Compass Impulse

Heating up the energy transition with district heating

SwissLife Asset Managers

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Source: Bring Energy and Heizwerk Gotthard, district heating portfolio companies of Swiss Life Asset Managers.

District heating is emerging as one of the most powerful yet underappreciated tools in the energy transition. While building decarbonisation discussions typically focus on individual technologies such as heat pumps or energy-efficiency measures, district heating takes a different approach: rather than solving the problem building by building, it addresses it at the scale of entire neighbourhoods and cities.

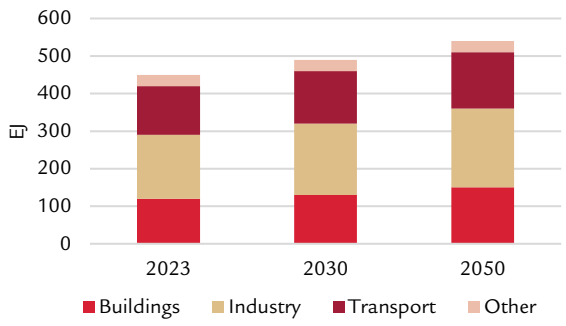
For infrastructure investors, district heating represents a long-lived, essential network asset capable of generating stable cash flows while supporting decarbonisation objectives. The scale of the opportunity is significant. According to a report by the University of Aalborg, achieving the full potential of district heating in Europe would require an investment volume of approximately EUR 1.16 trillion in district heating infrastructure by 2050, underscoring the magnitude of the asset class and its importance to the broader energy transition.

From the perspective of a real estate investor, district heating offers one of the most scalable pathways to reduce portfolio emissions, address regulatory requirements and future-proof assets against increasingly stringent climate policies all at once. Rather than requiring each building to solve its decarbonisation challenge independently, district heating enables a single infrastructure investment to support the decarbonisation of entire districts, connecting real estate assets to a progressively cleaner heat supply over time.

Decarbonising heat, the missing piece of the net-zero puzzle

Much of the progress achieved in the energy transition over the past decade has been driven by the rapid deployment of renewable power generation. Yet while electricity is steadily decarbonising, the heating sector remains heavily reliant on fossil fuels. With buildings accounting for roughly one-third of global energy demand, decarbonising heat represents one of the largest opportunities in the energy transition.

Buildings are among the largest consumers of energy



Source: International Energy Agency (IEA, 2025).

For real estate investors, the implications are material. Portfolio decarbonisation is no longer solely an ESG consideration but a core investment consideration. Building decarbonisation pathways are becoming embedded within regulation, tenant expectations and capital allocation decisions. Assets unable to demonstrate credible emissions reductions risk facing higher operating costs, regulatory penalties and greater obsolescence risk over time.

The conventional response has centred on building-level measures such as insulation upgrades, energy efficiency improvements and the deployment of heat pumps. While these interventions remain essential, scaling them across Europe's vast and often ageing building stock will be both costly and complex. Achieving the targeted 43% reduction in building heat demand by 2050 is estimated to require approximately EUR 2 trillion of renovation investment.

By shifting decarbonisation from the building level to the network level, district heating enables property owners to access progressively cleaner heat that can be aggregated, transported and delivered at scale, without repeatedly replacing onsite heating systems or securing alternative fuel sources. As heat networks incorporate renewable energy sources, connected buildings benefit directly from improvements occurring elsewhere in the system.

From a real estate perspective, this can create several advantages, including lower operational emissions, improved compliance with increasingly stringent building standards, reduced equipment replacement requirements and greater resilience against fossil fuel price volatility.

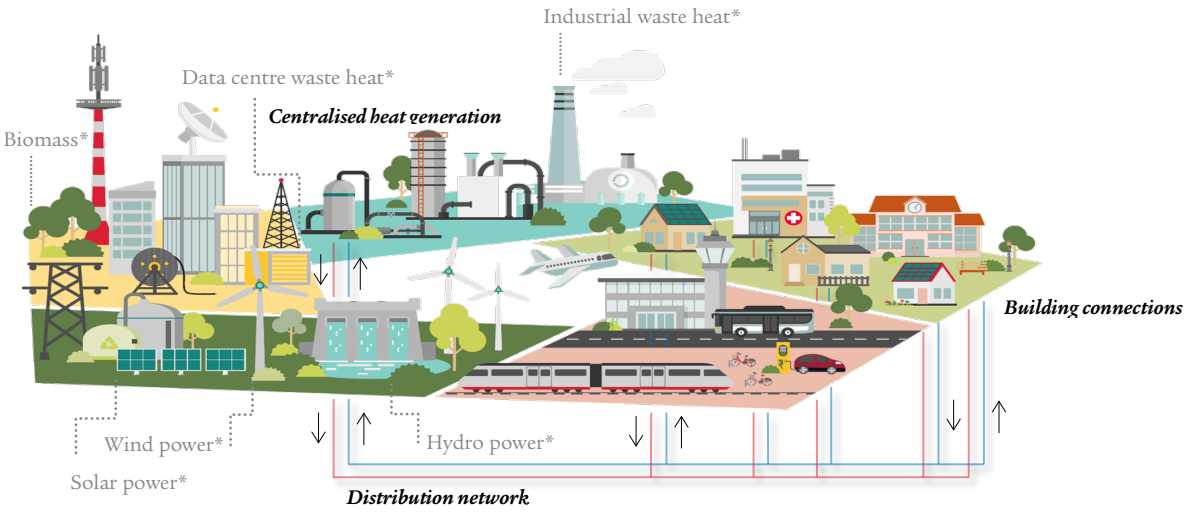
How district heating transforms heating from a building-level challenge into a network-level infrastructure solution

At its core, district heating is a relatively simple concept. Heat is produced centrally and distributed through insulated underground pipelines to multiple buildings within a defined area. Buildings connect to the network through heat exchangers, which transfer thermal energy into the property's internal heating system.

A district heating system comprises three key components that work together to generate, transport and deliver heat to end users:

- **Centralised heat generation:** Heat is produced from one or more energy sources in a centralised location.
- **Distribution network:** Insulated pipes transport centrally generated heat in the form of hot water or steam to connected buildings across a city, district or neighbourhood.
- **Building connections:** Each building receives heat through a heat exchanger connected to the distribution network, replacing standalone heating systems.

Components of a district heating system



*Source: Swiss Life Asset Managers. * District heating networks can draw on a range of energy sources, which are combined to produce heat at a central location before distribution to end users.*

District heating is a coordination challenge, not a technology challenge

Europe has no shortage of low-carbon heat. The continent possesses an estimated 3,112 TWh of renewable and waste heat potential, enough to meet nearly twice its projected building heating demand by 2050. District heating is a proven technology capable of unlocking these resources at scale while reducing decarbonisation costs, strengthening energy security and lowering dependence on imported fossil fuels.

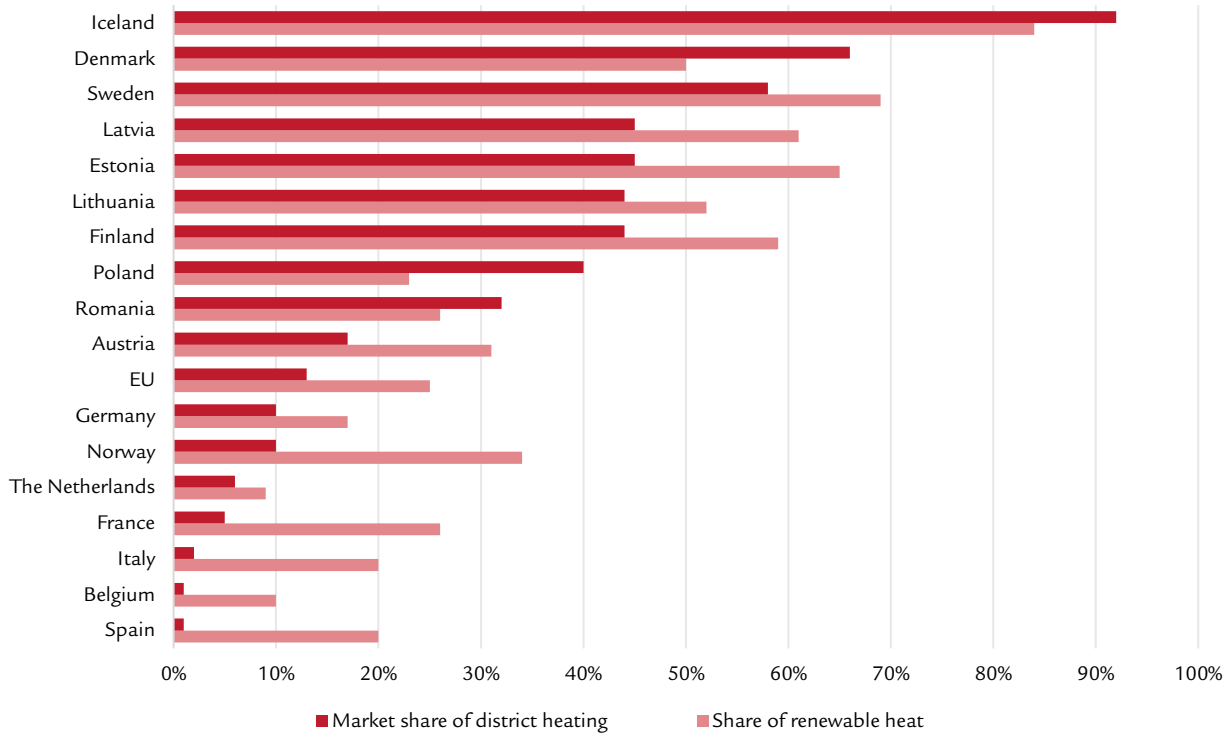
The challenge lies elsewhere. Despite its established track record, district heating deployment remains well below its potential in many markets. Expanding networks requires the coordination of municipalities, utilities, regulators, heat suppliers, network operators and property owners, supported by long-term planning, stable policy frameworks and aligned investment incentives.

Across Europe, these coordination requirements are addressed through a variety of ownership and governance structures. District heating systems may be developed and operated by municipal utilities, consumer cooperatives, private companies or public-private partnerships. Network owners typically coordinate the heat value chain, contracting with heat producers, managing distribution infrastructure and supplying customers under regulated or competitive market frameworks. The pace of deployment and attractiveness of investment opportunities are often shaped less by ownership models themselves than by the regulatory frameworks that govern returns, heat pricing and incentives for network expansion and decarbonisation.

The Nordic countries demonstrate what can be achieved when favourable policy frameworks meet aligned incentives. Following the oil crises of the 1970s, Iceland accelerated the development of its abundant geothermal resources and today meets virtually all space heating demand through district heating. Denmark, Sweden and Finland have similarly spent decades building extensive district heating networks through coordinated planning, supportive regulation and sustained investment.

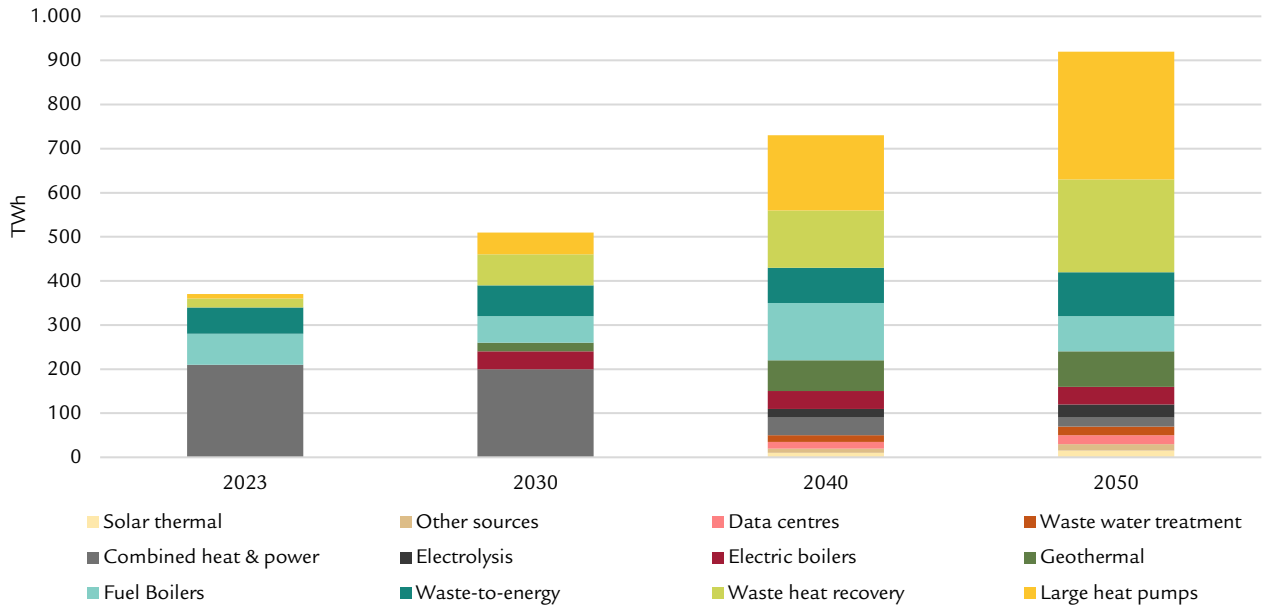
A consistent pattern emerges across Europe: countries with abundant renewable or recovered heat resources and supportive policy frameworks tend to achieve the highest levels of district heating penetration. Where deployment has lagged, the limiting factor is often not technology or resource availability, but the ability to align stakeholders, secure investment and execute long-term infrastructure plans

Markets with higher shares of renewable energy sources tend to lead in district heating penetration



Source: Euroheat & Power and Eurostat (2022). Market share of district heating in total energy required to meet heating demands from the residential and service sector. Share of renewable heat in gross final consumption for heating and cooling

Projected evolution of district heating energy sources (2023-2050, in TWh)



Source: Heat Roadmap Europe (Mathiesen et al., 2026), Swiss Life Asset Managers.

District heating as a platform for renewable and recovered energy

One of district heating's greatest advantages is fuel flexibility. Unlike individual heating systems, district heating networks make it possible to exploit a multitude of renewable and recovered energy sources that, on a stand-alone basis, might be uneconomic or technically impossible to utilise on a building-by-building basis.

Multiple energy sources can be integrated into the same network, increasing both efficiency and security of supply. As technologies evolve, the fuel mix can be modified without requiring major changes at the building level. This flexibility allows operators to decarbonise progressively without requiring extensive interventions at the building level.

Meaningful emissions reductions before full decarbonisation

Importantly, district heating can deliver meaningful emissions reductions even before networks become fully renewable. Many existing systems continue to rely on combined heat and power (CHP) plants fuelled by natural gas. By simultaneously producing electricity and useful heat, CHP systems utilise fuel significantly more efficiently than separate power generation and individual gas boilers in buildings.

As a result, even conventional gas-fired district heating networks can reduce CO_2 emissions by around 50% compared with standalone gas heating systems, providing an immediate pathway to lower emissions while creating the infrastructure required for deeper decarbonisation over time.

A diversified pathway to heat decarbonisation

Looking ahead, large heat pumps are expected to play a central role in the decarbonisation of district heating. However, the sector is unlikely to rely on a single technology. Future heat networks are expected to combine heat pumps with geothermal energy, waste heat, sustainable bioenergy and thermal storage, allowing operators to optimise costs, improve resilience and utilise the most efficient local heat resources available.

Unlocking circular economy opportunities

District heating networks also enable the utilisation of heat sources that would otherwise be wasted, including industrial excess heat, energy-from-waste facilities, wastewater systems and data centres. In doing so, they support the principles of the circular economy by transforming unavoidable waste heat streams into productive energy resources.

By aggregating demand across hundreds or thousands of buildings, district heating creates a market for low-carbon heat that would be difficult to access through individual heating systems, converting energy that would otherwise be discharged into the environment into a valuable local resource.

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Key technologies and energy sources shaping next-generation district heating networks

Large heat pumps 	Heat pumps represent a cornerstone of modern district heating systems. By leveraging ambient heat from sources such as geothermal energy stored in the ground, the surrounding air or nearby water or waste heat sources from industrial activities, they can deliver low-carbon heat at scale while achieving efficiencies well beyond those of conventional boilers and electric resistance heating. As highly efficient electrified assets, heat pumps are also acting as a flexible asset for renewable electricity systems. Many installations can also provide space cooling in summer, extending their value proposition beyond the heating season.
Waste heat recovery 	Many urban and industrial activities generate substantial quantities of unused heat. Data centres, industrial facilities, wastewater treatment plants and transport systems often reject low-temperature heat into the environment. District heating networks can capture and upgrade this resource through heat pumps, converting waste into a valuable energy source, amplifying the principle of the circular economy. Finland already derives approximately 18% of district heat production from waste heat sources.
Geothermal energy 	Geothermal energy offers a stable source of baseload renewable heat capable of supplying district heating networks over multi-decade horizons. By harnessing the Earth's naturally occurring heat, geothermal facilities can provide a continuous and highly reliable energy supply, complementing the intermittency of renewable sources such as wind and solar. In high-temperature reservoirs exceeding 100 °C, geothermal resources can also support combined heat and power applications, enabling the simultaneous generation of electricity and useful heat, thereby maximizing overall energy efficiency.
Waste-to-energy 	Waste-to-energy facilities convert non-recyclable municipal and commercial waste into useful heat and electricity, providing a reliable and largely domestically sourced energy supply for district heating networks. By recovering energy that would otherwise be lost through landfill or disposal, these facilities support both waste management and decarbonisation objectives. As dispatchable assets, waste-to-energy plants can deliver consistent heat output throughout the year, helping to ensure network reliability and complement more variable renewable heat sources. In many European cities, they already form an integral part of district heating systems, particularly in densely populated urban areas where waste generation and heat demand are closely aligned.

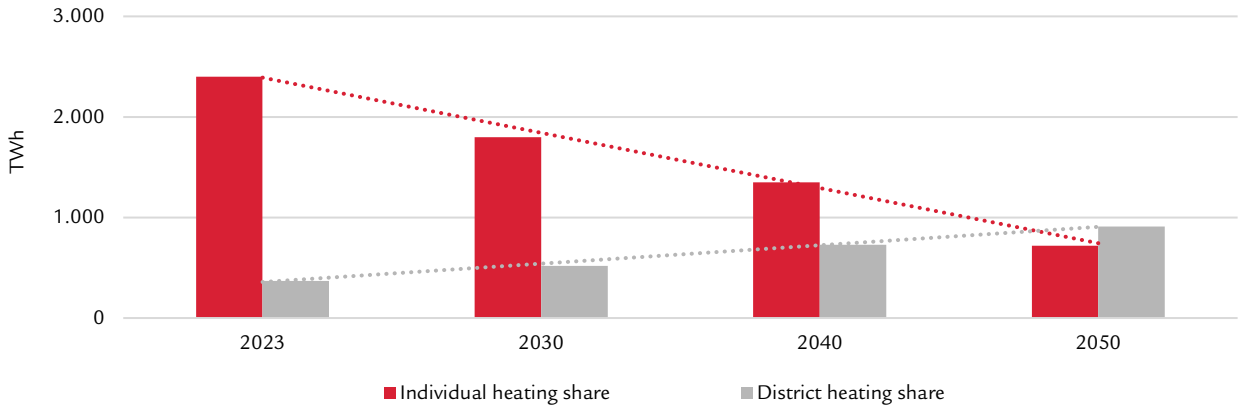
A rare opportunity across infrastructure and real estate

District heating creates a direct link between infrastructure investment and real estate decarbonisation. Expanding heat networks requires significant capital to finance generation assets, distribution infrastructure and customer connections. At the same time, the increasing use of renewable and recovered energy sources within those networks helps reduce the emissions intensity of connected buildings, improving their long-term sustainability profile.

The relationship is inherently mutually reinforcing. Investment in district heating infrastructure supports the decarbonisation of the built environment, while growing demand from building owners strengthens the economics of heat networks and supports further expansion. As adoption increases, both infrastructure and real estate assets stand to benefit.

For real estate owners, district heating offers one of the most scalable pathways to reduce operational emissions, improve compliance with tightening regulations and enhance asset resilience. For infrastructure investors, it provides exposure to a growing asset class supported by the long-term need to decarbonise heat and modernise energy systems. Few investment themes provide such a direct alignment between infrastructure growth and value creation in the built environment.

Participating in the heating transition through infrastructure investing



Source: Heat Roadmap Europe (Mathiesen et al., 2026), Swiss Life Asset Managers.



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