

Leveraging Low-Global Warming Potential Heat Pumps to Power Climate Action



Heat pumps are highly efficient solutions for space heating and cooling. When it comes to heating, they're three to four times more efficient than electric resistance heaters which convert electricity into heat at 100% efficiency. Heat pumps are also far more efficient than the most advanced gas heating systems, which operate at only 85-99% efficiency.

Transitioning away from burning fossil fuels to efficient and sustainable heat pumps is key for decarbonizing heating and cooling systems and achieving carbon neutrality. In the European Union (EU), over 24 million heat pumps have already been installed, with over 3 million sold in 2023

alone¹. To accelerate progress, the EU's [REPowerEU](#) plan aims to scale up heat pump adoption, targeting 60 million installed units by 2030. The United Kingdom (UK) has set its own goal to install 600,000 heat pumps annually by 2028².

In addition to being more efficient and sustainable than electric resistance heaters and gas heating systems, heat pumps deliver a wide range of benefits, including improved energy security, power system flexibility, and job creation.

THE BENEFITS OF HEAT PUMPS IN EUROPE

Data source: European Heat Pump Association, European Heat Pump Market and Statistics Report 2024



	250+ production sites in Europe		170,000 direct jobs		€21.3 billion turnover		24 million total stock
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1. European Heat Pump Association, European Heat Pump Market and Statistics Report 2024
2. UK Government, "Energy Security Bill factsheet: Low-carbon heat scheme", 2023, <https://www.gov.uk/government/publications/energy-security-bill-factsheets/energy-security-bill-factsheet-low-carbon-heat-scheme>

F-gases and forever chemicals harm the environment and human health.

Heat pumps use refrigerants to regulate temperature by absorbing and releasing heat between indoor and outdoor spaces. Currently, most heat pumps use hydrofluorocarbon (HFC) refrigerants R-32 and R-410A. These refrigerants, also known as 'F-gases', have a high global warming potential (GWP) and trap more heat in the atmosphere than carbon dioxide (CO₂). With respective GWPs of 675 and 2088, they are hundreds to thousands of times more potent greenhouse gases than CO₂.

While refrigerants are meant to remain contained within a piece of equipment, leaks and accidental releases can happen during maintenance or end of life disposal. Some refrigerants, like R-410A, also contain per- and polyfluoroalkyl substances (PFAS). These 'forever chemicals' persist in the environment for decades and pose risks to human health and the environment³.



Low-GWP refrigerants are the climate-friendly solution.



Natural refrigerants include:

- R-290 (propane, GWP 3)
- R717 (ammonia, GWP 0)
- R744 (carbon dioxide, GWP 1)
- R600a (isobutane, GWP 3)

While these alternative refrigerants are not yet widely used in Europe, the availability of technologies using natural refrigerants is expanding with more manufacturers adding them to their product portfolios⁴. Along with their environmental benefits, low-GWP heat pumps can operate at high temperatures, making them a convenient boiler replacement option without requiring changes to the rest of a heating system or building envelope.

There are more sustainable alternatives to HFC refrigerants, including a class of refrigerants known as hydrocarbons, often called 'natural' refrigerants.

These natural refrigerants have much lower global warming potential than traditional HFC refrigerants.

In the EU, the recent approval of the [F-gas Regulation \(EU\) 2024/573](#) presents a significant opportunity to improve the heat pump market's sustainability with ambitious HFC phase-down timelines. As demand for natural refrigerant heat pumps increases in the EU, it will drive innovation in manufacturing processes and technological advancements within the heat pump industry. This will, in turn, allow the EU to set the standard for sustainable heating and cooling solutions and boost the EU's competitiveness in the green technology sector. Having not yet aligned with the EU's regulation, the UK risks becoming a destination for high-GWP products that can't be sold in the EU.

3. United States Environmental Protection Agency, "PFAS Explained", <https://www.epa.gov/pfas/pfas-explained>
4. Christina Hayes and Jae Haroldsen, ATMO Market Report 2024, "Natural Refrigerants: State of the Industry 2024", <https://atmosphere.cool/atmo-market-report-2024>

Now is the time to act.

Without stringent regulation, F-gases could stay locked into European heating systems for years to come. Newly installed heat pump systems have an average lifetime of 10-15 years. This means that HFC heat pumps installed this year will continue to leak high-GWP gases during the next decade and more. Specialized equipment and technicians will have to be available for the next fifteen years to successfully repair and dismantle HFC heat pumps without releasing significant amounts of F-gases.

Despite a slump in sales from 2023-2024, the European heat pump market has experienced significant growth over the past decade⁵. With the continued, increasing prevalence of heat pumps in European households, we need to seize the opportunity to accelerate the transition to more sustainable refrigerants, rather than further increase the pool of F-gas-dependent heat pumps. The F-gas Regulation sets a timeline for phasing out F-gases in the EU, and this transition should be proactively planned and replicated in the UK. It's time to shift the heat pump refrigerant landscape toward safer, more environmentally-responsible alternatives.

Recommendations

National and local governments should expand or amend existing incentives to offer additional incentives for low-GWP refrigerant systems to make them more affordable and encourage adoption. Incentives, like the Boiler Upgrade Scheme⁶ in the UK, are already widely available in some European countries. Germany has introduced an additional 5% incentive⁷ for installing heat pumps that use natural refrigerants, on top of the base subsidy that amounts to 25% of the total system cost.

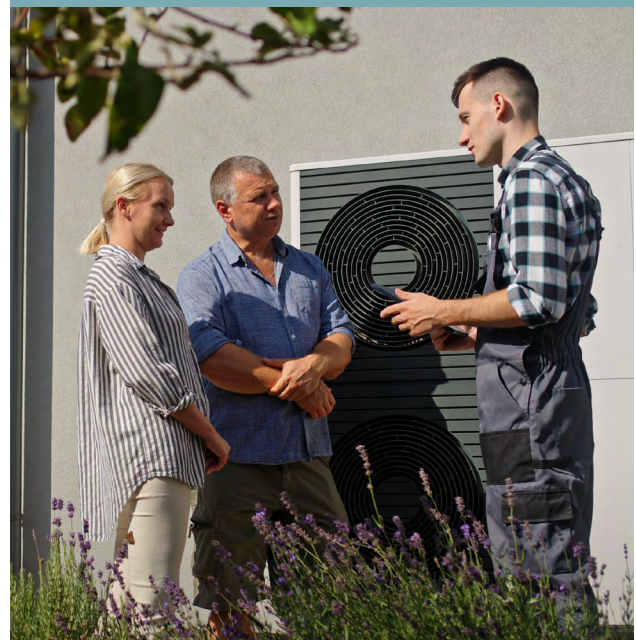
Governments and installers should raise awareness on the benefits of low-GWP heat pumps, especially for those unfamiliar with or skeptical of the technology. Raising awareness can help dispel myths about the installation process, safety, and efficiency of low-GWP heat pumps, highlighting them as a suitable alternative for heating and cooling system replacements.

The UK Government should update the F-gas Regulation to align with the EU's regulation. This alignment is essential for phasing out harmful HFC refrigerants and would ultimately encourage the development and adoption of safer, more sustainable refrigerants in heat pumps and other types of equipment, supporting climate targets.

The EU and UK Governments should revise energy labelling requirements to include the type of refrigerant used in heat pump systems. Refrigerant information should be easily available for European consumers, allowing them to choose the most efficient and sustainable heating and cooling systems available.

CLASP is conducting extensive research and engaging key stakeholders in the EU and the UK, focusing on the deployment of natural refrigerant heat pumps, as well as the barriers to their adoption. We aim to identify effective programs and strategies that can increase the awareness, availability, and adoption of these heating and cooling systems at local, national, and EU levels.

To drive market transformation, CLASP is seeking local partners and governments interested in developing and implementing policy interventions that accelerate the adoption of low-GWP heat pumps.



5. European Heat Pump Association, European Heat Pump Market and Statistics Report 2024

6. Energy Saving Trust, "Boiler Upgrade Scheme," 2024, <https://energysavingtrust.org.uk/grants-and-loans/boiler-upgrade-scheme>

7. Thomas Trevisan, "Germany Grants Bonus Subsidy to Home Heat Pumps That Use Natural Refrigerants," 10 January 2023, <https://naturalrefrigerants.com/germany-grants-bonus-subsidy-to-home-heat-pumps-that-use-natural-refrigerants/>