

Positive Energy districts

Monitoring actions and raising awareness

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Smart energy networks

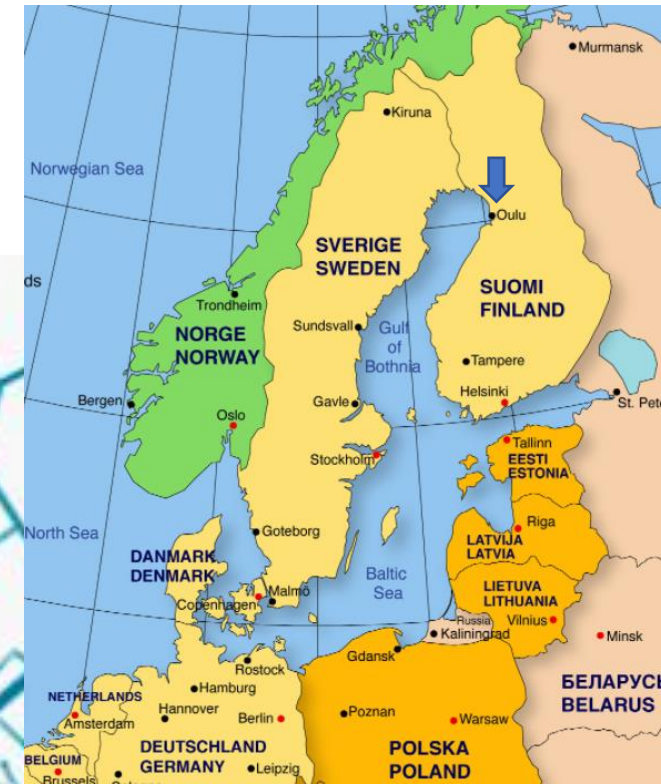


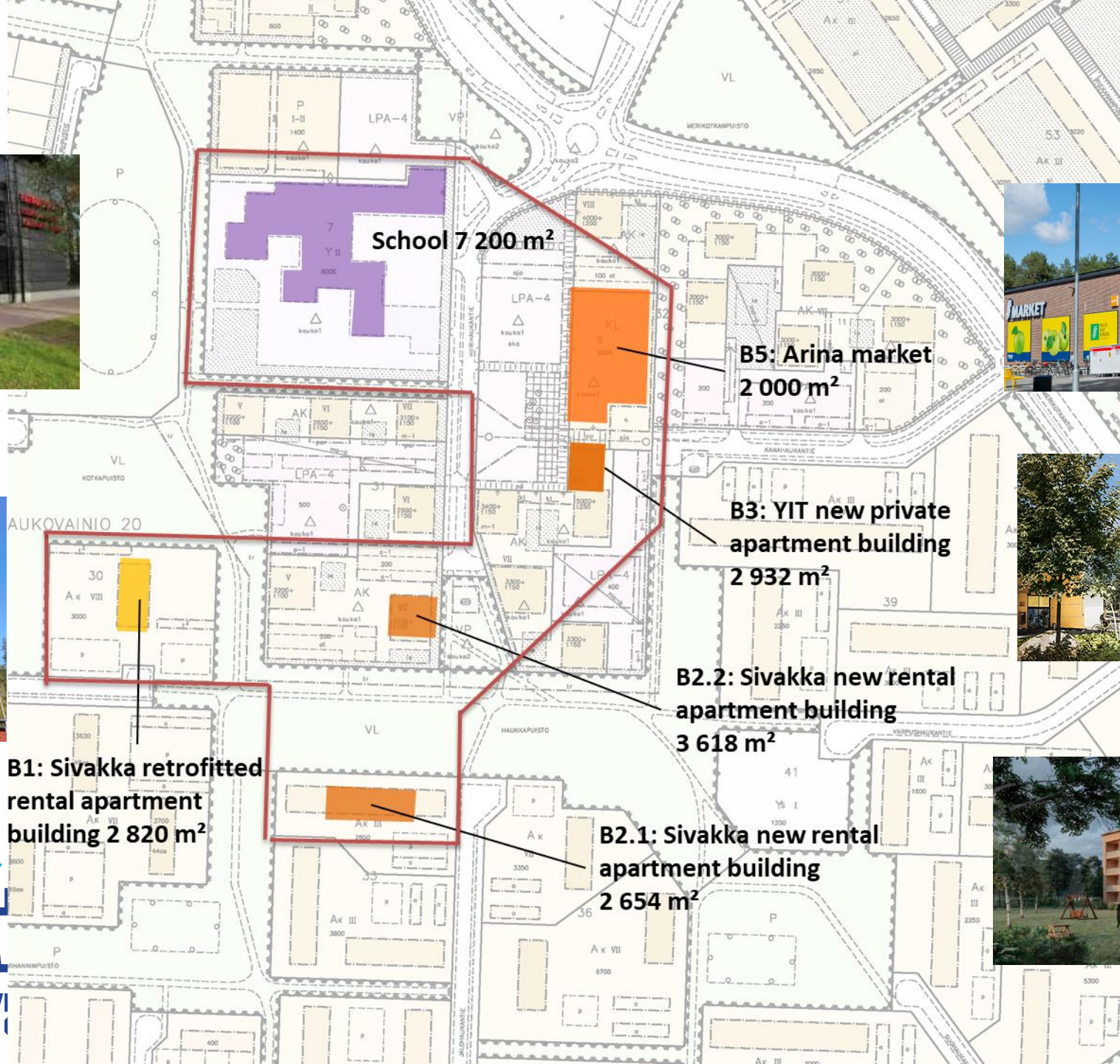
SMARTrenew Interreg NPA, 26/03/2022, Energy Monitoring
for Sustainable Communities



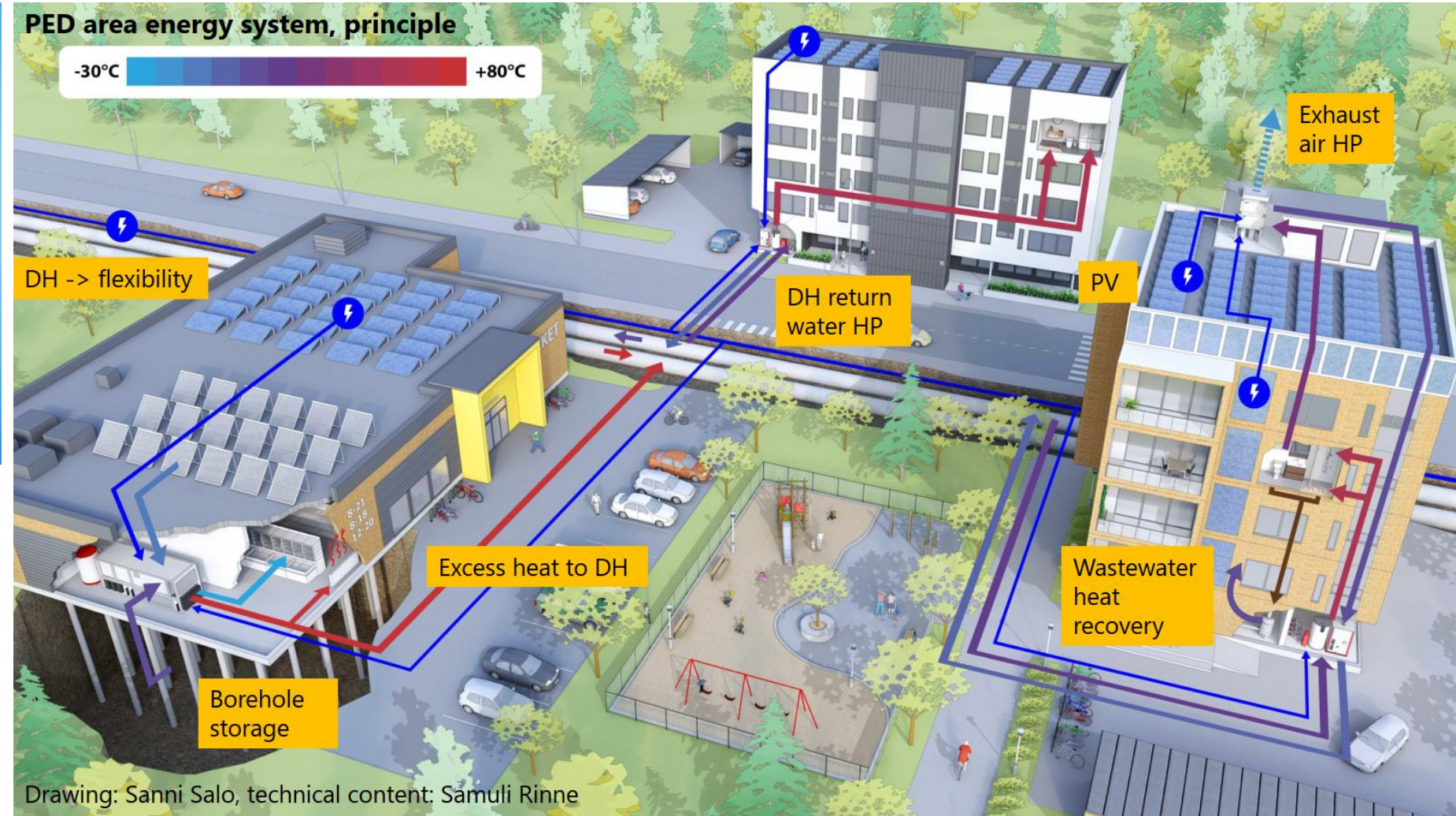
This project has received funding from the Horizon 2020 programme under grant agreement n°824418. The content of this presentation reflects only the author's view. The European Commission and INEA are not responsible for any use that may be made of the information it contains.

Kaukovainio district in Oulu, Finland





PED development and target



Energy Use in PED Boundary

- ▶ Energy consumption is measured at building system level and at residents' level as well (GDPR regulated)
- ▶ A set of energy parameters are monitored from all demo buildings, Arina store has the most measurement points (over 1000, minute-resolution data), for the needs of predictive AI-based modelling of the energy system
- ▶ End use = imported DH + “free heat” from return-line & other free/waste sources to Heat Pumps (+ electricity to HP's & other building systems)



Energy Delivered to the PED

- ▶ All demo-buildings are connected to the national power grid, and to the city-wide district heating network.
- ▶ DH-network is used efficiently by utilizing the return water pipeline (can be considered as zero-emission waste energy) with the help of heat pumps (increases electricity use).
- ▶ Energy is imported from outside the boundaries to cover the remaining energy (heat & electricity). Generation is efficient CHP/biomass, hydro & wind power → low environmental impact
- ▶ PEDvirtual: Wind-power and other regional RES co-owned by building owners delivered to PED (mainly Arina calculated for now)



Why monitoring?

► Building level data

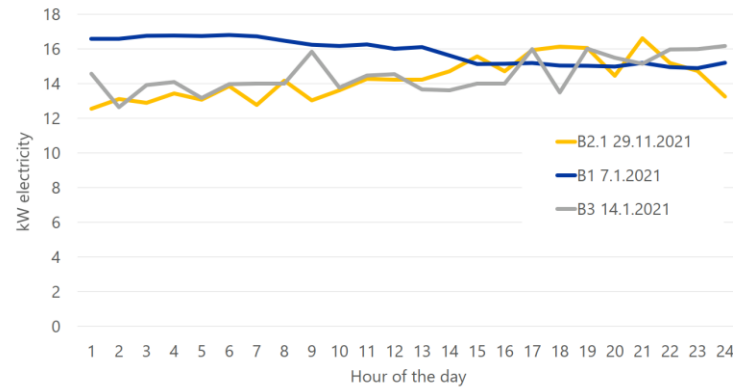
- for ML training
- PED KPI objectives
- Control system

► Residents' level

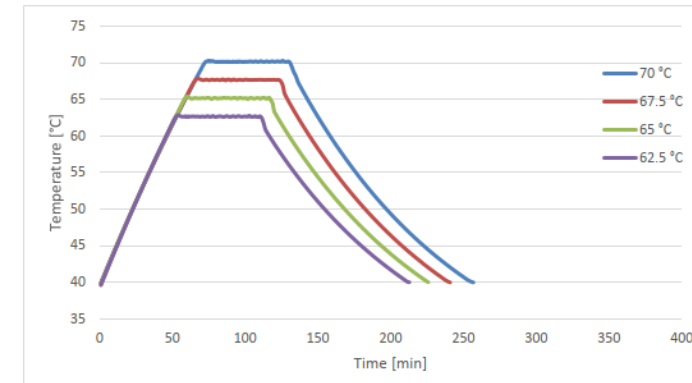
- Awareness increase in energy, cost, and environmental impact



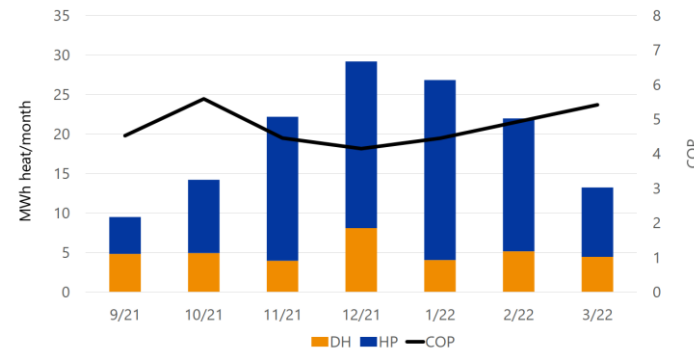
Some results



HP - Elec



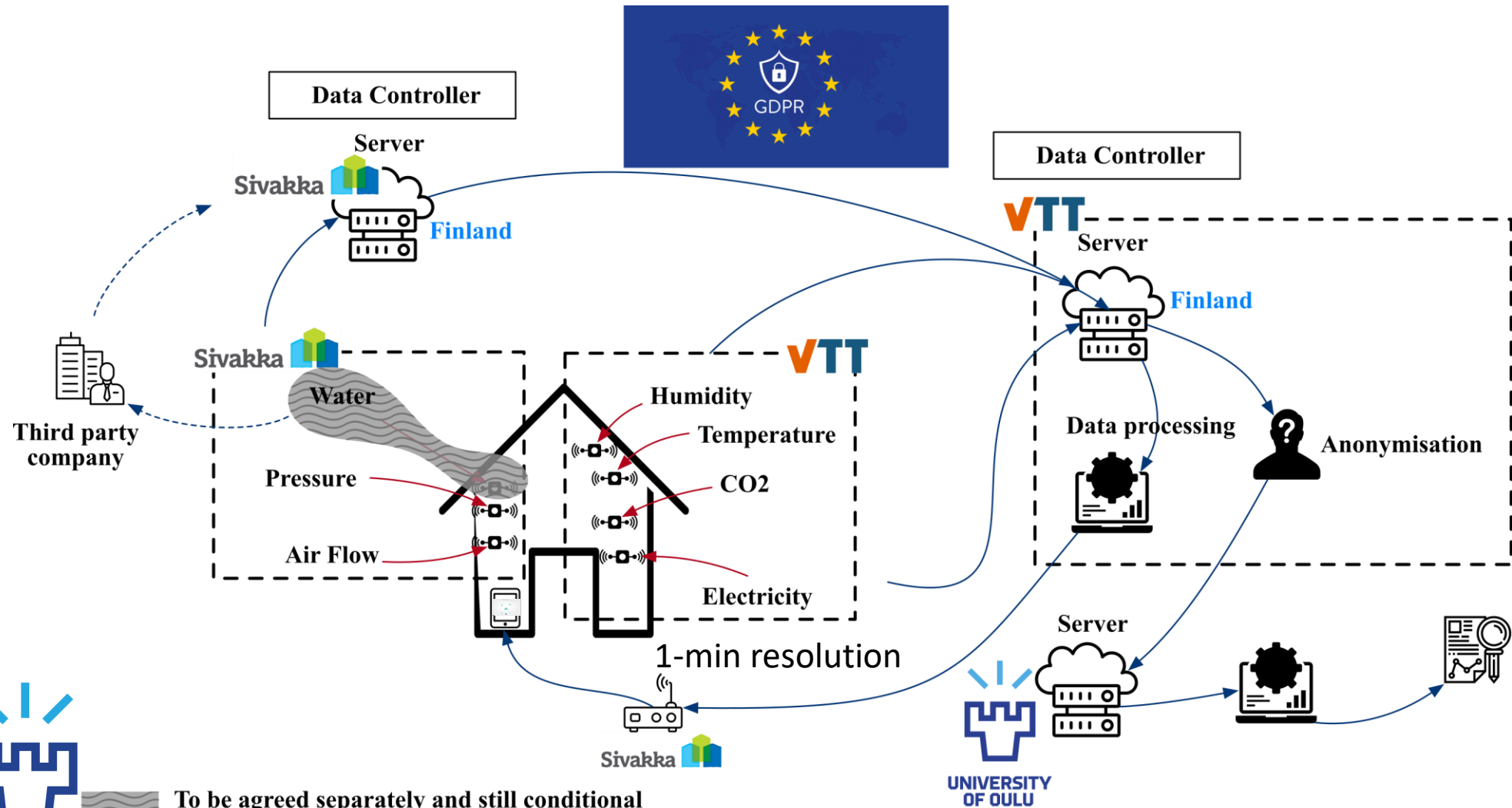
PCM



HP - Performance

GDPR - Challenges

Planned monitoring
Might not reflect the reality



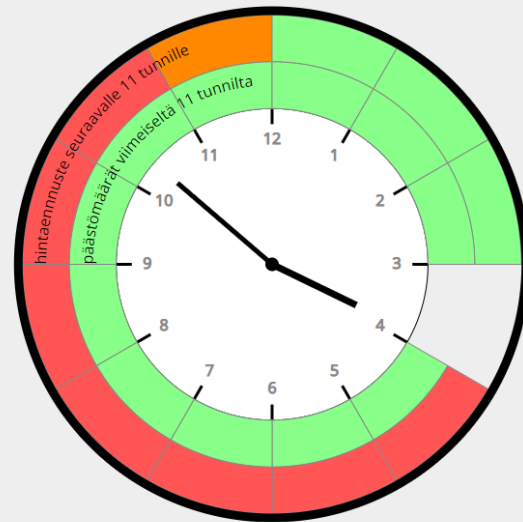
Integrating the tenants



Monitoring for planning

- ▶ Give the next 11 hours of spot price
- ▶ Provide the past 11 hours of emissions
 - 3 minutes intervals

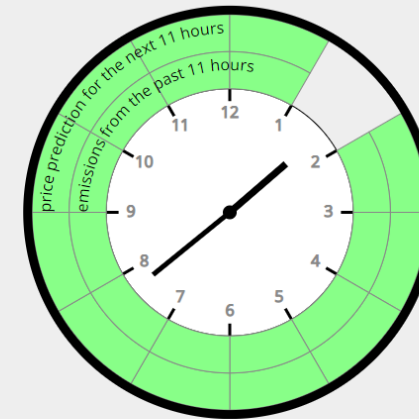
Different time →



Electricity Emissions vs Price

The clock visualizes the amount of emissions for past 11 hours (counterclockwise) and price prediction for next 11 hours (clockwise).

Color coding: Green = emissions and price smaller. Orange = emissions and price same. Red = emissions and price bigger



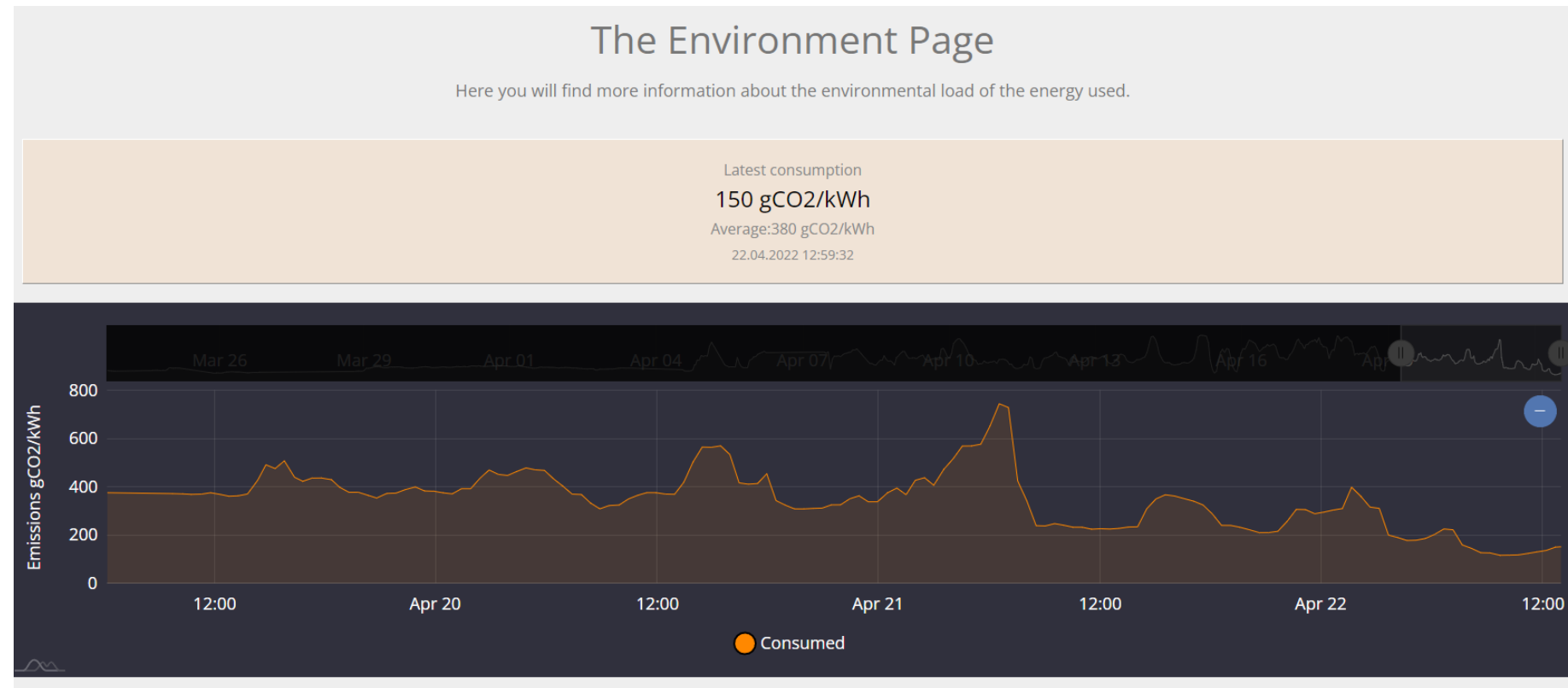
The Grid Load

Here you will find more information about the aggregated load (from Fingrid open data). Values are updated once every 3 minutes.

<https://makingcity.vtt.fi>

Emissions

► Ecolnvent – TSO data with exchanged power



To come next

- ▶ Once the tenants will be selected for direct monitoring
 - ~ 30 apartments → constraints from the project
 - Feedbacks were obtained from before the project started and energy consumption from the apartments before the renovation was done
 - The metering will start in May/2022 and will be carried on until May/2023
 - Regular meeting with the tenants is planned
 - Tutorial videos are made and will be available on youtube (or other video platform)



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Thank you

Get in touch for more information!

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All the reports of the project will be available for download on the MAKING CITY website: www.makingcity.eu



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