



Heat Pumping Technologies MAGAZINE

Heat Pumps for All: How to Extend the Working Envelope of Heat Pumps

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A HEAT PUMP CENTER PRODUCT

Foreword

Broadening horizons: Heat pumps for every apartment

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Nowadays, heat pumps are a hot topic. Recently, they've been hailed as crucial for reducing reliance on (Russian) fossil fuels, even earning the nickname "peace pumps" from environmentalist Bill McKibben. This technology is praised for its efficiency, use of renewable or waste energy, and significant reduction of CO₂ emissions, helping Europe meet energy and climate targets. However, high electricity prices limit its success, and critics put forward doubt on its suitability for old, unrenovated buildings. Despite these concerns, more than 20 million heat pumps are in operation throughout Europe, with thousands of examples in various building types, industrial applications, and district heating.

Regarding the challenging segment of multi-family buildings, the observed lack of heat pump deployment is more an information gap and less a technical issue. And hence, addressing this segment requires a social or policy innovation more than technology improvement.

Available solutions include:

1. commercial heat pumps with larger capacity that deliver heating and hot water to entire buildings,
2. apartment-based heat pumps for individual units providing heating, cooling, hot water, and potentially ventilation.

The choice depends on the building's needs, layout, available space, access to energy sources, power supply and, not least, ownership structure and financing options.

While all this is known in expert cycles and has been documented by the International Energy Agency¹, by the European Heat Pump Association² and by others, it is still not mainstream knowledge or the standard solution. To the contrary: a typical discussion with owners and

¹ See the joint website of Annex 50 and Annex 62: <https://heatpumpingtechnologies.org/annex62/>

² See the case study booklet on heat pumps in high rise homes: <https://www.ehpa.org/news-and-resources/publications/heat-pumps-and-high-rise-homes-case-studies-from-across-europe/>

operators of multiple-family buildings will show that they feel left alone. What they perceive is: policy makers force us to change the heating system because of heat planning and the energy transition without explaining to end-users how to do this, let alone providing planning, financing support, or subsidies to enable them to do so.

Indeed, there is an increase in pressure on building owners to transition away from fossil energy-based heating. As the buildings stock is planned to be carbon neutral by 2050 the latest no more fossil fuels can be used by then. To accelerate this change, efficiency requirements are set by policy makers and are increased both on the building and on the product level. They make it more difficult or de-facto impossible to install fossil-based solutions in new and existing buildings or to place them on the market. National governments are adding bans for such technologies on the country level. Typically, such bans are introduced in new buildings first and are extended to existing units later. With an expected lifetime of about 20 years, it is obvious, that the last fossil boilers should be installed between now and 2030. This has implications on the gas grids that are increasingly recognized. Think tanks, operators and consumer associations have started to raise the question of what happens to cost when fewer and fewer clients are connected to the grid. They also wonder how to finance the dismantling of grids if no further use can be found. It is by now agreed on, that a proper plan of the energy transition in heating must include a strategy to dismantle the existing gas grid.

In parallel, national governments, have the obligation to prepare and present heating and cooling assessment and planning documents. These plans will have to start on the city level. They must take climate, economics, and technical feasibility into consideration and should lead to the identification of the most cost- and resource efficient solution. Having such plans gives cities a much better view on the demand for heating and cooling as well as on existing sources of excess heat. It could be called the foundation of closing energy cycles.

The future energy system will integrate three major components:

- 1) heat pumps in many variations, big and small,
- 2) thermal grids connecting apartments, buildings and cities,
- 3) smart controllers that aggregate individual loads, providing demand-side flexibility to the electric grid.

The system's attractiveness lies in using thermal grids at ambient temperature, utilizing waste heat, and minimizing thermal waste to maximize efficiency and avoid thermal waste. On the apartment level, waste heat from an air conditioning can be stored in the form of hot water and to be used later, or it can be dumped into the thermal grid and used, where needed by other apartments or buildings connected to the same grid.

On the building level, instances such as hotels, hospitals, office buildings, or similar, that are typically cooled permanently make the waste heat required available in the grid. The combination of heat pumps with heating and cooling function and the thermal grid avoids the visual clutter of facades with cooling equipment. On the city quarter or city level, the many buildings connected via an ambient loop create a huge thermal battery that allows the system to operate at reduced overall energy demand by making the one user's energy waste the other user's energy source.

Heat pump solutions designed and manufactured in Europe for Europeans bridge the gap between industrialization and green growth seamlessly. European innovation caters specifically to the continent's diverse building types, including multi-family residences. Advancing the deployment of heat pump-based solutions bolsters economic growth and technological advancement within Europe and pave the way for a greener future, where industrial progress and environmental stewardship go hand in hand.

Such systems have started to gain attention across the continent, and at Qvantum Industries in Sweden, we focus on this integrated approach with three components: heat pumps, thermal batteries, and smart controllers. Together, they offer a versatile solution for decarbonizing multi-family buildings, making the energy transition straightforward. ABC, as simple as one-two-three, that's how easy energy can be.

Against this backdrop, the theme of this issue, "Heat Pumps for All: How to Extend the Working Envelope of Heat Pumps," becomes even more relevant. By broadening the applications space and enhancing the capabilities of heat pumps, we pave the way for more inclusive and efficient energy solutions, ensuring that heat pumps can serve a wider array of needs in our journey toward a sustainable future.



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