District cooling, Tartu experience

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Session: Cooling – The Other Side of a Shiny Coin
1. Affordable but intermittent solar and wind electricity increases rapidly in the energy system

2. Coupling of electricity, heating & cooling, gas and transport systems helps to balance intermittent electricity

3. Active customers are part of the intelligent energy system and gain many benefits through digitalisation

The future energy system is based on renewable energy, strong coupling of energy sectors and customer oriented solutions
Where is Tartu?

Europe, Fortum City Solutions countries

Estonia

City of Tartu
District cooling from river

Heat pump – waste heat from DC is used in DH

Heat and Power cogeneration from biofuels

Solar, wind

Waste heat from industry is used in DH

Heat storage

Low temp DH network under development
• **City centre cooling (since 2016)**
  - Designed capacity of DC plant 13MW
  - Installed capacity 8,4MW
  - Chillers 2,3+4,7MW and heat pump 1,4MW
  - Length of DC network 3,9km
  - 7 connected buildings (total 6,8MW, incl. under construction 2,1MW)

• **Aardla (Lõunakeskus shopping area (since 2017)**
  - Designed capacity of DC plant 9,8MW
  - Installed capacity 5,4MW
  - Chillers 1,6+3,2MW and heat pump 0,6MW
  - Length of DC network 2,1km
  - 5 connected buildings (total 5,8MW, incl. under construction 1,4MW)

• **Maarjamõisa area (starting 2019)**
  - Design is ongoing
  - Will be connected with City centre
  - Starting autumn 2019
  - In long term plan will be connected to Lõunakeskus as well
Benefits to the customer

- Less investments
- Less risk from cooling capacity (capacity is contracted)
- Better energy label, better efficiency (DC 0,2 vs electricity 2,0)
- Less space required
- No devices outside of building (better architecture, rooftop areas for other use)
- Lower electricity consumption capacity of building
- Less maintenance and operating costs, less risks from that side
- Environmental benefits
  - No noise
  - No vibration
  - Less F-gases
  - Smaller ecological footprint

First DC customer in Tartu - shopping center Kvartal
Conclusions and lessons learned

- **DC is growing market** – customers are interested to get full indoor climate related services from one place and without investing too much to ownership of heating or cooling equipment.

- Tartu experience shows that 1 MW of DC brings 2.6 MW of DH – DC helps customers to decide in favor of DH.

- Customers waste heat is recovered to DH network – larger DH network provides more opportunities to use waste heat than customers own heat recovery equipment.

- DC helps customers to get better energy class for their buildings.

DH and DC customer. Southern Estonian biggest shopping/entertainment Center Lõunakeskus
Our key messages

- HELPS TO INTEGRATE MORE RENEWABLES
- CAN BE TRANSFORMED FOSSIL-FREE
- BOOSTS CIRCULAR ECONOMY
- IS CLEAN AND IMPROVES AIR QUALITY
- PROVIDES LIVING COMFORT, YEAR-ROUND
For a cleaner Tartu
Thank you!