



Vantaa is transforming district heating

Vantaa, Finland

IN A NUTSHELL

Vantaa's district heating network is an efficient system that supplies almost all the city's buildings. The network has moved from using fossil fuels to more sustainable strategies such as converting waste to heat. Now, it's aiming to go carbon-negative and boost the circular economy.

Vantaa's District Heating Network

Vantaa's district heating network is instrumental in the city's decarbonisation efforts. The network is operated by Vantaa Energy, an urban energy company jointly owned by the cities of Vantaa (60% ownership) and Helsinki (40% ownership). At present, the network supplies heat to approximately 70% of the buildings in Vantaa, providing warmth for 90% of the city's inhabitants.

The district heating concept is simple but effective. It involves heating water and distributing it through an underground pipeline network, supplying heat to the buildings along its path. Vantaa's district heating system extends over 600 kilometres, establishing it as the primary heating and sole electricity distributor for the area under Finnish law.

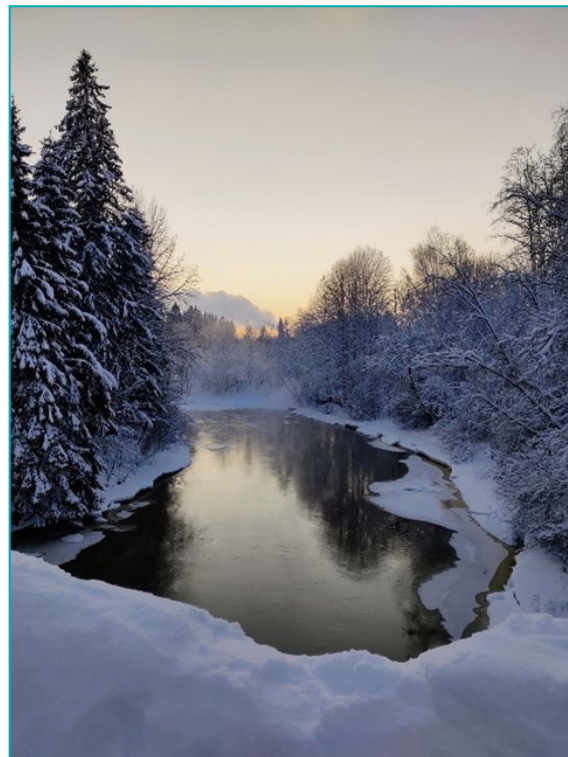
In accordance with Vantaa's goal of becoming carbon neutral by 2030, and carbon negative thereafter, its district heating system is being transformed. This has been achieved partly through the introduction of a waste-to-heat facility and partly by switching from natural gas to biofuel. Vantaa Energy is also planning on sequestering heat underground, implementing carbon capture and increasing its contribution to the circular economy.

Powering District Heat

The generation of heat for Vantaa's district heating network is largely based on waste-to-energy plants and bioenergy. The waste-to-energy plants process and incinerate mixed waste, generating heat as a byproduct. The bioenergy facility uses mainly residual wood that is a waste product of other processes in the forestry industry.

As Vantaa is situated in a Nordic country, its residents require a lot of heat during the winter, and very little during the summer. This means demand is uneven through the year, even though the quantities of waste that feed the system are consistent.

To increase efficiency, Vantaa Energy plans to construct the world's largest heat storage facility. This facility would have the capacity to



© Picture of Vantaa

VANTAA



© Photo de DAT VO

Population: 242,819	Area: 240.5 km ²
Signatory to the Covenant of Mayors since: 25 November 2019	Covenant of Mayors GHG emission reduction: Carbon neutral by 2030

store a million cubic metres of water beneath the bedrock. The water would be heated with excess heat produced during the summer, which could then be drawn upon to produce heat more sustainably during the winter.

The waste-to-energy approach adopted in Vantaa is not only efficient but also sustainable. It reduces reliance on fossil fuels, and by incinerating waste, it reduces emissions of methane, a greenhouse gas more potent than carbon dioxide. The primary waste-to-energy facility in Vantaa processes 600,000 tonnes of mixed waste annually—approximately a quarter of Finland's total mixed waste—serving 1.5 million people. Over 90% of this waste is converted into heat and electricity, demonstrating impressive efficiency.

A profitable company driven by cities

Vantaa Energy, the company that manages Vantaa's district heating network, has adopted a strategic approach to sustainability, prioritising innovative technologies, financial viability and circular economy principles. The company is owned by Helsinki and Vantaa, with the latter being the larger shareholder. Politicians from both cities sit on the company's board and provide its mandate: to rapidly increase the efficiency and sustainability of the heating supply while remaining a profitable company that pays financial dividends to the cities.

Rather than depending on municipal funding, Vantaa Energy procures market-based loans for profitable projects and taps into funds from the European Union and national sources of funding for green technology. The company establishes its profit margins through carbon neutrality and the circular economy. For example, Vantaa Energy plans to produce hydrogen fuel to power carbon-neutral transport. This fuel could be sold, and the excess heat generated during production could be distributed to homes through the district heating network.

Vantaa Energy also aims to capitalise on waste more effectively by enhancing its recycling operations before incineration. By sorting and refining different waste components, the company could generate additional income and heat. The company also believes that developing carbon capture could provide a further revenue stream, allowing it to sell the carbon as a raw material.

Part of Vantaa Energy's mandate is to pass on the savings from energy efficiency to its customers. The company remains committed to maintaining low energy prices for its customers, and demonstrating to them that decarbonisation does not necessarily mean higher energy costs, provided efficient technologies are adopted and renewable resources are used strategically.

Results and next steps

Vantaa's district heating network was responsible for 800,000 tonnes of CO2 emissions annually in 2010, but significant strides have been made since then. The commissioning of a waste-to-energy plant in 2014 led to a 30% reduction in emissions. Further steps were taken in 2019 with the conversion of a natural gas plant to biofuel, contributing an additional 20% reduction.

Despite these achievements, Vantaa Energy continues to push further. The company plans to implement carbon capture and use technology to prevent 100% of carbon emissions from processes such as incineration in the waste-to-heat facility. In addition to storing or repurposing captured CO2 as a feedstock, there is potential for collaboration with waste collection companies in the Helsinki area.

KEY FIGURES

600km district heating network

Supplies energy to **70%** of buildings and **90%** of residents

800,000 tonnes of CO2 from district heating in 2010 has been reduced by 30% using waste-to-energy, and a further 20% by converting from natural gas to biofuel

Processes **600,000 tonnes** of mixed waste annually

The system serves **1.5 million** people and converts over **90%** of waste to energy



FINANCING THE PROJECT

- +** The district heating network is run at a profit.

USEFUL LINKS

- » https://energia.fi/en/newsroom/publications/energy_year_2022_-_district_heating.html#material-view
- » <https://www.vantaa.fi/en/housing-and-environment/environment-and-nature/climate-action-vantaa>



CONTACT

Jari Viinanen, Head of Environmental Protection,
City of Vantaa
jari.viinanen@vantaa.fi

Juha Luomala, Communications & Marketing
Director, Vantaa Energy
juha.luomala@vantaanenergia.fi