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Success story of district cooling in Finland

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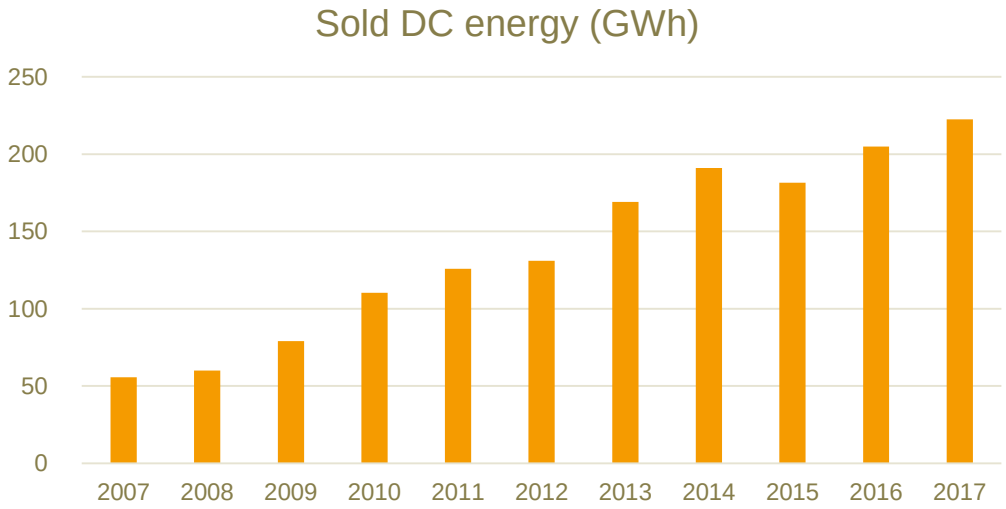
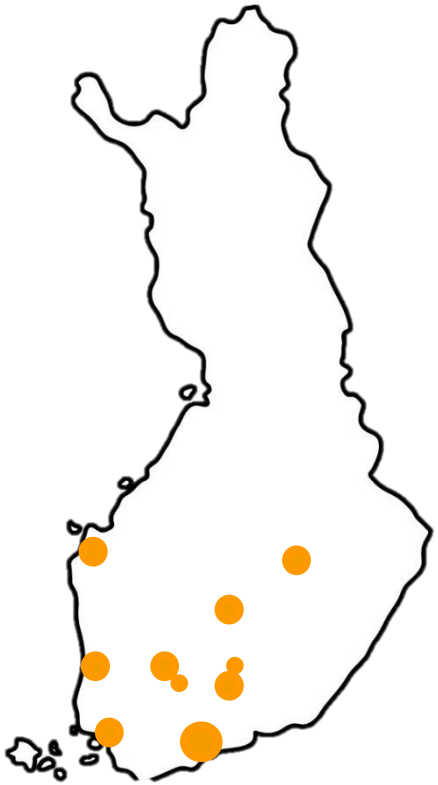
Content

- Story of district cooling in Finland: case Turku Energia
- Why do we need cooling also in colder climates.
- Future of district cooling in Finland, what are the possibilities and main challenges.
- New business models - don’t get stuck in the grid!

District cooling in Finland

- 10 companies provide district cooling in Finland
  - Same energy utilities are also usually providing district heating
- Most typical way is to produce cooling with large scale heat pumps or compressors
- Customers vary from industrial, corporative and residential buildings
- Still not a core business but growing rapidly!





Case Turku Energia

- Background:
  - District cooling in Turku was initially released in early 2000 (DH on 1976)
- Currently 104 customers, including both corporative and residential: hospital, business offices, hotels, shopping centers, few residential buildings
- Total sales 31 GWh (2017)
- Grid length over 30 kilometres: supply temperature is 7 °C and return 17 °C
- Encouraging customers to have both DHC by giving 50 % seasonal discount

Producing 100 % renewable cooling

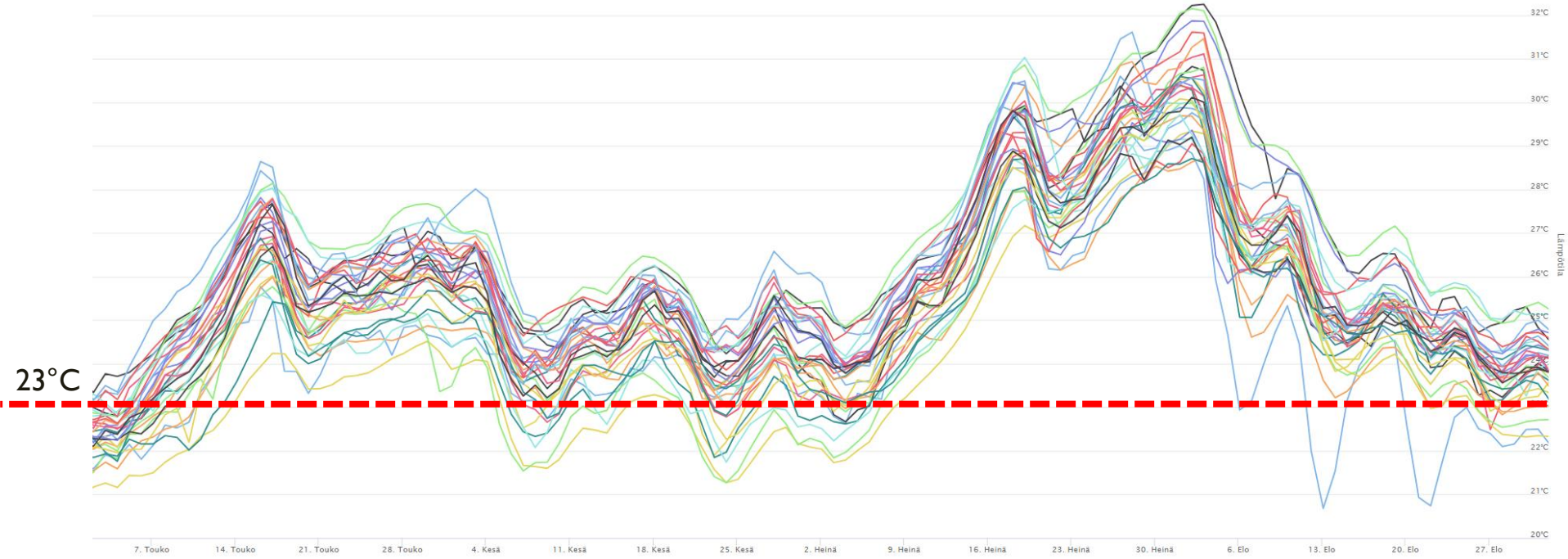
- 2 turbo heat pumps in Kakola → 42 MW heating and 28 MW cooling capacity
- Heat source is waste heat from purified sewage water → circular economy
- In 2017 Turku Energia produced 90 % of is cooling power from the Kakola heat pumps
- Chilled water storage 15 000 m^3
- 15 water chillers with screw compressors for peak loads and balancing the network → about 20 MW total cooling power

Why do we need cooling also in colder climates

- Key customers need cooling all year around
- Climate change can already be seen in Nordic countries
  - Especially summers are getting more warmer.
  - At the same time new buildings are very energy efficient and have high level of isolation. This makes apartment temperature levels and comfortable living conditions challenging to succeed.
- Best result for healthier indoor climate comes from combination of DHC and smart building control.
- District cooling collects the passive heat the buildings and with heat pumps it can be turned into district heating.

Cooling is already needed in Finland

One building, temperature metering in each apartment.
Including smart DH control system – *only passive heating and no cooling systems.*



May/2018

August/2018

Future of district cooling in Finland

Possibilities

- According to Helen and Finnish Meteorological Institute study by 2050 the need for heating in reducing 17 % in Finland. At the same time the need for cooling is increasing 35 %.
- Customers have a need for more comfortable and healthier living conditions as climate gets warmer
- Strong background in district heating helps to grow also district cooling

Challenges

- Customers have low understanding of the value of district cooling in residential building
  - We believe that in future cooling in apartments will be as common as car air-conditioning
  - Construction companies and customers need more education about the benefits of cooling
- How smaller district heating companies get district cooling in their business?

Don't be stuck in grid!

- District heating companies can provide cooling anywhere where the heating network is located
- Case Yli-Maaria multi-function school center.
  - Besides school the building includes child health center, library, flexible spaces etc.
  - Building is in use all day and all year around
  - Energy efficient building and school circumstances makes good indoor climate very important

Taking the full benefit of district heating

- School is heated with district heating and cooled with heat pump
  - Heat pump uses return water from district heating for heat source.
  - Cooling is used for cooling the building and the ‘‘surplus’’ heat can be fed to district heating supply side (85 °C)
- Good example how heat pumps and DHC work well together!

Thank you!