Challenges and solutions for a 100% renewable heating and cooling (RHC) sector in Finland
Energy from people to people

Let’s join forces
Our vision is to be the most customer-driven energy company in the market. We give everyone the chance to enjoy the opportunities of the new energy era.

Climate change  l  Urbanisation  l  New technologies
Over a hundred years of urban energy

The electricity company of the City of Helsinki was established in 1909 in order to create a safer and more environmentally friendly way to produce energy in a smoky city.

Helen in brief

<table>
<thead>
<tr>
<th>Number of employees in the Helen Group</th>
<th>Net sales of the Helen Group in 2019</th>
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<tr>
<td>957</td>
<td>914 EUR mill.</td>
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Total of 1,300 km of district heating network

Total of 6,200 km of electricity network

In Helsinki, our security of electricity supply is among the best in the world: 99.9%

We offer world-class expertise

We produce district heat, district cooling, electricity and services for microgeneration of energy, electric traffic and more efficient energy use.

Helen is carbon neutral by 2035

Over a hundred years of urban energy

The electricity company of the City of Helsinki was established in 1909 in order to create a safer and more environmentally friendly way to produce energy in a smoky city.
The total district heating usage in Helsinki was 6.6 TWh on 2019 (19% of Finland’s usage)
- Capacity requirement exceeds 2000 MW

Three power plants
- Hanasaari CHP (220 MW electricity, 420 MW heat)
  - Coal, pellets (minorly)
  - **Shutdown on 2024**
- Salmisaari CHP (160 MW electricity, 300 MW heat)
  - Coal, pellets (minorly)
  - **Shutdown on 2029**
- Vuosaari CHP (650 MW Electricity, 600 MW Heat)
  - natural gas

Vuosaari bioenergy heating plant (250MW)
- Commercial use 2023
- Heating plants (orange colour) providing supply
  - 10 heating plants around Helsinki
  - 2200 MW in total
  - Natural gas, pellets and fuel oil
- Heating and cooling plant with heat pumps utilizing different waste heat from municipal waste system as an example
  - Katri Vala, Heat 100 MW, cooling 65 MW
  - Keskuskatu, Heat 22MW, cooling 15MW
- Heat storage mustikkamaa to be ready 2021
  - 11.6 GWh / 120 MW
Towards carbon-neutral energy production

Our task is to meet the energy challenges of today and tomorrow. We aim for a carbon-neutral, cost-effective and reliable energy system.

1909
Helen has been leading the way throughout its existence, constantly seeking and piloting new energy solutions.

Currently
Helen replaces coal through recycling of heat, energy storage and bio-heat.

2025
Hanasaari power plant will be decommissioned by the end of 2024. Helen will raise the share of renewables in energy production to 25 per cent and cut carbon dioxide emissions by 40 per cent.

2029
Helen will phase out the use of coal in full. Non-combustion based solutions are sought for Salmisaari.

In 2035 we will offer only 100% carbon-neutral energy to our customers.

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1ST STEP: Hanasaari power plant will be replaced by biomass, heat pumps and storages

- Hanasaari, fuel capacity
- Hanasaari, heat production
- Heat pumps
- Geothermal heat
- Heat trade
- Regional renewable solutions
- Vuosaari bioenergy heating plant

New heat production, total

3.11.2020
New solutions

- Sea water heat pump, water from coastal side
- District cooling
- Waste heat from industrial sites and service...
- Data centers
- Utilisation of Kilpilahti waste heats
- Exhaust air heat pumps
- Sea water heat pump, water from distance
- Decentralised geothermal energy
- Biogas
- Utilization of municipal waste water heat
- Geothermal energy
- Bio heating plant
- Solar panel heating
- Electric

Heat supply potential: Poor to Good
Cost-effectiveness: Poor to Good

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Heating, cooling and electricity form the basis of our operations. We are building the new solutions upon this expertise.
Sector Coupling or Just Bundling the Energy Forms

Complex Energy Model:

**HYBRID, INTERCONNECTED, LOW-CARBON**

- Integrating gas, power, heating, cooling – and buildings
  - CHP, CHC and DHC are enablers for intelligent energy system
  - **Power-to-heat**: Geothermal and Sea Water as *heat sources for heatpumps*
  - Energy recovery from Condence-energy, Waste Water and industry processes
  - District Cooling network operates as waste heat collecting system
- Flexibility with Storages and Demand response systems
- Bidirectional networks

Role of "utility": balancing, managing, optimising
= energy operator

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Most diverse solar energy solutions on the market

Helen is a forerunner in solar energy, and we are implementing the largest solar projects in Finland.

We have revolutionised the field with innovative new solutions, e.g. Virtual battery and Designated panel.

Our services are centred around quality and safety, which safeguard a long life cycle for our solar power plants.

Designated panels are Helen’s own concept.
A pioneer in electric traffic

We have more than 10 years’ experience in the development of a public charging solution network, which already includes more than 100 charging points in Helsinki. The network is expanding along the main roads in Finland during 2020.

We offer public and private electric vehicle charging solutions with a turnkey principle. The solution includes the installation and application in addition to the charging device.

Finland’s first public on-street charging point in Runeberginkatu is implemented by Helen.

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Promoting energy efficiency in buildings

Helen offers its customers energy efficiency services that optimise the energy use of buildings.

Helen’s Kiinteistövahti range of products improves the comfort of living, brings savings in heating costs and makes homes more climate friendly. Kiinteistövahti is already used in 50,000 homes in different parts of Finland.

The expanding service entity improves energy efficiency without initial investment.

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Towards carbon-neutral energy production

Helen has succeeded in its role as a trailblazer throughout its existence. It is constantly seeking and piloting new energy solutions. We aim for a carbon-neutral, cost-effective and reliable energy system.

Carbon-dioxide emissions are reduced by 40%

The amount of renewable energy is increased by 25%

The use of coal is halved by 2025 – Hanasaari power plant is decommissioned.

The use of coal is phased out by 2029. Solutions that are not based on combustion are sought for Salmisaari.

3.11.2020
Together we will make the future happen
Thank You!

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