

We take our customers and partners into a
low-emission future

HUKKALÄMPÖSEMINAARI

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Future prospects for Helen District Heating

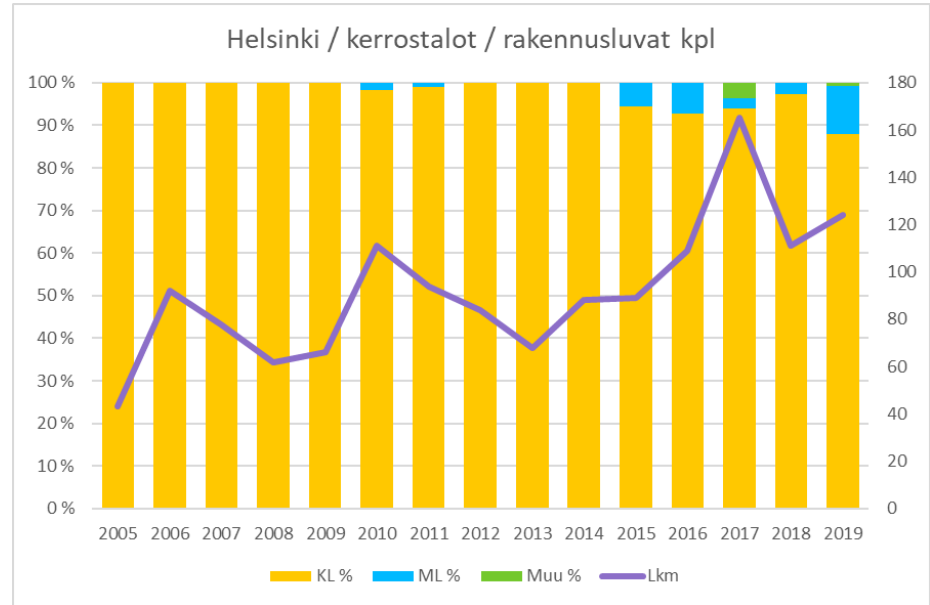
Market position



Helen's District heating has strong market position:

- Market share 2019 was close to 90% in residential newconstruction segment
- New customers 220 pc:s
- Customer loyalty was 2019 99,9%
- Despite hard taxation politics in previous years
- Customer price outlook is lowering
- Emissions are decreasing rapidly

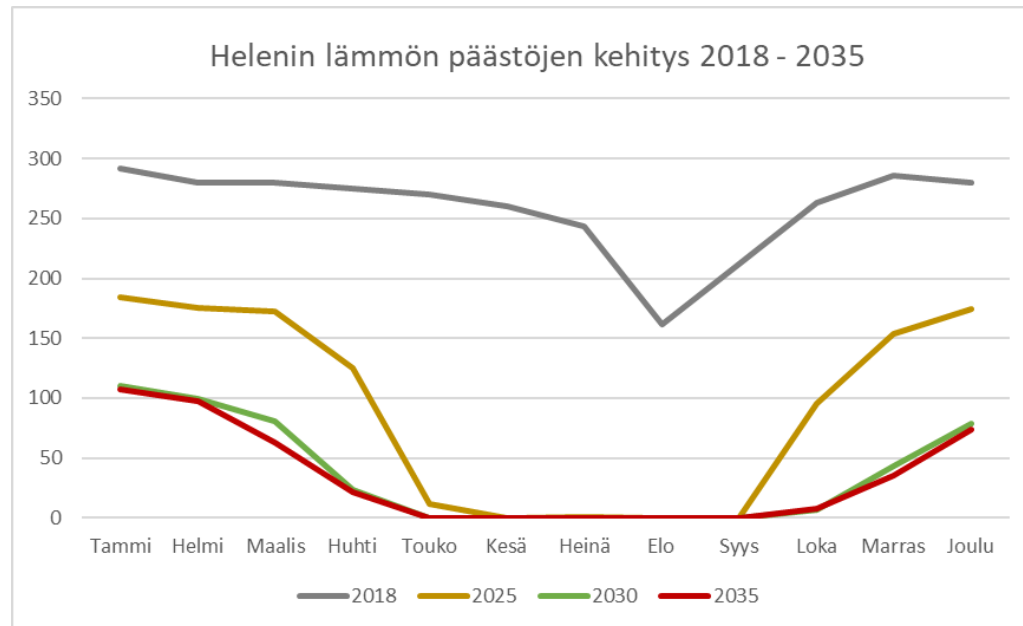
Customers trust us and appreciate our high level of service.



From annual emissions to monthly resolution

Helen's emission efficiency measures strongly modify the emission graph:

- The variation in emissions between different seasons is increasing
- The period of very low-emission heat is extended every year
- The focus of emission reductions will shift to the most challenging heating season

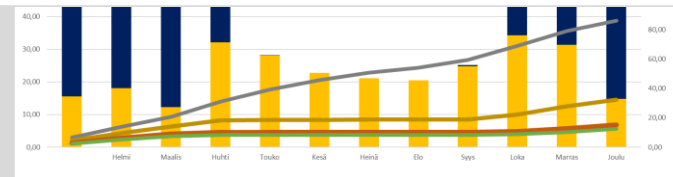
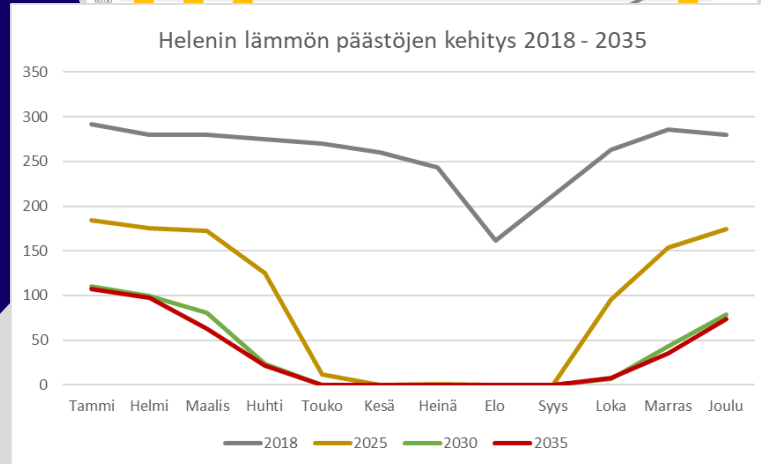


Resource emission based optimization

Helen will play a key role in many of the HNH 2035 measures together with the city organization.

After 2025, Helen's district heating will be very low in emissions for much of the year. During peak heat demand, heat production is transferred to a heat pump that utilizes a local heat resource.

Our goal is to minimize emissions by using each resource when it is best for emissions. We create a block-level energy solution that combines the best of traditional district heating with new decentralized production using local resources

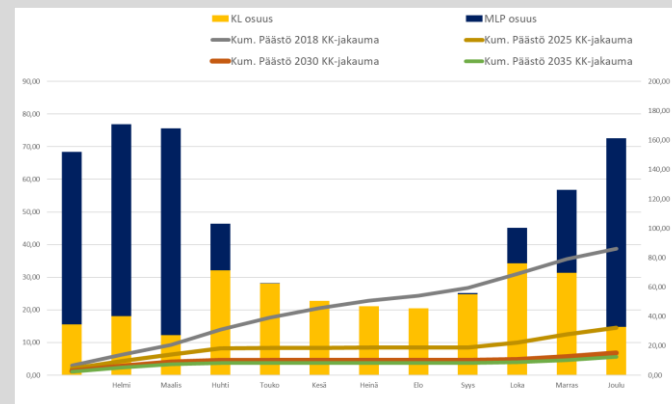
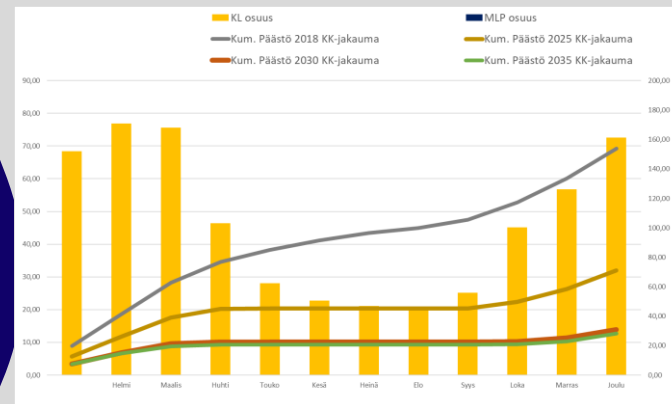


Emission based Resource optimization

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Emission based Resource optimization

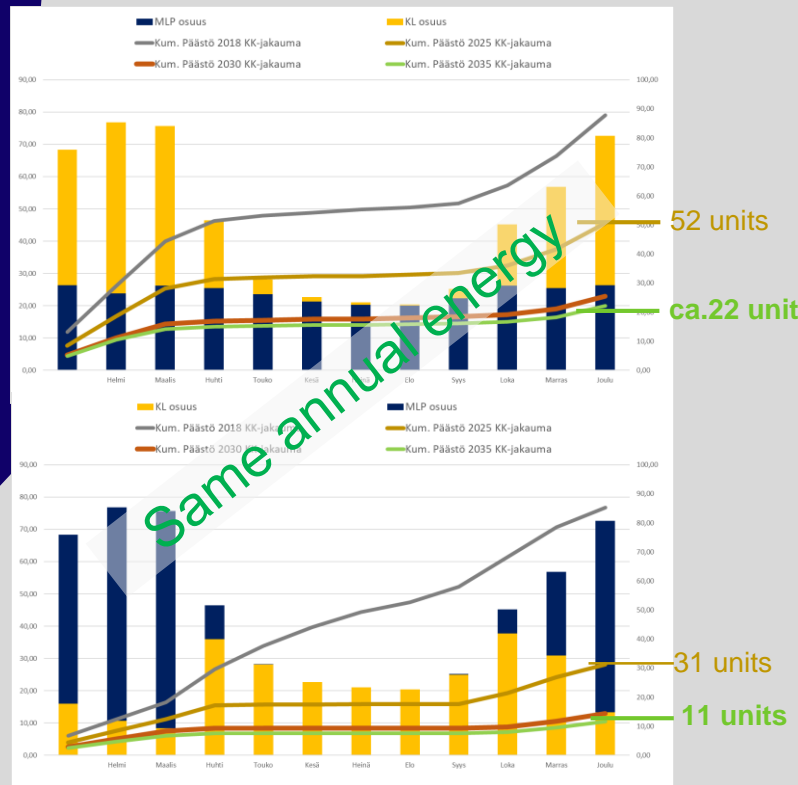
We use limited resources in a timely manner

Helen directs new decentralized production on an emission basis with the aim of minimizing emissions for the customer.

Local geothermal heat will come to the aid of district heating as the need for heating increases. Combining limited low-emission resources in a timely manner provides the best outcome for both emissions and economics.

In this way, the dependence of the new building stock on combustion-based heating is eliminated.

Traditional GSHP production combination



”New Normal” production combination

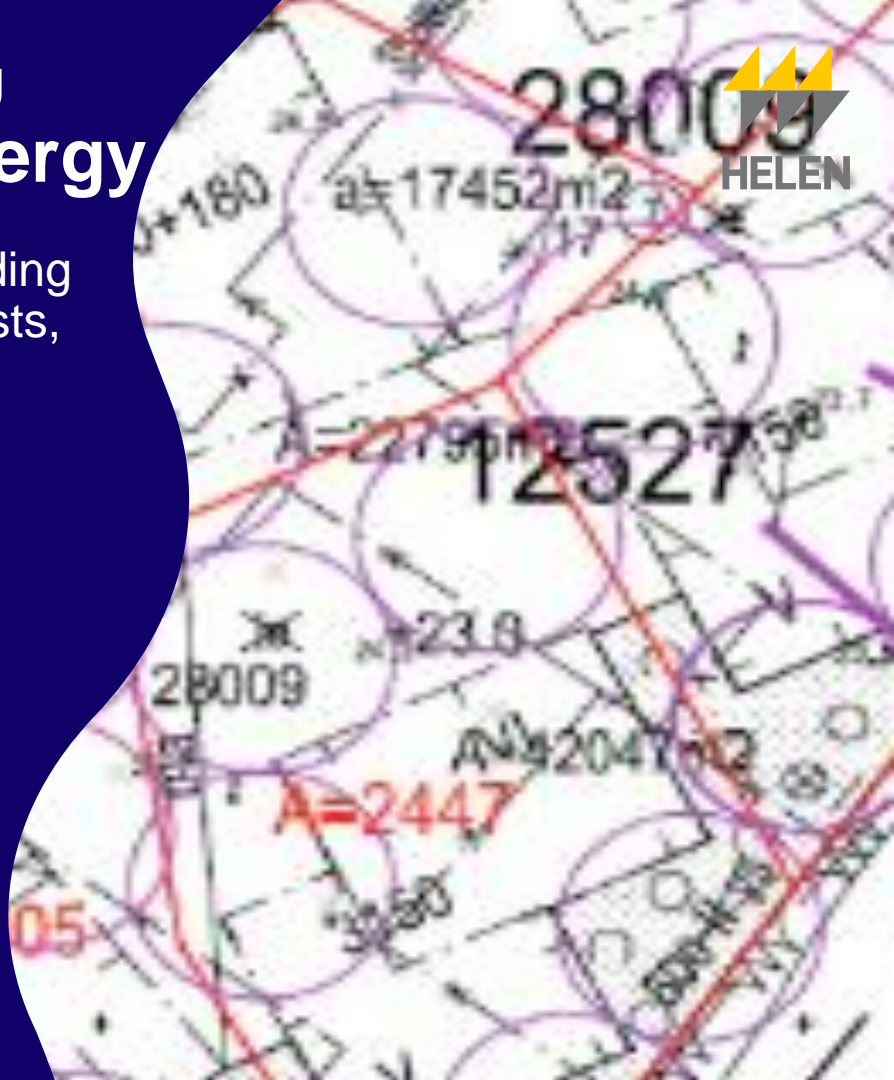
Future prospects for Helen District Heating

Price of Geothermal raw -energy



Nominal Price for GSHP-energy excluding energy production opex and capex costs,

GSH potential		Electricity tot price
70 kWh/m,a		90 €/MWh
Drilling cost		HP COP
28 €/m		3
Calc. Period	Raw heat CAPEX	GSHeat excl. Production CAPEX and maintenance
yrs.	€/MWh	€/MWh
5	80	110
10	40	70
15	27	57
20	20	50
25	16	46
30	13	43
35	11	41
40	10	40
45	9	39
50	8	38



New Normal

Costs for Zero Carbon newbuildings



Cost outlook for very low-emission practically 0-Carbon new construction:

Additional cost for projects $< 15 \text{ € / m}^2$

The total heating cost during operation:
approx. $0.6 \text{ € / month, apt-m}^2$

Optional very affordable cooling

The key question is:

- **where to find the required 15 € / m^2**

When the end result is a very low-emission new construction stock.





SECTOR COUPLING
or just
BUNDLING THE ENERGY
FORMS

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Interactive energy community

IN MODERN CITY, ENERGY INFRASTRUCTURE CONNECTS BUILDINGS TO EACH OTHER

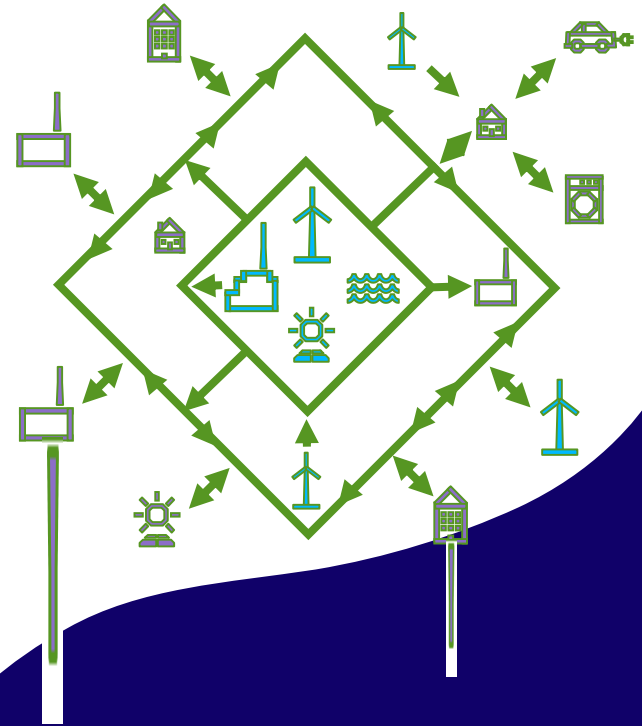
- Energy flows are managed in Bi-Directional energy networks
- Heating-, Cooling-, and Electricity demands are balanced and optimised by energy operator
- Operator controlled Demand response systems enlarges energy systems into building technologies
- Customer satisfaction and value creation is key driver for Service provider – the Operator



Bundling the energy forms

IT'S NOT ANYMORE QUESTION OF ONLY HEATING, COOLING OR ELECTRICITY

- The significant increase of solar and wind power in the electricity market calls for various flexibilities in the production and use of energy.
- Weatherproof production, such as combined heat and power generation, hydropower and nuclear power, is needed for the coldest periods of the year.
- Energy storage systems and demand response will increase and come more common.
- Demand response bundles customer/end user also into energy system



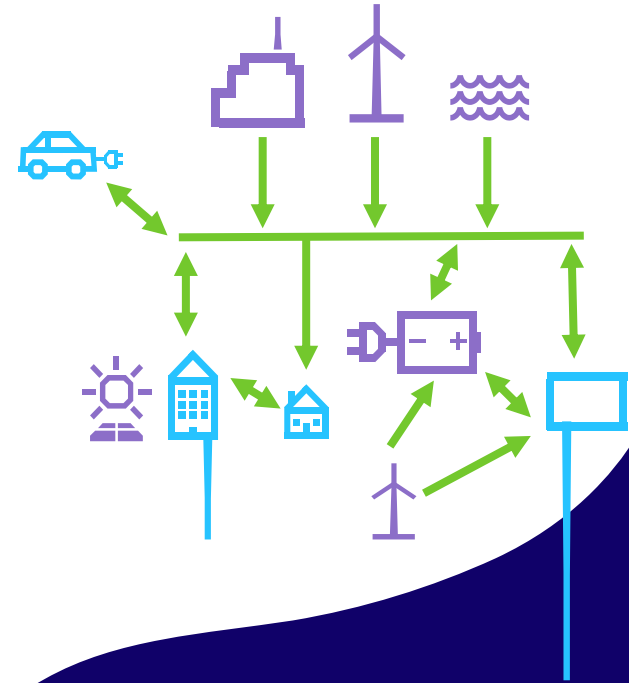
HELEN Model:



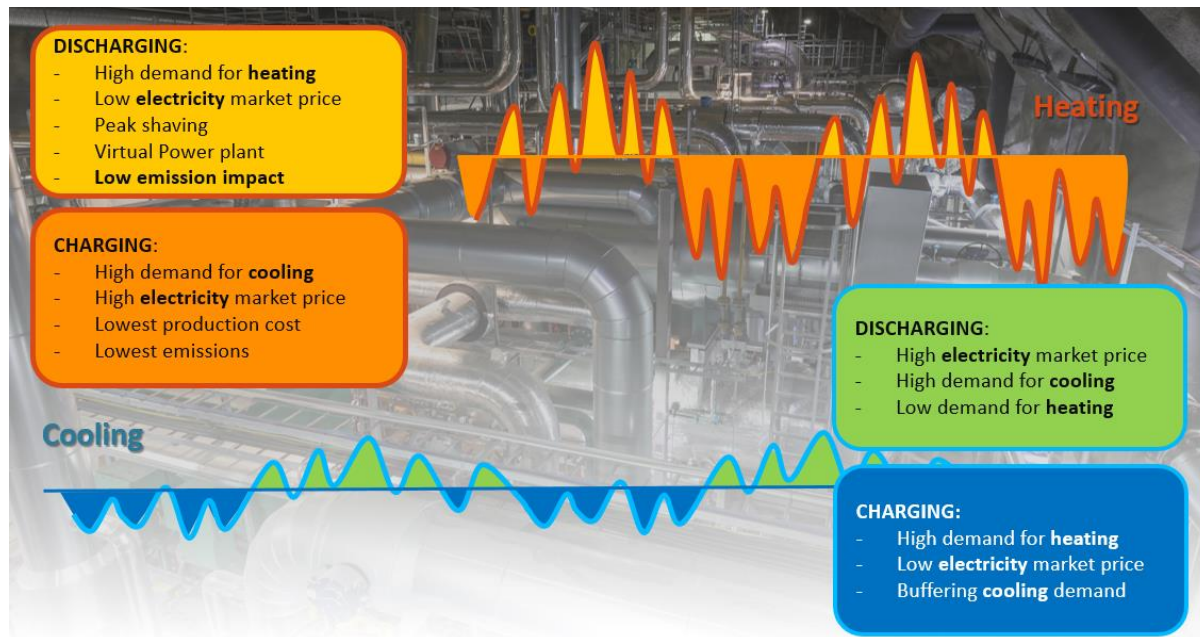
HYBRID, INTERCONNECTED, LOW-CARBON

- 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, where available
 - 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
- Prosumers with electricity or heat are most Welcome

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



Role and added value of Storages



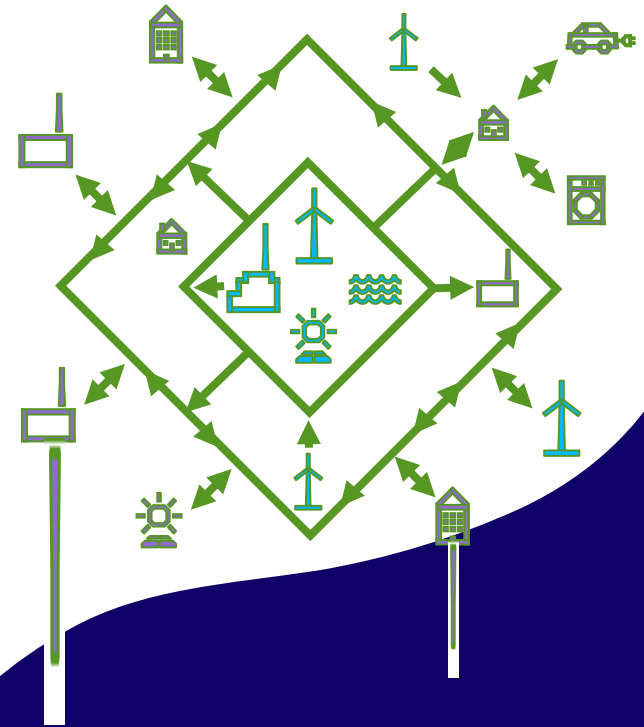
Example, how and when heating and cooling storages are operated DHC system:

- Lowest production costs
- Lowest primary energy need
- Best price for customers

Energy forms are bundled

REALLY, IT'S NOT ANYMORE QUESTION OF ONLY HEATING, COOLING OR ELECTRICITY

- It is question of taking the best advantages from each resource all the time in every single moment
 - Market Based Guidance towards bi-directional networks is essential
 - The Operators are the key-role players
- Do not encourage to optimize just one energy form or optimize just building (on-site) solutions
 - Let the operator optimize the entity eg. Emission based production sequence
 - Energy asset boundary is not in the facade it is deep inside the building





HELEN

THANK YOU

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