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Accelerating the deployment of heat pumps – Recommendations by EdEn

Introduction

Heat pumps are approximately three to five times more efficient than fossil heating equipment as they transfer and concentrate energy from their environment through the use of electricity.

Heat pumps being both energy efficient and increasingly carbon neutral, thanks to the EU transition toward low-carbon electricity, they are a key part of the strategy towards achieving a decarbonised building sector in the EU.

In 2021 alone, heat pumps allowed to save nearly 46 Mt of GHG emissions according to the European Heat Pump Association (EHPA)¹.

In order to take advantage of the energy and climate performance benefits provided by heat pumps, the European Commission announced in its REPowerEU communication dated 18 May 2022 the objective of doubling the deployment rate of heat pumps, meaning that an additional 10 million heat pumps are to be installed within 5 years². EdEn supports this objective, which appears realistic and could have even been set higher considering current growth rates in Germany (53% in 2022) and in Finland (50% in 2022).

But in order to develop a strong and competitive domestic industry, adequate support measures are required. In this paper, EdEn analyses the current deployment level of heat pumps in the EU and the growth potential of the sector as well as our recommendations to develop a strong EU-based heat pump industry capable of competing with third country leaders.

The heat pump market growth in Europe

The European heat pump market is currently expanding. Between 2014 and 2021, EHPA³ estimates that PAC sales in Europe increased from 791,500 to 2,170,000, with the installed base reaching 16.96 million units at the end of 2021 (Figure 1).

In 2021, the sector's growth was further accentuated with a 33.8% increase in sales in Europe and a record 2.17 million units sold.

¹ Statistics from EHPA (European Heat Pump Association) cover 18 Member States as well as the UK, Switzerland and Norway.

² COM(2022) 230 final – 18 May 2022

³ Within the perimeter defined in nota 1, EHPA's statistics take into account the heat pumps that provide a heating function or sanitary hot water. As for air/air heat pumps, it is assumed that only a share of them provide a heating function. This share ranges from 90% in Northern countries (Sweden, Norway, Finland, Denmark...) to 9.5% in Southern countries (France, Italy, Spain...). **This underlying assumption results in significantly diminishing the role of air/air heat pumps in the energy transition.**

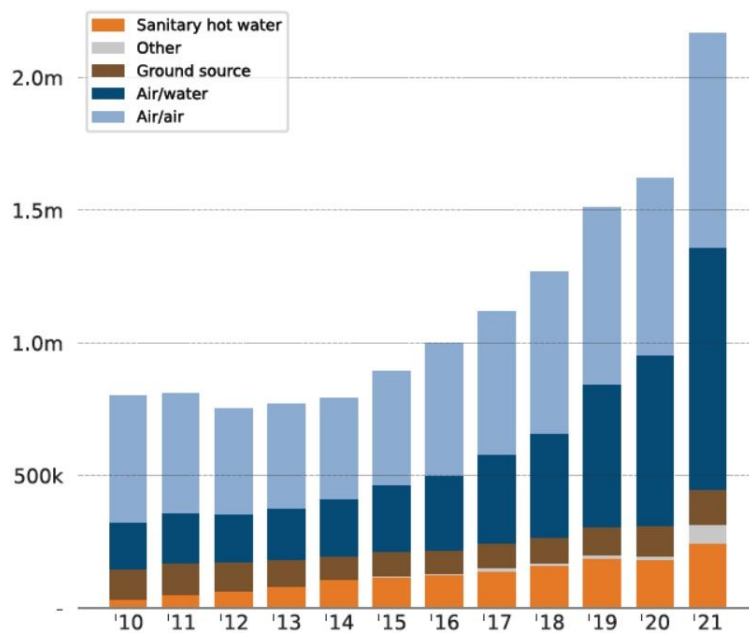


Figure 1: Evolution of the heat pump market in Europe – Source: EHPA (European Heat Pump Association).

The deployment of the heat pump market is still quite uneven between Member States since, according to the EHPA, 87% of the European market is concentrated in only 10 Member States. The five largest European markets in 2021 are France (537,111 units sold), Italy (379,970), Germany (177,500), Sweden (133,498) and Finland (129,375).

In total, only about 10% of Europe's 170 million homes are already equipped with heat pumps⁴. There is therefore considerable room for improvement.

The role of heat pumps in the energy and climate transition

Although REPowerEU does not provide a specific timeline and trajectory for the deployment of heat pumps, it can be inferred from the objectives that have been announced in May 2022 that the number of heat pumps in dwellings shall increase from 17 million in 2021 to 30 million in 2026.

Considering the current growth rate, it would even be possible to set a more ambitious goal of tripling the installation rate by 2030. This would result in around 46.6 million heat pumps installed in 2030. Assuming that 5% of them would be installed in multi-family dwellings containing 20 dwelling units on average, that would mean that 67 million out of 200 million dwelling units could be equipped with heat pumps in 2030.

This would result in approximately 34,6 Mtoe of final energy and around 80 Mt of CO₂ savings per year compared to the 2021 baseline⁵.

Developing a domestic heat pump industry

It is estimated that in France the heat pump sector represented a turnover of 6.2 billion euros and employed 42,500 people in 2021⁶.

⁴ Source : Eurostat – Number of households in the EU 27 (2021).

⁵ According to EHPA's methodology.

⁶ Source : AFPAC (Association française des pompes à chaleur) 2021.



Considering that the French market accounted for 25% of the European market in the same year, it can be conservatively estimated that at the EU level this market generated a turnover between 20 and 25 billion euros and is responsible for about 180 000 jobs, one third of which are directly located in the EU's 170 industrial sites.

Tripling the volume of activity of this sector by 2030 would result in a turnover of 60 billion euros and in about 500,000 jobs, two-thirds of which would be in the installation and maintenance sector.

Obviously, achieving this result would require significant investment of more than 1 billion euros each year until 2030, notably in order to ensure the proper training of industry workers and of maintenance operators.

Facing competition from international players

Considering that a significant part of the added value of heat pumps, notably the compressor as well as the electronic modules, is currently produced outside of the EU, the growth potential of the sector could even be higher if the EU was to relocate the whole value chain on its territory.

While the EU is currently working to reduce its energy and industrial dependencies, the heat pump deployment strategy is an opportunity to bring the entire value chain of the sector back to the EU.

Achieving industrial independence in the heat pump sector is all the more important since the countries currently supplying most of the components used in the EU heat pumps industry are also those that develop their own heat pump industry and compete with European companies.

Recent evolutions in the EU's trade balance with China reveal that Europe could risk losing its current leadership position to competitors.

Between 2015 and 2020, the EU's trade balance with China went from a surplus of €249 million in the heat pump industry to a deficit of 40 million euros⁷. During this period, imports from China increased by 17% each year. The first available data suggests that imports from China have doubled in 2021.

The United States are also developing their own domestic industry and have adopted a support system through the Inflation Reduction Act that will facilitate the installation of heat pumps in the US and also exports to Europe.

Improving the heat pump technology

Heat pumps are already very energy efficient and can contribute significantly to decarbonisation but the technology still needs to be enhanced, in particular in order to adapt to different types of housing.

Currently, heat pumps can be considered a mature technology for new and existing individual housing. However, developments are less advanced in collective housing where heat pumps only represented 0.7% of heating equipment in 2020.

The reason for that is that collective housing is associated with higher constraints in terms of architecture, urban planning and neighborhood than individual housing.

There are solutions however but their implementation will require specific financial support programs to be set up.

⁷ Source : Euractiv "Battle for dominance in heat pump markets reaches Europe" 2022



Solutions for new collective housing already exist and support should be provided to improve their competitiveness and further develop them.

For existing collective housing, it is necessary to distinguish between small collective housing (less than 50 dwelling units) and large collective housing.

In small collective housing, replacing a boiler with a collective heat pump can usually provide enough heat with low energy consumption, as long as it is associated with appropriate isolation. However, replacing individual gas boilers with heat pump solutions remain challenging.

In large collective housing, a transitional period is necessary during which support can be provided for the installation of hybrid heat pumps that combined with existing fossil boilers. Progressively, with the development of new heat pump technologies, those hybrid heating systems would be replaced with 100 % electric heat pumps.

The use of HFC gases in the heat pump sector

As part of the revision of the F-Gas regulation on fluorinated gases, the European Union intends to significantly reduce the maximum quantities of HFC gases that can be placed on the market.

The revision proposed by the Commission would lead from 2024 to a 44% decline of these quantities compared to what the current regulation permits. Concretely, heat pumps would no longer be allowed to use HFC gases by 2030, thus imposing a forced phase-out from 2025 or 2027 of HFCs in small and medium-sized heat pumps (< 12 kW), while alternative solutions have not reached industrial maturity.

This phase out is not realistic as alternative options are limited:

- the use of HFOs could be restricted by the European REACH regulation, which is why manufacturers prefer not to develop this pathway;
- The use of propane is associated with serious safety issues as it is highly flammable. If propane can be used for monobloc heat pumps installed outside of the buildings, it is not an appropriate solution for split-system heat pumps (air/air and air/water heat pumps);
- natural refrigerants such as CO₂ or ammonia do not appear to be viable options for heating buildings due to poor thermodynamic properties and, for ammonia, toxicity issues.

It seems that the European Commission has assumed that propane heat pumps could be put on the market in the relatively short term, which is not realistic considering the current maturity level of this technology. In addition, the safety issues related to its explosiveness will require developing a specific training for installers, which means that appropriately trained workers will only become widely available in about ten years.

EdEn's recommendations

In order to maintain its leadership position and to be consistent with the climate neutrality objective, the European Union should adopt a robust strategy and industrial plan for the development of its domestic heat pump industrial sector.

EdEn recommends developing this strategy through the implementation of an IPCEI (Important Projects of Common European Interest) that would:

- support research and development for certain types of heat pumps, particularly those intended for collective housing;
- support the development of new heat pump models using fluids with a low climate impact;
- support the relocation in Europe of the whole added-value chain of heat pumps;



- support the implementation of adequate training for heat pump installers.

1. Supporting the deployment of heat pumps in collective housing

EdEn recommends setting up facilities or financing mechanisms to support renovation work in order to combine the installation of heat pumps with improved isolation in small collective housing. In large collective housing, similar programs should be set up to develop hybrid heating systems.

2. Supporting the development of heat pumps using fluids with a low climate impact

EdEn recommends ensuring consistency between the objectives set out in the F-Gas revision project and those announced by the Commission for the deployment of heat pumps. Manufacturers need time in order to develop and put on the market equipment using fluids with a low climate impact.

In order to accelerate this transition, financial support mechanisms should be set up to support research and the implementation of specific training for the handling of gases such as propane and HFOs, if they are eventually authorised by REACH.

3. Supporting for the establishment of means of production of key components for PACs on European territory

EdEn recommends setting up incentive schemes at the European level to promote the development of industries manufacturing the key components of heat pumps, in particular:

- Compressors;
- Electric motors (for compressors and fans);
- Electronic cards;
- Electronic modules.

These support schemes could take the form of European financial support from the Innovation Fund or exemption from charges.

4. Supporting for the training of installers

EdEn recommends supporting the development of a training programme for heat pump installers and maintenance operators.

Currently, the heat pump sector is facing difficulties in recruiting qualified workers, which hinders its deployment and the proper functioning of installed equipment due to malfunctions or poorly-sized heat pumps.

To prevent these difficulties, EdEn recommends setting up a financing mechanism for solid training for installers and the creation of a reference system for new fluids are necessary at European level.