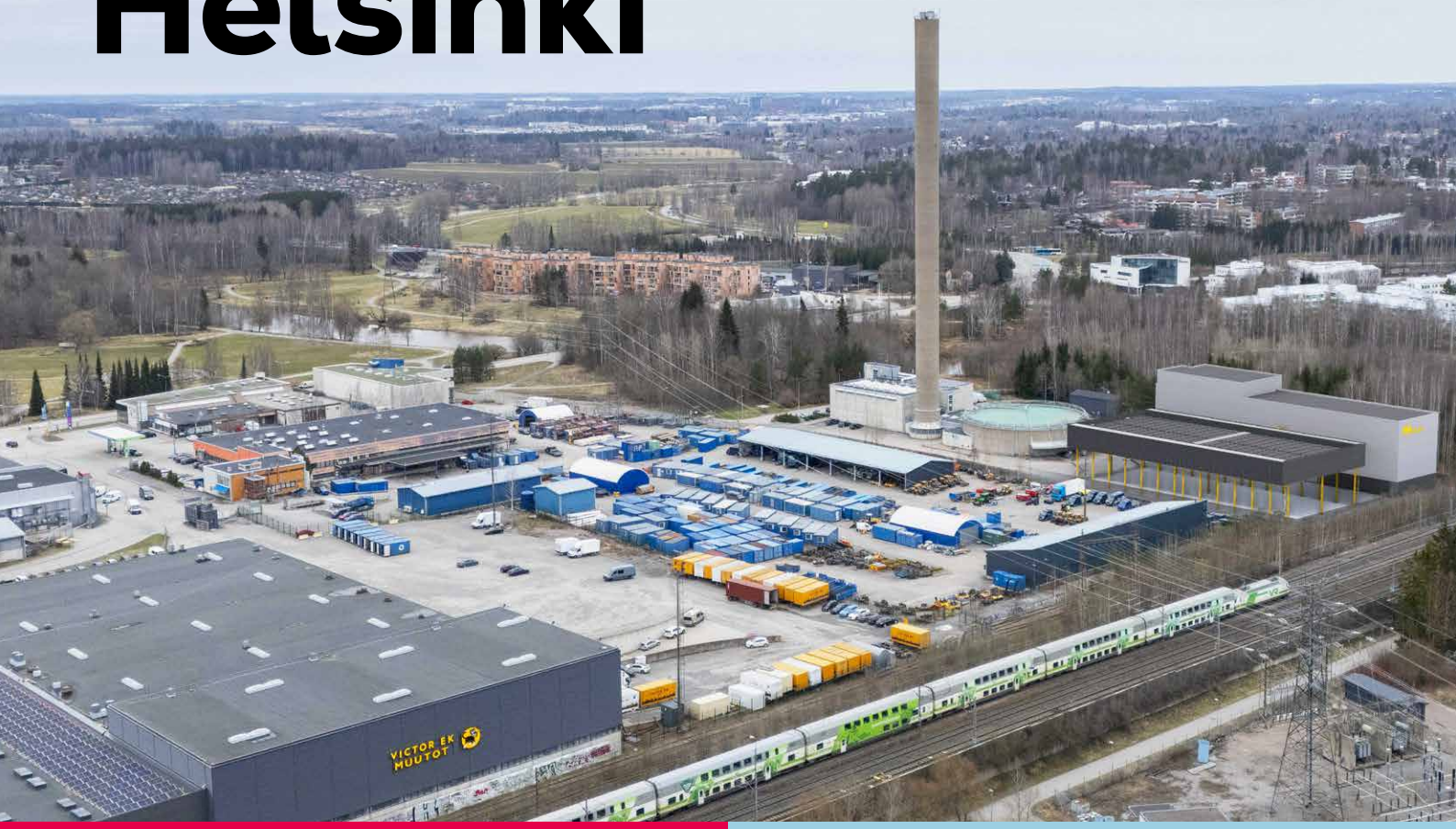
Heat pump reference case

Energy Industries

Helen Helsinki



To support Helsinki's 2030 carbon neutrality target, energy provider Helen Oy is building one of the world's largest air-to-water heat pumps for district heating. The new system, developed in collaboration with Everllence, will deliver up to 200 GWh of clean heat annually to around 30,000 households – directly replacing fossil-based production and cutting CO_2 emissions by up to 26,000 tons per year.

Key facts

- End customer: Helen (Finland)
- Application: District heating for approx. 30,000 households
- Scope of delivery: One large-scale air-to-water heat pump
- Refrigerant: CO_2 (R744)
- Heat source: Ambient air
- Heat sink: Water up to 90 °C
- Heat output: 20–33 MW (temperature-dependent)
- Annual heat output: Approx. 200 GWh
- COP: ~3.0–3.5 (estimated)
- CO_2 savings: Up to 26,000 tons p.a.

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Everllence

Helen Helsinki

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Project background

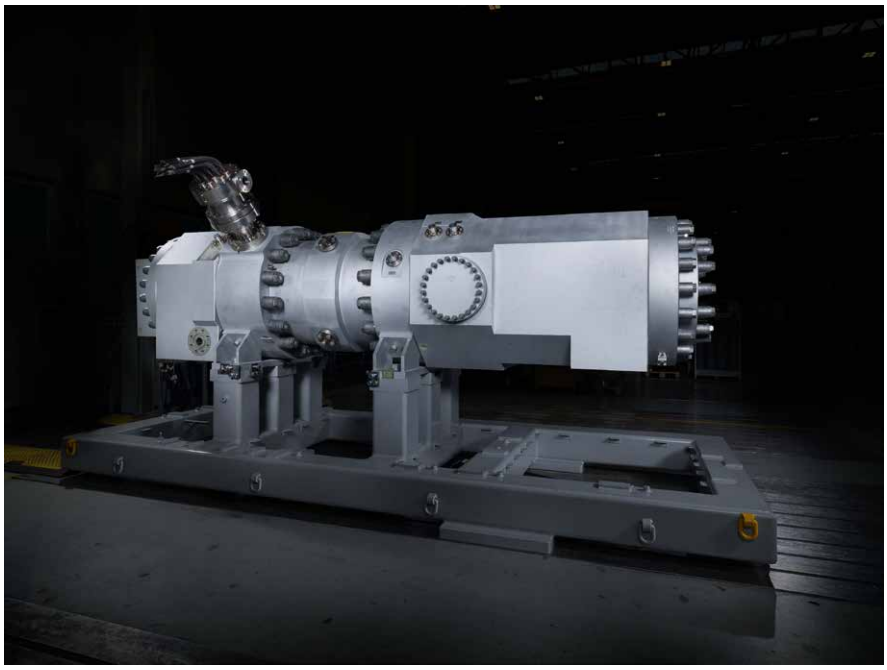
As part of Helsinki's goal to reach carbon neutrality by 2030, local utility Helen Oy is expanding its district heating capacity with a groundbreaking air-to-water heat pump installation. Developed in partnership with Everllence, the project replaces fossil-fueled heat production with a future-ready, zero-emission alternative. The new Patola plant will feature the world's largest air-to-water heat pump ever installed for district heating – a flagship installation within Finland's transition toward clean thermal energy.

System integration & application

The system captures thermal energy from the ambient air – even at outdoor temperatures as low as –20 °C – and uses CO_2 as a refrigerant to raise the water temperature to up to 90 °C. Operated with electricity from renewable sources, the heat pump feeds directly into Helsinki's district heating network. Together with two 50 MW electric boilers, the unit forms a hybrid solution capable of delivering flexible base and peak load capacity, while helping balance Finland's power grid and reducing reliance on imported fuels.

Operational impact & scalability

Once operational, the system will supply approximately 200 GWh of renewable heat annually to around 30,000 households. Replacing fossil-based heat generation, the plant will cut CO_2 emissions by up to 26,000 tons per year. At the heart of the system lies Everllence's HOFIM® compressor technology – oil-free with magnetic bearings and designed for optimal efficiency and durability in large-scale thermal infrastructure. This installation sets a new benchmark for air-based heat pump applications and underlines the potential of electrified heating in cold-climate cities.



Oil-free HOFIM® compressor skid by Everllence for high-temperature heat pump applications.

Technical highlights

Heat source	Ambient air (operational down to –20 °C)
Heat sink temperature	Up to 90 °C
Total heating capacity	20–33 MW (air temperature-dependent)
Annual heat output	Approx. 200 GWh
Refrigerant	CO_2 (R744), a natural and non-toxic refrigerant
Technology	Oil-free HOFIM® compressor with high-speed motor and magnetic bearings
Electrical input	Renewable electricity
COP	~3.0–3.5 (estimated)
Annual CO_2 savings	Up to 26,000 tons

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