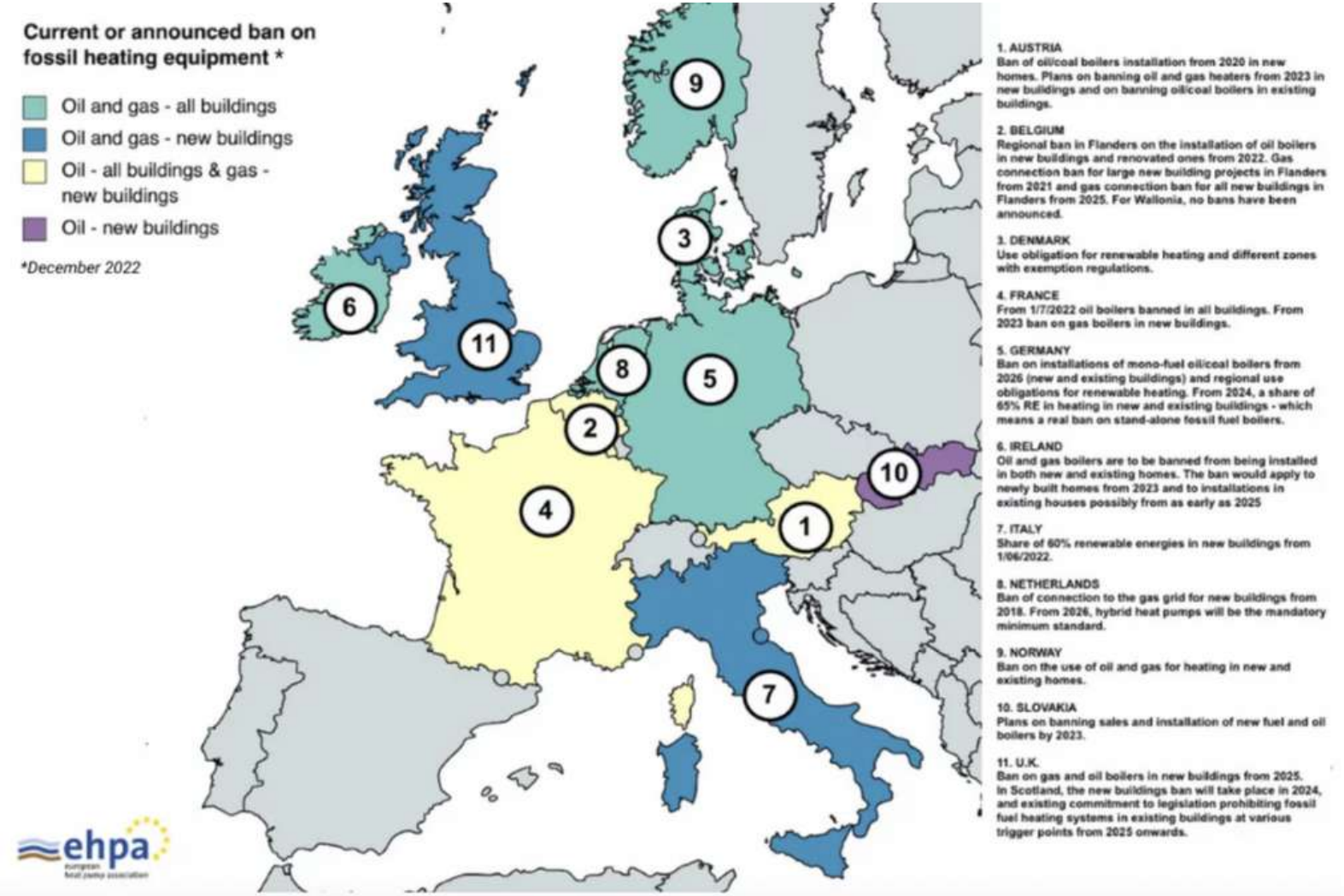
- REPowerEU is the European Commission's plan to make Europe independent from Russian fossil fuels well before 2030, in the wake of Russia's invasion of Ukraine.

- The REPowerEU targets require the amount of **newly plugged-in heat pumps to double each year. EHPA estimates that this would lead to 20 million more heat pumps by 2026 and 60 million by 2030, up from about 17 million units in 2021** (int. EHPA, *EU Heat Pump Accelerator*, 2023).

- To help reach the target, **the European Commission announced a heat pump action plan** to be published at the beginning of 2024. **To input the plan, EHPA and other organisations worked together to build an 'accelerator' document which identifies the barriers and solutions to faster heat pump roll-out. The document was handed over to EU Commissioner Kadri Simson on 6 June 2023.** (int. EHPA, *EU Heat Pump Accelerator*, 2023).

- **Over the past two years, 19 European governments have announced plans to phase out or ban fossil fuel heaters** (ext. CREA, *Shocked into action*, 2022, p.5) (int. EHPA, *Which countries are scrapping fossil fuel heaters?*, 2022), as shown in the following map:

Figure 12. Current or announced bans on fossil heating equipment, December 2022:



Source: int. EHPA, *Which countries are scrapping fossil fuel heaters?*, 2022.

- **If all EU countries implemented a ban on new fossil fuel boiler installations beginning in 2025, 48 million households would be required to switch to alternative heating options by 2030** (ext. IEA, *The Future of Heat Pumps*, 2022, p.35).

- Simultaneously, **a number of EU member states have recently strengthened their policy support for heat pumps** (ext. IEA, *The Future of Heat Pumps*, 2022, p.33).

- **These extra heat pump installations will lower gas consumption by 7 billion cubic meters in 2025 and 21 billion cubic metres by 2030, which is roughly equal to 15% of Russian imports today** (ext. IEA, *The Future of Heat Pumps*, 2022, p.34).

Figure 13. Deployment of heat pumps in selected European countries:

Source: ext. IEA, *The Future of Heat Pumps*, 2022, p.33.

Country	Year	Target
European Union	2030	30 million additional heat pumps installed compared with 2022
Belgium	2030	Final energy consumption by heat pumps to increase fivefold over 2018
France	2023	Reach 2.7 million to 2.9 million total heat pumps installed
Germany	2024 2030	Install 500 000 heat pumps per year Reach a heat pump stock of 6 million
Hungary	2030	Final energy consumption by heat pumps to increase sixfold over 2020
Italy	2030	Final energy consumption by heat pumps to increase twofold over 2017
Poland	2030	Final energy consumption by heat pumps to increase threefold over 2020
Spain	2030	Final energy consumption by heat pumps to increase sixfold over 2020
United Kingdom	2028	600 000 annual heat pump installations

Sources: European Commission (2022b); France, Ministry of Ecological Transition (2022); Clean Energy Wire (2022); GOV.UK (2020); Government of Italy (2019); Government of Spain (2019); Toleikyte and Carlsson (2021).

Sources

- BEUC, *Goodby Gas: why your next boiler should be a heat pump*, 2022.
- CREA, *Shocked into action*, 2022.
- EHPA, *EU Heat Pump Accelerator*, 2023.
- EHPA, *Which countries are scrapping fossil fuel heaters?*, 2022.
- IEA, *The Future of Heat Pumps*, 2022.

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11. EMPLOYMENT & INNOVATION IN THE HEAT PUMP SECTOR

Employment and innovation in the heat pump sector

- **Globally, meeting the Net Zero Emissions Scenario requirements in 2030 would require a total of roughly USD 15 billion in cumulative investment to expand heat pump manufacturing capacity**, beyond what has already been announced (ext. IEA, *Energy Technology Perspectives*, 2023, p.235).

- Supportive EU and national legislation alongside the current market growth are set to strengthen heat pumps' manufacturing base in Europe. **To reduce reliance on the imports of components, the European Commission intends to increase domestic production by facilitating access to finance where necessary.**

- Part of the objectives of **REPowerEU aims to boost and support European heat pump supply chains** by improving the regulatory framework, ensuring lifecycle sustainability, and supporting R&D (ext. IEA, *The Future of Heat Pumps*, 2022, p.p.35-36).

- The Green Deal Industrial Plan with its **Net-Zero Industry Act**, launched in 2023, further expands the REPowerEU targets, establishing a **large-scale skills partnership under the EU Pact for Skills to train and upskill workers in the heat pump industry** (ext. EC, A Green Deal Industrial Plan for the Net-Zero Age, 2023, p. 15).

- According to a recent analysis by Cambridge Econometrics, the **accelerated deployment of heat pumps** (both in individual heating systems and in district heating networks) and a high renovation rate can **increase the disposable incomes of households by at least 2%, leading to a 2.5% growth in annual Gross Domestic Product (GDP)** and **create 3 million additional jobs by 2030** compared to a business as usual scenario (int./ext. ECF, EHPA, *Europe's leap to heat pumps*, 2023, p.4)

- **Leading manufacturers have recently announced plans to invest more than USD 4 billion** in expanding heat pump production capacity and related efforts, mostly in Europe (ext. IEA, *The Future of Heat Pumps*, 2022, p.14).

Figure 14. Recently announced investments in heat pump production by selected manufacturers in Europe, in 2022:

Source: ext. IEA, *The Future of Heat Pumps*, 2022, p.80.

Company	Region/country	Investment allocation	Investment (EUR)	Date of completion
Vaillant	EU	Heat pumps and energy efficiency	130 million	2022-2023
Hoval	Liechtenstein, Slovakia	Heat pumps	60 million	2023-2024
Clivet (Midea Group)	Italy	Heat pumps	60 million	2024
Mitsubishi	Turkey, UK	Heat pumps and air conditioning	128 million	2024
Bosch	Europe	Heat pumps	300 million	2025
Daikin Europe	Belgium, Czech Republic, Germany, Poland	Heat pumps, digitalisation, R&D and service capacity	1.2 billion	2025
Stiebel Eltron	Germany	Heat pumps	600 million	2025
NIBE	Sweden	Heat pumps	460 million	2025
Viessmann	Poland	Heat pumps and other green solutions	1 billion	2025
Panasonic	Czech Republic	Heat pumps	145 million	2026

Note: Converted to EUR for Mitsubishi (USD 113 million plus GBP 15 million) and NIBE (SEK 5 billion [Swedish kronor]).

Sources: Vaillant Group (2022); Business Solutions (2021); Hoval (2022); Quanlin (2022); Mitsubishi (2022); Walker (2021); Bosch (2022); Daikin (2022); Klingauf (2022); NIBE (2022); Viessman Group (2022); Panasonic (2022).

- In Europe, 13 manufacturers in Germany, Poland, Belgium, Republic of Türkiye, the United Kingdom, France, Sweden, Slovakia and the Czech Republic made concrete expansion plans public (ext. IEA, *Energy Technology Perspectives*, 2023, p.p 236-237).

- **There are more than 255 facilities in the EU that manufacture (i.e. assemble) heat pumps, across 21 Member States**. Italy and Germany lead at the country level, although Eastern Europe competes strongly as a region. (ext. EC, *Heat Pumps in the European Union*, 2023, p.27).

- Heat pumps create jobs locally. More public and private investments will boost heat pump manufacturing and job creation in Europe. **The total turnover is worth €14.5 billion.** It is interesting to note that most of these sites are located in less densely populated areas of Europe, providing employment and perspective to rural communities (int. EHPA, *Heat Pumps in Figures*, 2022, p.16).

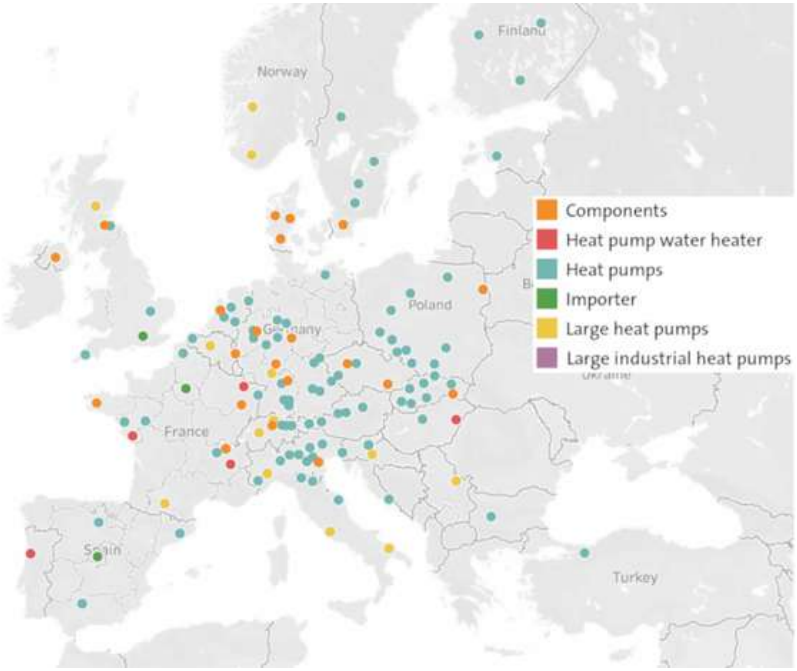


Figure 15. Heat pump manufacturing locations - coloured by type:

Source: int. EHPA, *Statistics*, 2022.

- Although **public RD&I funding for heat pumps is small compared to some other clean energy technologies**, the EU spends a significant amount on public research into heat pumps relative to several major countries worldwide. **EU support for RD&I into heat pumps is provided mainly through Horizon 2020 and Horizon Europe, with 59 ongoing and completed projects worth around EUR 350 million** (ext. EC, *Heat Pumps in the European Union*, 2023, p.22-23).

- **Investment in heat pump start-ups in the EU jumped from EUR 11 million in 2021 to almost EUR 70 million in 2022. The EU as a whole is host to 41% of all innovating companies.** The United States has a strong base of venture-capital-funded companies, while all innovators in Japan are larger corporations **The Netherlands has more start-ups than any other Member State** (ext. EC, *Heat Pumps in the European Union*, 2023, p.24-26).

- **Patents for heat pumps may be reported under a variety of codes**. The EU is a world leader in heat pump technology (Figure 18). Only 3% of Chinese inventions are high-value patents,29 compared to more than 60% of EU inventions. T**he EU share of all high-value patents was 47% during the period 2018-2020. Germany had a clear lead, with France, Sweden, Italy and the Netherlands also among the top ten countries worldwide** (ext. EC, H*eat Pumps in the European Union*, 2023, p.25-26).

- In terms of jobs, the heat pump industry employs a workforce in R&D, component and heat pump manufacturing, installers (including drillers), and service and maintenance.

- Based on the number of working hours required to install various types of heat pumps and experts' estimates of turnover per employee, **the total number of employees in the European heat pump industry is believed to be 116,679 people, with approximately 37% of these working in heat pump manufacturing** (int. EHPA, *Statistics*, 2022).

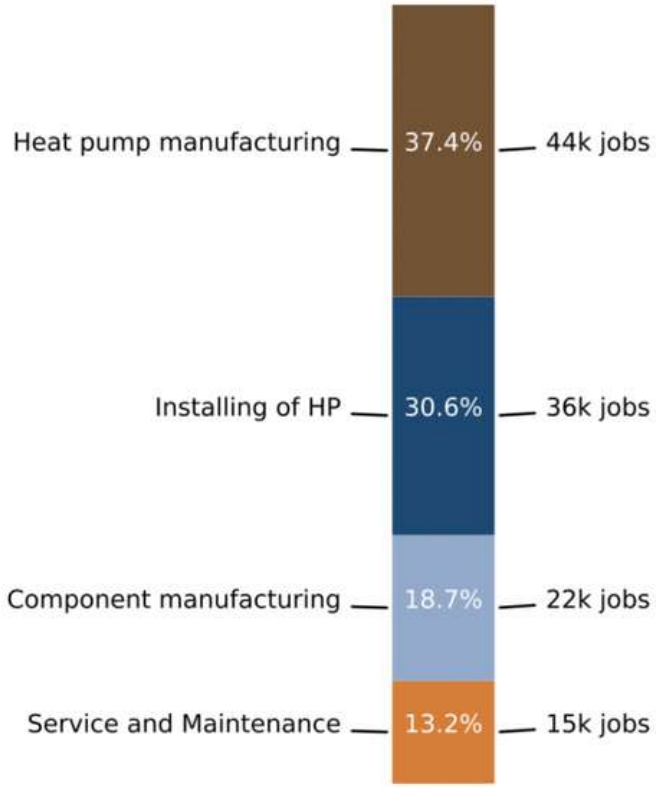


Figure 16. Employment in the heat pump sector in 2021:

Source: int. EHPA, *Statistics*, 2022.

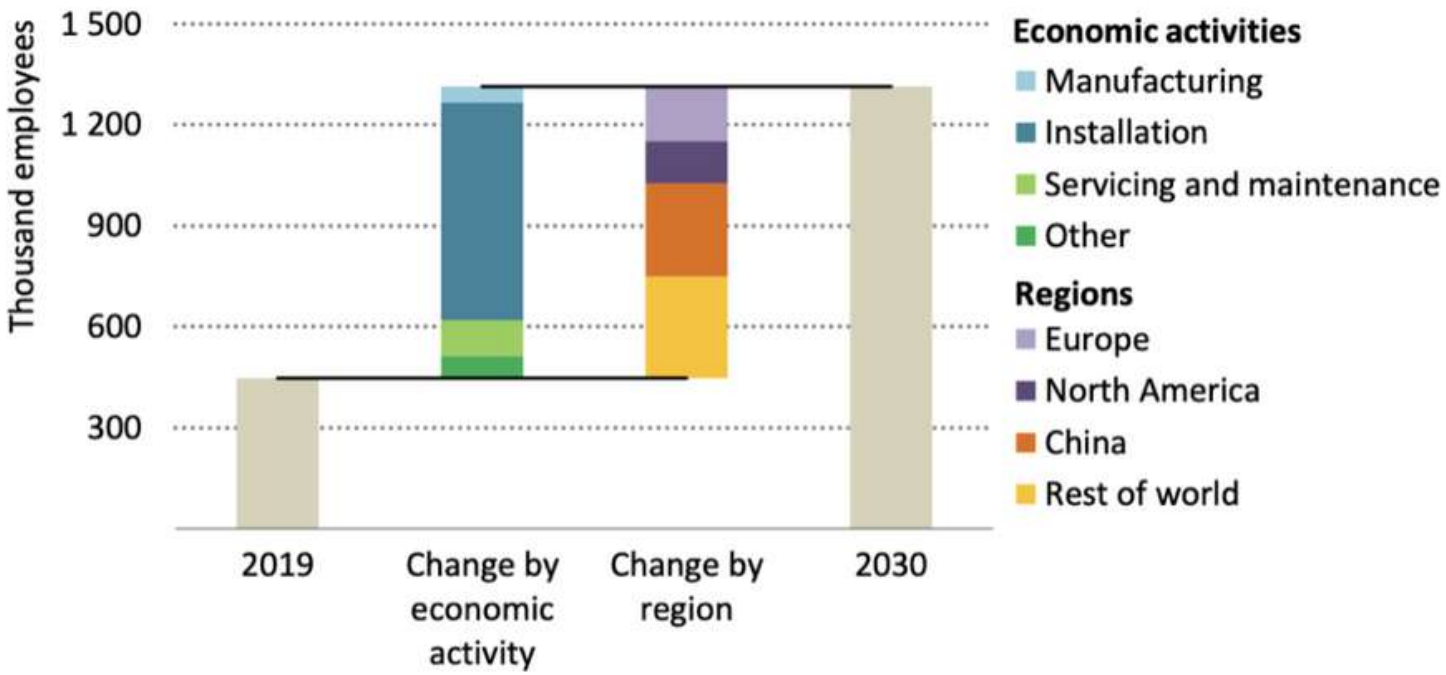
- By 2030, as European manufacturers and installers respond to the ambitious goals of the REPowerEU initiative and other national heat pump deployment plans, the workforce is set to become three times bigger (ext. IEA, *The Future of Heat Pumps*, 2022, p.60).

- **This is a deficit in skills as well as workers.** There is a lack of heat pump-specific skills in the curricula for the relevant trades (e.g. plumber, electrician, heating technician), and issues with skills recognition across Member States. **There are particular needs for skills in installing integrated systems, in digitalisation, in refrigerants and in ground-source heat pumps (including drilling). The Renewable Energy Directive (RED) requires installers to have a specific certification to install heat pumps**. Also, **the F-Gas Regulation requires anyone who installs, services, repairs or decommissions heat pumps with HFCs to do leak checks or to reclaim HFCs to be certified** (ext. EC, Heat Pumps in the European Union, 2023, p.31-32).

- Therefore, **EHPA estimates that the number of employees needed to supply the 2030 sales to the market will amount to between 450 and 500,000 FTE (full-time equivalent), compared to around 117,000 today**. While some of these will be re-trained boiler installers, others will be new to the industry (int. EHPA, *EU plan will boost heat pumps but aims too low*, 2023).

- **Worldwide, approximately 450,000 people work directly in the manufacturing, planning and installation, wholesale, servicing, and maintenance of heat pumps today.** With an estimated 210,000 workers employed, installation is the most labour-intensive part of the heat pump value chain (ext. IEA, *The Future of Heat Pumps*, 2022, p.59).

Figure 17. Variations in heat pump employment by activity and region/country, 2019-2030:



Source: ext. IEA, *The Future of Heat Pumps,* 2022, p.59.

- **By 2030, global employment in the heat pump sector is expected to triple to over 1.3 million workers** (ext. IEA, *The Future of Heat Pumps*, 2022, p.59).

- **Globally, the number of heat pump installers is expected to reach 850,000 by 2030, while around 170,000 more workers are needed to maintain and service the additional heat pumps installed by 2030.** Moreover, 700,000 additional workers will be employed in the construction and renovation of energy-efficient buildings (ext. IEA, *The Future of Heat Pumps*, 2022, p.60).

- Manufacturing workers need to be able to work with new technologies as well as perform manual tasks, similarly, to other industries. **Training, particularly for installers, will be crucial in expanding the global heat pump workforce** (ext. IEA, The Future of Heat Pumps, 2022, p.61).

- **Installation training programs, such as those proposed by industry associations and manufacturers, must be offered in both rural and urban areas.** The heat pump manufacturing and installation sector, like the air conditioning industry, is dominated by men today. Gender equality efforts could be integrated into training and recruitment programs (ext. IEA, *The Future of Heat Pumps*, 2022, p.61).

- While it could take up to four years for someone without previous experience in heating and cooling installation to become a certified heat pump installer (depending on the level of qualification), workers with previous experience in installing heating systems could be trained in just a few weeks (ext. IEA, *Energy Technology Perspectives*, 2023, p.211).

- More broadly, there will be major opportunities for growth and employment in all renewable energy industries. **Clean energy technologies, will be worth around USD 650 billion per year by 2030 – more than three times today's level** (ext. IEA, *Energy Technology Perspectives*, 2023, p.20).

Sources

- EC, *A Green Deal Industrial Plan for the Net-Zero Age*, 2023.
- ECF, EHPA, *Europe's leap to heat pumps*, 2023.
- EHPA, *EU Heat Pump Accelerator*, 2023.
- EHPA, *EU plan will boost heat pumps but aims too low*, 2023.
- EHPA, *Heat Pumps in Figures*, 2022.
- EHPA, *Statistics*, 2022.
- IEA, *Energy Technology Perspectives*, 2023
- IEA, *The Future of Heat Pumps*, 2022.

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- Joint Research Centre of the European Commission, *Heat Pumps in the European Union,* 2023.

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Heat Pumps in Europe

Key Facts & Figures

Brussels, November 2023