AI based demand/supply balancing in DH network

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Enermix Oy, 24.4.2019

Finnish smart energy platforms for SMEs

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TaloTohtori 2.0
We digitalize buildings

Enermix Oy

- Software company, 10 employees
- Founded 2009, “start again” 2015
- Office in Tampere
- Offers Talotohtori digital platform with comprehensive set of services
- Customers are Energy Utilities, service companies and Building owners who wants to offer new digital service on same platform

Main owners are two energy utilities:

Our customer segments

Energy utilities

Companies offering products with services

Building owners

As Oy kohteet
KOy kohteet

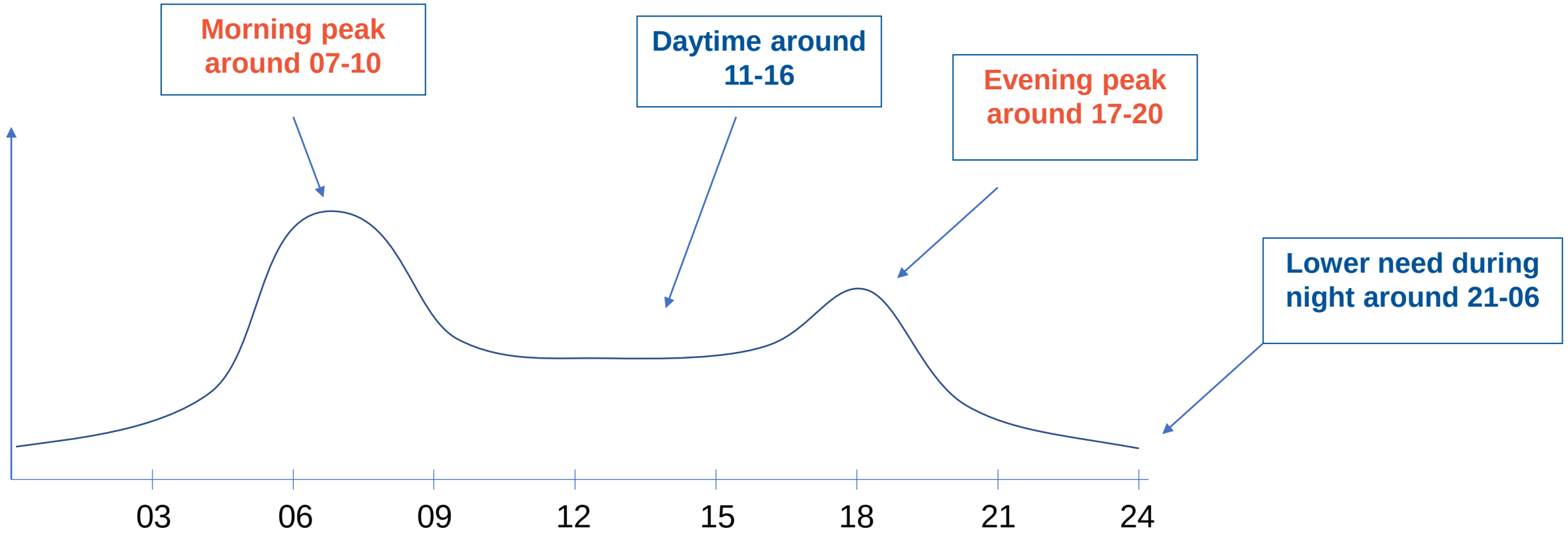
Cities and municipalities

Real estate Management companies

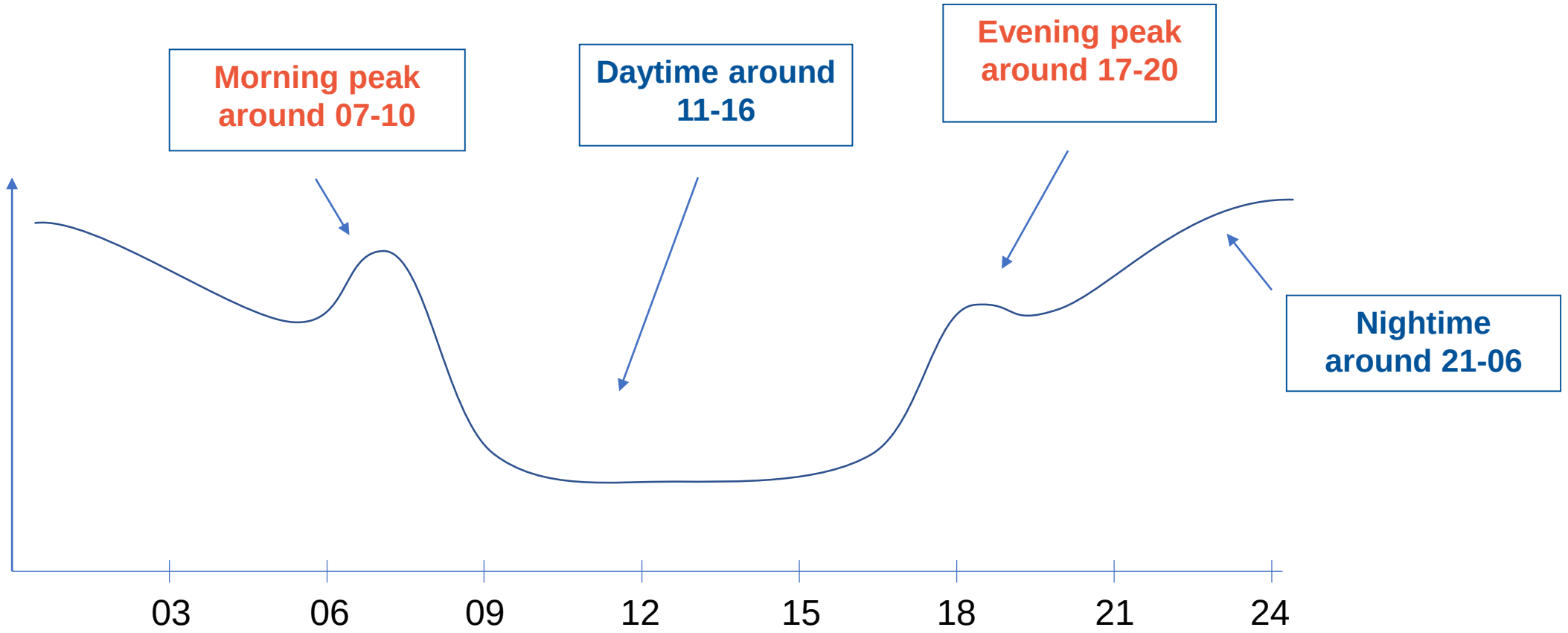
Water utilities

www.talotohtori.fi

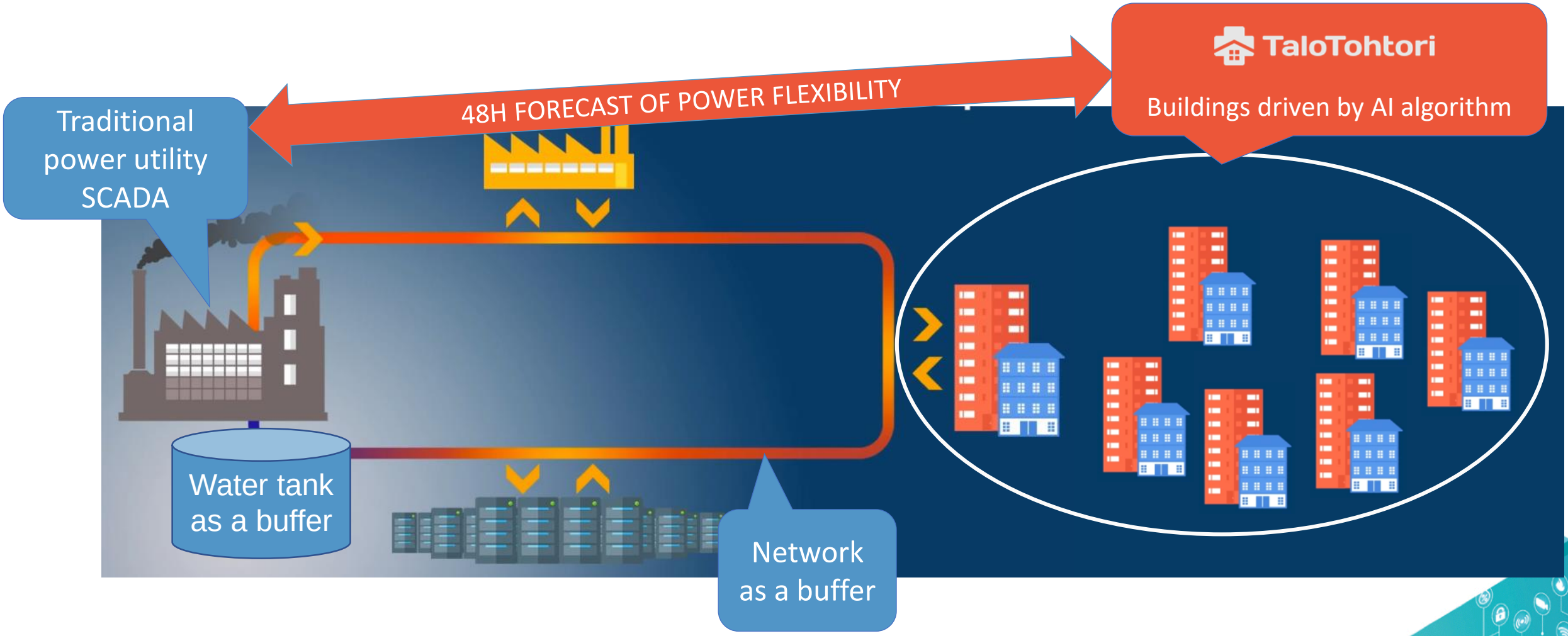
The problem: Typical winter profile of district heating supply



The problem: Typical spring time profile of district heating supply



Principal of concept



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Buildings are cost-effective solution for demand/supply balancing

- Buildings has high thermal capacity meaning that temperature changes are slow
- People do not regocnize temperature changes under 0,5 degree
- More flexibility available when buildings are not in use
- These two facts gives potential for several hours (2-14h) to adjust heating
- This potential is used by clever algorithms that offers reliable data for forecasting how much demand can be adjusted to balance supply in Power utility
- Self-learning forecasting based machine learning algorithm

Buildings flexibility is individual behaviour

Inside temperature change from 21,0C to 20,5C:

	Building thermal behaviour		
Outside temp	Small building	Medium size building	Large building
-10 C	2 h	3 h	5 h
-5 C	2 h	4 h	6 h
0 C	2 h	5 h	7 h
5 C	3 h	6 h	10 h
10 C	5 h	9 h	14 h

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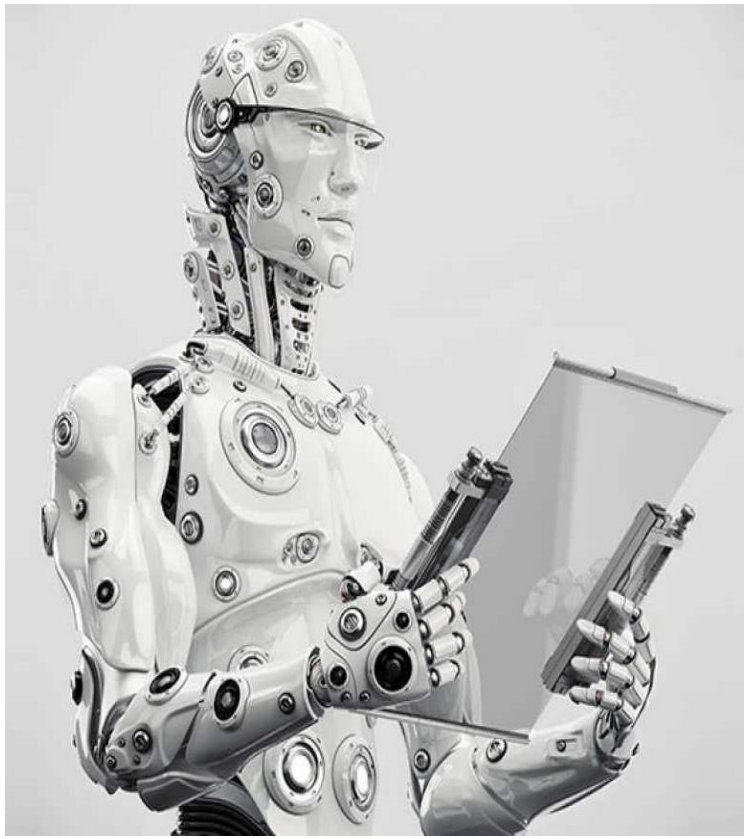
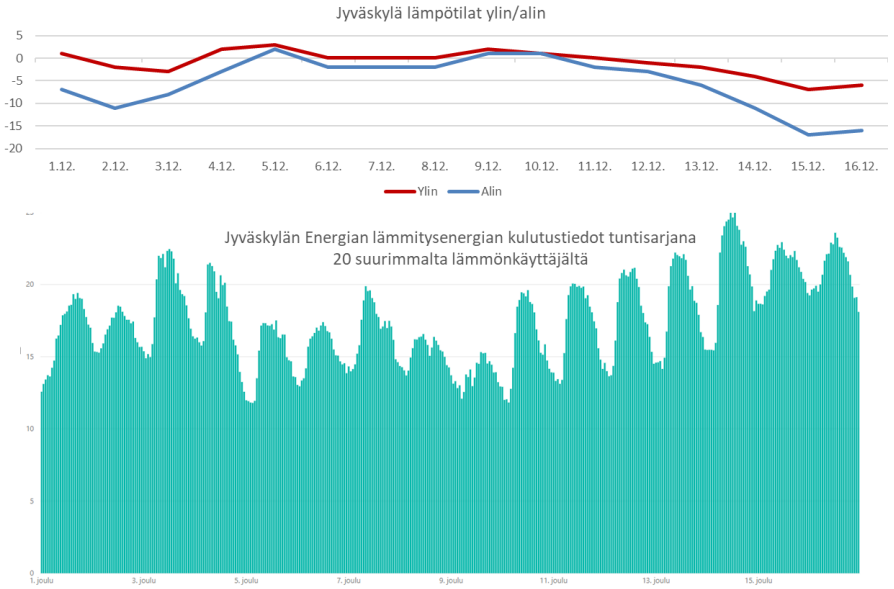
Why solution needs to be based on machine learning?

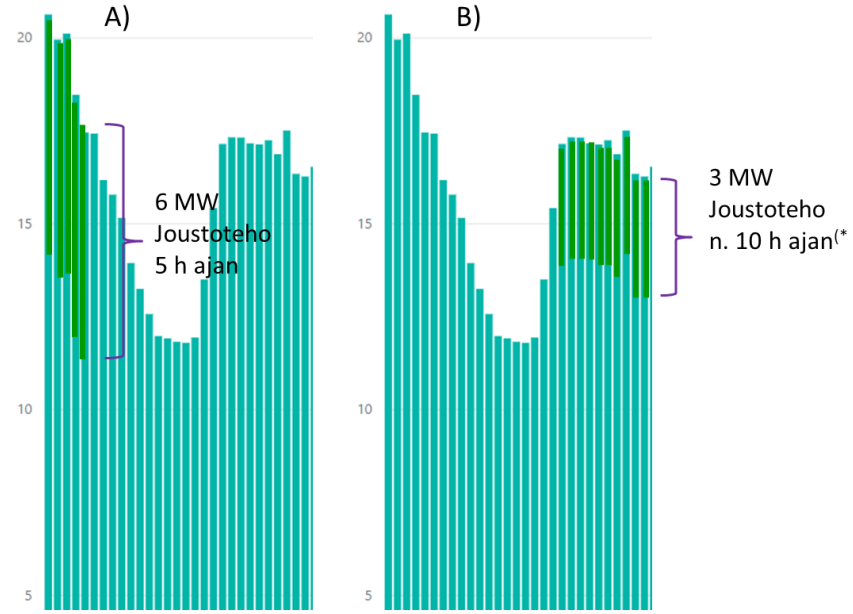


- Flexibility of each building is unique and based on several factors and most of them varies continuously
- For example, charge or discharge power capacity depends on buildings power need in that particular moment
- Typical factors:
  - Outside temperature
  - Allowed inside temperature variations
  - Buildings thermal capacity
  - Buildings other heat sources
  - Minimum (tap water, ventilation) and maximum heating capacity
  - Weather forecast
- Machine learning algorithm makes it possible to offer reliable forecast to power utility

Concept tested with two energy utilities in Finland

- Tampere City: 49 largest buildings offers +/- 18 MW / 60 MWh flexibility
- Jyväskylä City: 40 largest buildings (or 200 apartment buildings) offers +/- 10 MW / 34 MWh flexibility





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Are you interested to know more?

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Thank you!

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