

## Green energy heating systems

Green heating stands at the center of global efforts to cut down emissions and curb climate change. In this major transition, societies around the world are exploring alternatives to find the best option among green heating solutions: one that effectively mitigates CO<sub>2</sub> emissions while also remaining cost-effective, resilient and viable overall.

As nearly two thirds of heating energy today still rely on fossil fuels and with space and water heating accounting for almost half of global energy use in buildings, the need for achieving green heating is extraordinarily pressing.

In this context, heat pumps stand out as a tried and tested option for eco-friendly heating systems. Free from combustion processes and able to efficiently incorporate renewable energy sources, this piece of equipment takes center stage among the most noteworthy green heating solutions.

This process is powered by a small amount of electric energy. This allows heat pumps to absorb energy from air, water or the ground and transfer it into a refrigerant fluid, which then releases heat in a designated area.

The working principle of heat pumps is reversible, meaning they can both provide green heating and cooling. With current models being 3-5 times more efficient than gas boilers, heat pumps have become an efficient, sustainable alternative, with sales increasing consistently in the last decade.

Heat pumps present outstanding efficiency levels, measured by both the COP (Coefficient of Performance) and SCOP (Seasonal Coefficient of Performance). While these values may vary depending on factors such as design quality, temperature differences between source and sink or the choice of working fluid, most heat pumps present COP values of between 3-5. In other words, for every unit of electricity they consume, they provide between 3-5 units of heat.

Heat pumps are also considered a green heating solution because they move away from combustion processes, which cause harmful emissions, and towards the electrification of heat. As mentioned in the Heat Pumps White Paper by the European Copper Institute, heat pumps are able to reduce carbon emissions by between 35-65% compared to gas boilers, with bigger reductions when compared to coal or oil boilers.

Waste heat, heat recovery, seawater or groundwater are among the key sustainable, local and non-fuel heat sources that heat pumps are able to incorporate. This is further enhanced when pairing advanced heat pumps with 5th district heating generation, which is able to operate at lower temperatures and upgrade heat sources that were previously not available.

This move away from fossil fuels and the versatile incorporation of various types of renewable sources is not



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only advantageous in environmental terms: it's also crucial for achieving resilient, low-cost heat networks that rely on local resources and are less prone to disruptions related to global energy markets.

As part of a dedicated tailor-made plan and with applied thermal engineering expertise, heat pumps stand out as reliable, cost-efficient green heating solutions. Through economic modeling, different factors (from changing electricity costs, to available heat sources and carbon regulations) may be selected and compared to determine the best choice.

Exhaustive economic planning (with clear efficiency and performance goals based on maximizing benefits) also means projects stand a better chance when looking for the participation of public or private actors. As such, careful calculations around the best ROI and payback period can be crucial to guarantee economic savings.

As the potential of heat pumps as green heating solutions is increasingly understood, policy support is growing quickly with the aim of fulfilling heat decarbonisation goals across the globe. Europe and North America are particularly important in leading the way to support heat pump initiatives via financial incentives and energy taxation benefits, among other measures.

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