

Decarbonisation of residential heating and cooling: The heat pump challenge

Introduction

The decarbonisation of residential heating is a critical component of the European Union's (EU) strategy to achieve carbon neutrality by 2050. This Eurofound research paper focuses on the installation of heat pumps in residential buildings, exploring their potential to enhance energy efficiency and reduce greenhouse gas emissions. Buildings account for over one-third of the EU's greenhouse gas emissions, making improvements in this sector essential for meeting climate targets.

Policy context

To meet the ambitious climate targets set by the EU, significant policy measures have been introduced.

- **Fit-for-55 policy package:** Accelerates the decarbonisation agenda across all sectors. This complex legislative and policy package will increase the penetration of renewables, drive energy efficiency and stimulate new financial tools. It also means that buildings emissions will be considered within the new Emissions Trading System from 2027.
- **Renovation Wave initiative:** Aims to double the rate of renovation of the EU's building stock and focuses on helping Member States to scale up renovation measures.
- **RePower EU initiative:** Seeks to double the number of heat pump installations between 2022 and 2026, targeting 50–60 million new installations by 2030, as a means of reducing EU dependence on imported gas.
- **Energy Performance of Buildings Directive:** Sets the framework for the gradual phasing out of fossil fuels in buildings and incentivises the installation of renewable alternatives, including heat pumps, while also improving the energy efficiency of buildings and addressing areas such as energy poverty.

Key findings

- **Technology:** Heat pumps are highly efficient, using renewable energy sources to transfer heat and provide both heating and cooling. The technology is well advanced and known across Europe, although greater awareness raising is required in emerging markets where heat pumps are less well known.
- **Installation:** Installing heat pumps is more complicated than installing the fossil-fuel equivalents that they will replace (e.g. gas boilers) and requires a broader range of skills and competencies. This makes installation relatively expensive. Making the installation process faster and more efficient may reduce costs and encourage greater take-up.
- **Market trends:** Europe was the fastest-growing market for heat pumps in 2022, but growth stalled in 2023 due to the normalisation of gas prices and uncertainty regarding policy and subsidies in some EU countries. While heat pump adoption is widespread in some countries (e.g. Finland, Sweden), it is considered new technology in others (e.g. Hungary) and there is limited market development.
- **Labour market:** Significant labour shortages exist: It is estimated that an additional 70,000 installers will be needed to meet the heat pump objectives set for 2030. Labour market shortages vary considerably across Europe, depending on the state of the wider construction market and availability of particular trades and crafts.
- **Training and skills development:** Many EU countries have adapted training curricula to include heat pump installation, but further efforts are needed to upskill the workforce and attract new entrants. There are many examples of public- and industry-led initiatives to enable upskilling. Gender balance within the heat pump sector is an issue, combined with an ageing population of installers.

- Subsidies and incentives: These vary widely across Europe, with substantial financial support available in some countries to encourage heat pump installation. Where there is already high penetration of heat pumps, supports tend to favour district heat solutions; other countries have packages of supports which can be combined depending on the type of heat pump and other measures undertaken (e.g. insulation, solar panels). Ensuring the stability of subsidies and supports has been highlighted as an issue by industry representatives.
- Energy pricing: The high cost of electricity compared to gas is a significant barrier to the adoption of heat pumps in many countries, and the financial return on investment can be perceived as too long due to low gas prices when compared with electricity prices.
- Address energy pricing: Implement measures to reduce the price differential between electricity and gas to make heat pumps more economically viable. This may involve electricity market reform more generally as well as taxes or other measures to reduce the electricity-to-gas price ratio to approximately 2.5 or less. At present, the monetary savings from the greater energy efficiency of appropriately installed heat pumps compared to fossil fuel-based heating systems are sometimes negated by relatively high electricity prices.
- Promote public awareness: Increase awareness of the benefits of heat pumps and available subsidies to drive consumer adoption. This is particularly critical in emerging and new markets.
- Support low-income households: Provide targeted support for low-income households to ensure equitable access to energy-efficient heating solutions, thereby expanding the take-up of heat pumps.
- Monitor progress: Establish robust monitoring and reporting mechanisms to track the progress made in achieving heat pump installation targets and adjust policies as needed.

Policy pointers

- Expand training programmes: Enhance vocational training and apprenticeships to develop the required skills for heat pump installation and maintenance. This requires public and private partnership and must be linked to the wider policy and subsidy framework. Small and medium-sized enterprises in particular need support to facilitate staff training.
- Standardise certification: Implement standardised training and certification programmes across the EU to ensure a consistent and high-quality installation workforce. This can also contribute to workforce mobility.
- Subsidise heat pump installation: Maintain and expand financial incentives for heat pump installation to offset initial costs and encourage adoption. The level of support should be stable over a sufficient period to support market development. Encourage the development of new business models that facilitate broader take-up. Examples include all-inclusive third-party installation and after-service packages and lease-based heating-as-a-service (HaaS) models.

The transition to heat pumps is essential for the decarbonisation of residential heating in the EU. While significant progress has been made, challenges remain, particularly in workforce development, subsidy and incentive packages and energy pricing. Continued policy support and targeted interventions will be crucial to overcoming these barriers and achieving climate targets.

Further information

The report *Decarbonisation of residential heating and cooling: The heat pump challenge* is available at <https://eurofound.link/ef24051>

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