



Heat Pumping Technologies

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Natural Refrigerants in Heat Pumps: Pushing the Boundaries of Sustainability

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A HEAT PUMP CENTER PRODUCT

Column

From Legacy to Leadership: District Heating in Eastern Europe as a Platform for Large-Scale Heat Pumps

By Tomas Caha, Consulting Engineer, Exergie Czech Republic

What if Eastern Europe's energy legacy became its greatest asset in the climate transition?

Eastern Europe's district heating systems, once considered relics of centralized planning, now represent a strategic opportunity in the clean energy transition. These extensive networks are uniquely positioned to accelerate the deployment of large-scale heat pumps, transforming a perceived challenge into a competitive advantage.

While Western European countries like Germany struggle with limited district heating coverage (approximately 11%), Eastern European cities enjoy remarkably high penetration rates. In urban centers such as Bucharest, Warsaw, Sofia, and Prague, these networks satisfy 40–70% of residential heating demands. Despite aging infrastructure and a legacy reliance on fossil fuels, they provide a ready-made foundation for cost-effective urban heating decarbonization.

A common criticism concerns high operating temperatures (60–120°C), which often exceed both practical requirements and conventional heat pump capabilities. Yet this challenge is not unique to Eastern Europe; similar constraints exist in Germany, the Netherlands, or Austria. Across the EU, solutions are already being implemented: staged temperature reduction, thermal storage, and advanced high-temperature heat pumps are proving effective in overcoming this barrier.

Gas Legacy and the Case for Heat Electrification

The region's historical gasification presents a significant hurdle. Legacy infrastructure and subsidized pricing schemes have kept gas artificially affordable, delaying investments in clean heating. However, the inclusion of the building sector in the EU ETS II could

dramatically shift this dynamic. Meaningful carbon pricing would substantially improve the economics of renewable heat, particularly for large-scale heat pump deployment.

Beyond emissions reduction, electrifying heat unlocks broader energy system benefits. Heat pumps bridge the heat and power sectors, enabling load flexibility, grid support, and efficient use of surplus renewable electricity. As variable renewables grow and traditional base-load generation declines, this flexibility becomes increasingly valuable, turning heat electrification into both an environmental and strategic asset.

Call to Action: Aligning Policy, (Political) Capital, and Courage

Cities like Zagreb, Bratislava, and Budapest are ideally positioned for centralized heat pump deployment, provided that supportive policy frameworks are in place. Their advantages include municipal ownership of district heating networks, high urban density, and broad public acceptance of centralized heat supply. These conditions simplify transactions and enable integrated urban energy planning.

However, this opportunity also requires political leadership. City governments must act now, even if the full benefits of transition will materialize beyond the next election cycle. Long-term vision and institutional continuity are key to delivering energy systems that serve both today's needs and those of future generations.

Fortunately, European policy is moving in the same direction. EU legislation provides critical momentum through multiple instruments: the Renewable Energy Directive (RED III) mandates increased renewable heat adoption; the Energy Efficiency Directive (EED) defines efficient district heating criteria; and the Energy Performance of Buildings Directive (EPBD) drives demand for zero-emission buildings. National frameworks that align with these instruments will be essential for unlocking investment potential.

Eastern Europe possesses a unique combination of structural assets despite technical constraints. With appropriate policy support, including long-term price signals, access to EU investment tools, and regulatory clarity, the region could emerge as a heat transition leader. This is not just a technical upgrade; it is a strategic opportunity to build future-proof, resilient cities. Eastern Europe doesn't need to catch up. It can lead.



Name	Tomas Caha
Title	Consulting Engineer
Affiliation	Exergie Czech Republic
E-mail address	tc@exergie.cz