Helen

WORLD’S BEST CITY ENERGY

Concept of City Refinery as part of future energy production in Helsinki

Jussi Uitto, 3.4.2019 Kaunas
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HELEN IN BRIEF

- Finland's second-largest energy company.
- Aiming for climate neutral energy production.
- Over 400,000 customers throughout Finland.
- The most satisfied customers for ten years running.
- Services for homes and enterprises: district heat, district cooling, electricity, services for small-scale energy production, electric traffic and energy efficiency.
- Helen Group’s turnover EUR 930 million (2018), number of employees 1,080.
- In the Helsinki region: three power plants, more than ten heating plants and the world’s largest heating and cooling plant of its kind. Holdings in energy production in various parts of Finland and in Sweden.
- Helen Ltd is an energy company owned by the City of Helsinki.
CITY ENERGY SYSTEM AWARDED AS THE MOST EFFICIENT IN THE WORLD
The district heating networks of Finland

Power plants and heat production sites in Finland

The district heating system is diversified and regional

166 towns and cities
106 power plants
772 heating plants
350 transferable heating plants

• The total demand of district heating 33.7 TWh on 2018

Source: Energiateollisuus
The future of the district heating in Finland

The use of coal will be banned in the energy production in 2029

Source: Energiateollisuus
The total district heating usage in Helsinki was 7.1 TWh on 2017 (19% of Finland's usage)
- Capacity requirement exceeds 2000 MW

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

- 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
  - Case Katri Vala
  - Heat 100 MW, cooling 65 MW

- Heat storage mustikkamaa to be ready 2021
  - 11.6 GWh / 120 MW
Solutions to replace Hanasaari coal-fired power plant by 2025

- Vuosaari 250 MW biomass-fired HOB commissioned by 2025
- Katri Vala 6. and 7. heat pumps: ~40 MW
- Vuosaari heat pump: 15 MW
- Heat pumps (e.g data centres) 50 MW
- Mustikkamaa underground heat storage
- Kruunuvuori underground seasonal heat storage
- Energy efficiency and energy production solutions together with our customers
- Next to find solutions to replace Salmisaari coal-fired power plant by 2030
New solutions

- Sea water heat pump, water from coastal side
- District cooling
- Waste heat from service sectors in Helsinki
- Data centers
- Exhaust air heat pumps
- Utilisation of Neste waste heats
- Decentralised geothermal energy
- Sea water heat pump, water from distance
- Utilization of municipal waste water heat
- Biogas
- Electric boiler
- Solar panel heating
- Geothermal energy
- Bio heating plant

Cost-effectiveness:
- Poor
- Good

Winter heat supply potential:
- Poor
- Good
Climate neutral heat production

Today
- District cooling, sewage water heat, data centers

Long-term target
- P2G, biogas, electric boilers
- New solutions: geothermal, seawater heat pumps, refinery, bio-CCS/CCU, small modular reactors
- Waste heat: District cooling, sewage water heat, data centers, local solutions, industry, heat storages

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Concept of Cityrefinery

Dark heating season
- 30 MW Biomass
- 15 MW Biomass
- Renewable electricity 15 MW

Solar energy season
- 3 MW Bioproducts
- 15 MW Heat and Power
- 20 MW Bioproducts
- 2 MW Heat
Thank you!

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