



# *Green Heating and Cooling Workshop*

Heat Pump RD&I in European Projects – 06.10.2021

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# Background

- 72% of the European population (EU28) lives in cities and towns
- A huge amount of low-grade waste heat is diffused within the urban texture, the largest amount being rejected by air-conditioners, cooling systems in industrial processes and tertiary buildings, chillers of refrigeration systems and service facilities, e.g. sewer pipes
- For historic reasons, cities and towns have born along rivers, lakes and seashores. All these sources make low-temperature renewable energy available, which utilisation is highly replicable because it is accessible right where it is needed



# The Vision

- The overall objective of REWARDHeat is to demonstrate district heating and cooling (DHC) networks, which are able to recover renewable and waste heat available at low temperature, i.e. lower than 40°C
- Focus is on the exploitation of the energy sources available within the urban context, allowing to maximize the upscale potential of the decentralized solutions developed
- To do this, we need to lower the supply temperature compared to conventional networks. Focus on supply temperature lower than 60 °C and down to 10-20°C.



# Specific Objectives



## TO INTEGRATE MULTIPLE URBAN RENEWABLE AND WASTE ENERGY SOURCES

REWARDHeat explores configurations of a DHC network, providing tools and recommendations for the integration of multiple renewable and waste heat sources

- Planning schemes database
- Pre-design tool
- Informational material for publication in wiki-tools
- Guidebook for planners
- Serious gaming

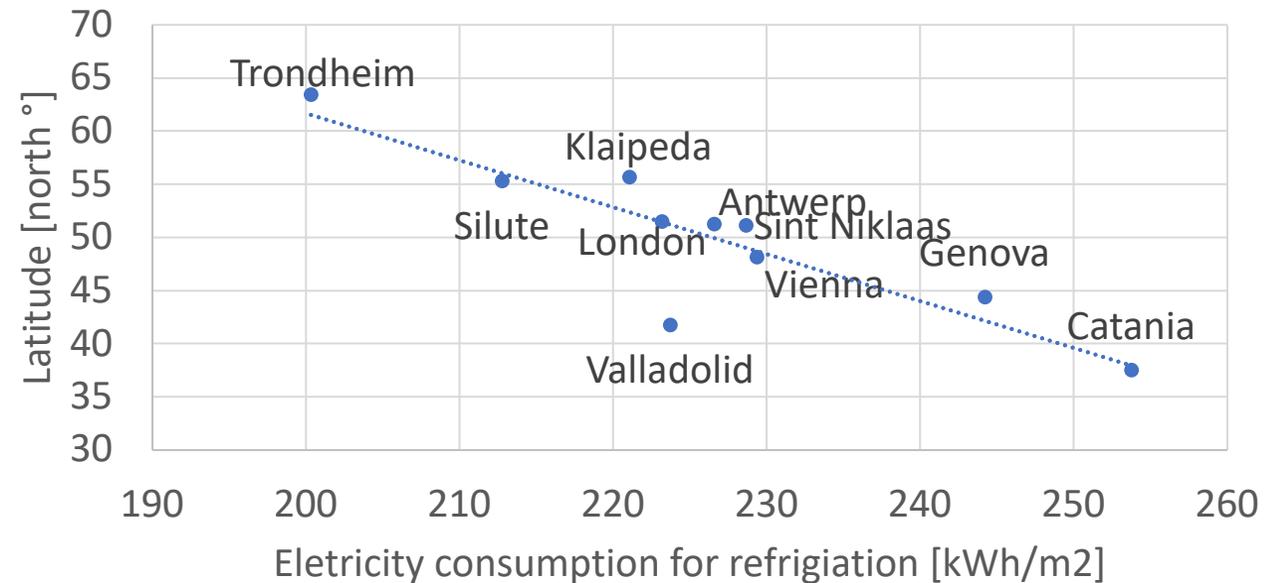
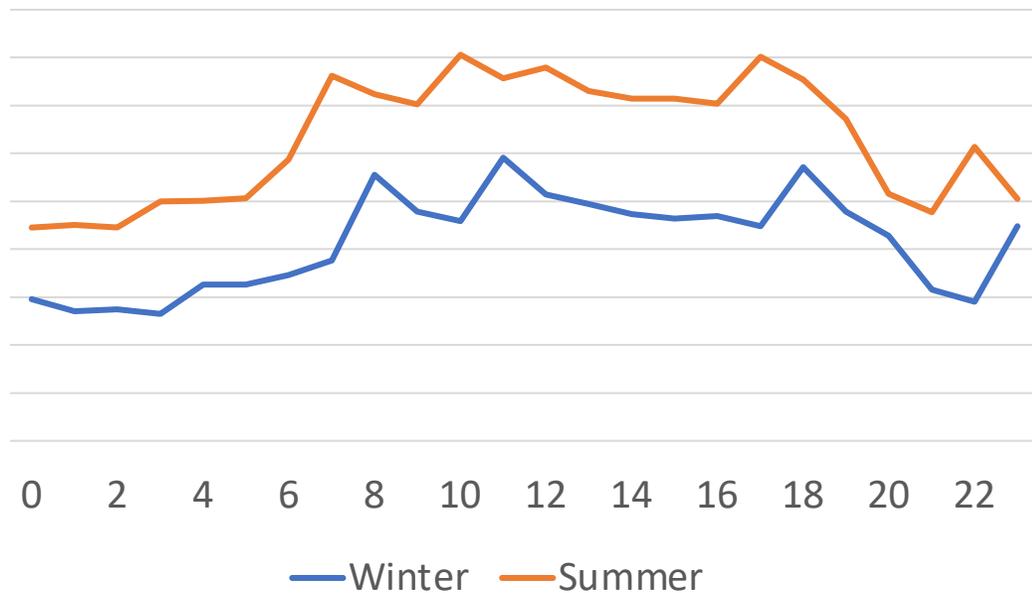


# To integrate multiple waste energy sources



Starting from publicly available data

- Hourly **electricity** consumption for refrigeration (for reference days)

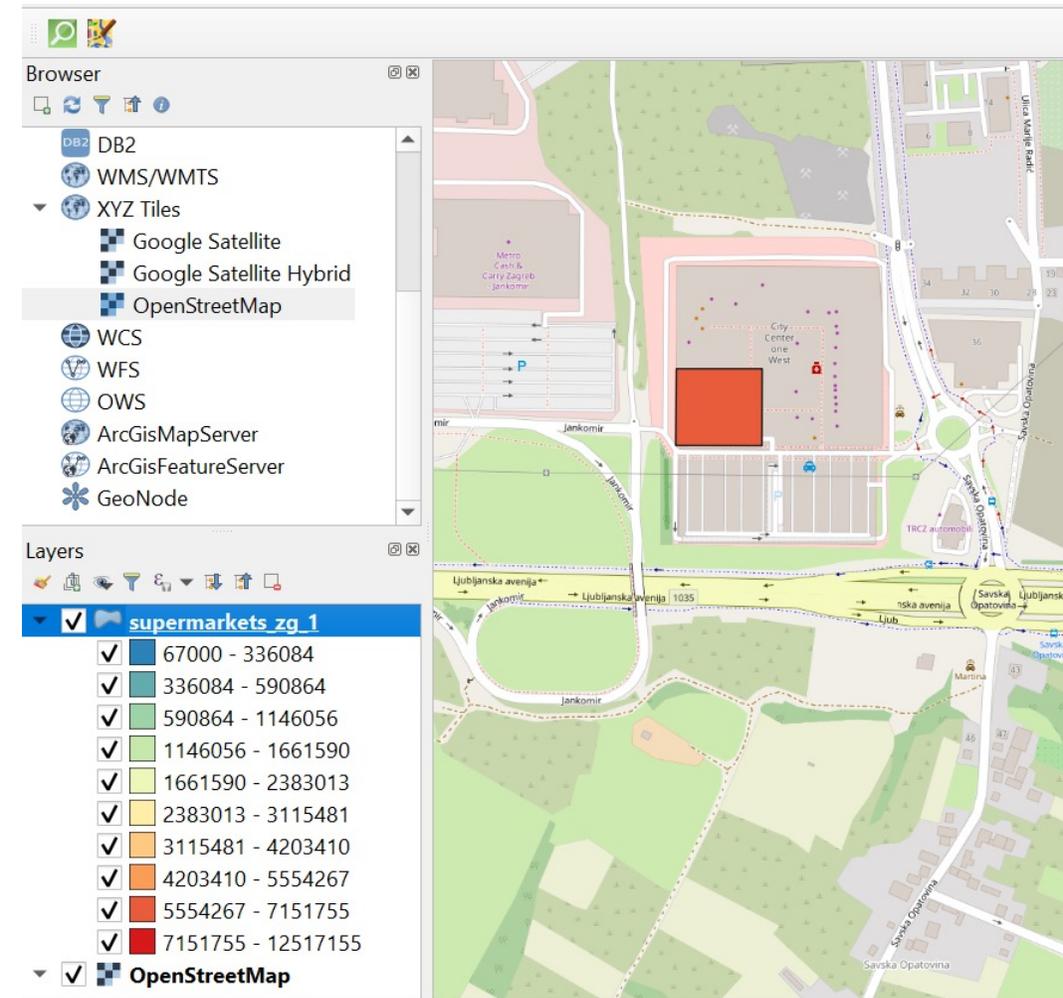


# To integrate multiple waste energy sources



To total yearly potential “educated guess”

- According to the **specific yearly electricity consumption** + equivalent **COP** of the system → specific yearly **waste heat**
- Combined with Open Street Maps we make available the location and area of waste heat generation for:
  - Supermarkets
  - Industrial processes
  - Data Centres
  - Power substations
  - Water treatment plants



# Specific Objectives

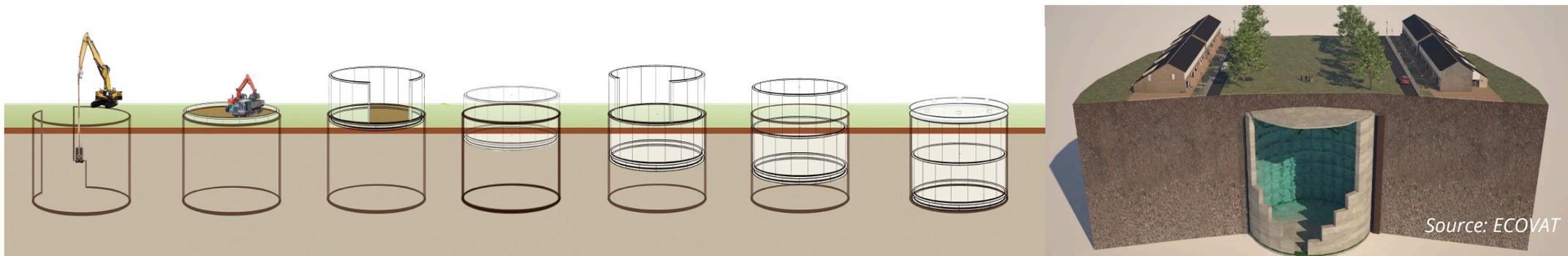


## TO DEVELOP INNOVATIVE TECHNOLOGIES FOR FLEXIBLE USE OF HEAT IN DHC NETWORKS

Substations - Two approaches are pursued: prefabrication for building solutions and standardisation for large-scale district heating plants

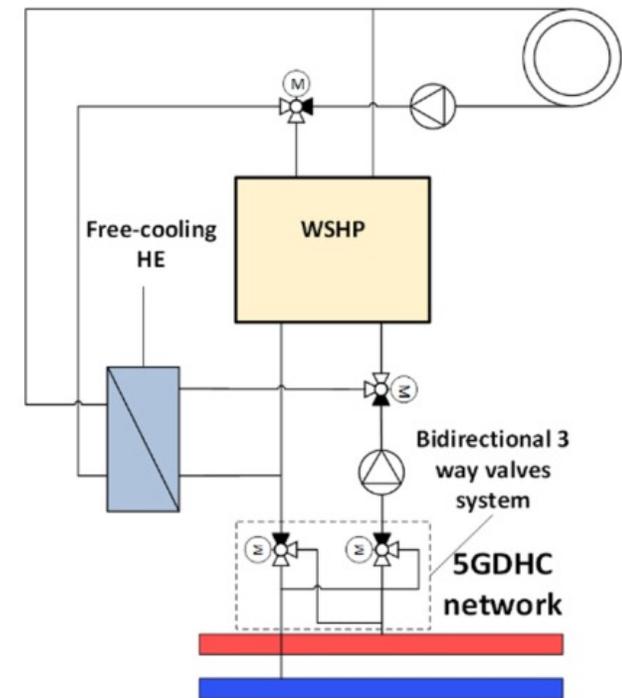
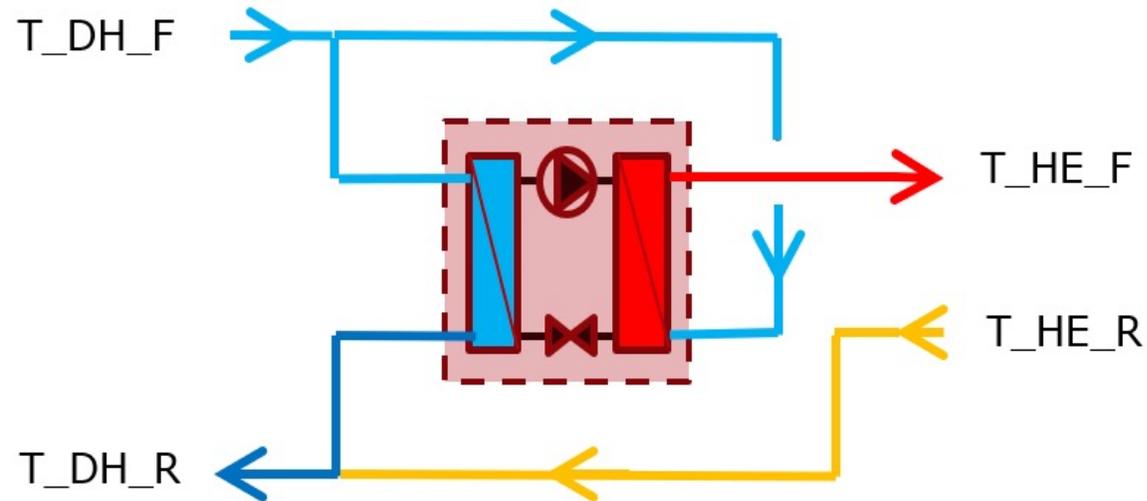
### Thermal storages

- Local, intra-day storages at customer substations
- Central, intra-day storages to balance the network and store energy during off-peak periods



# To develop innovative technologies

Prefabricated bi-directional substations with heat pump and storages for installation in single buildings

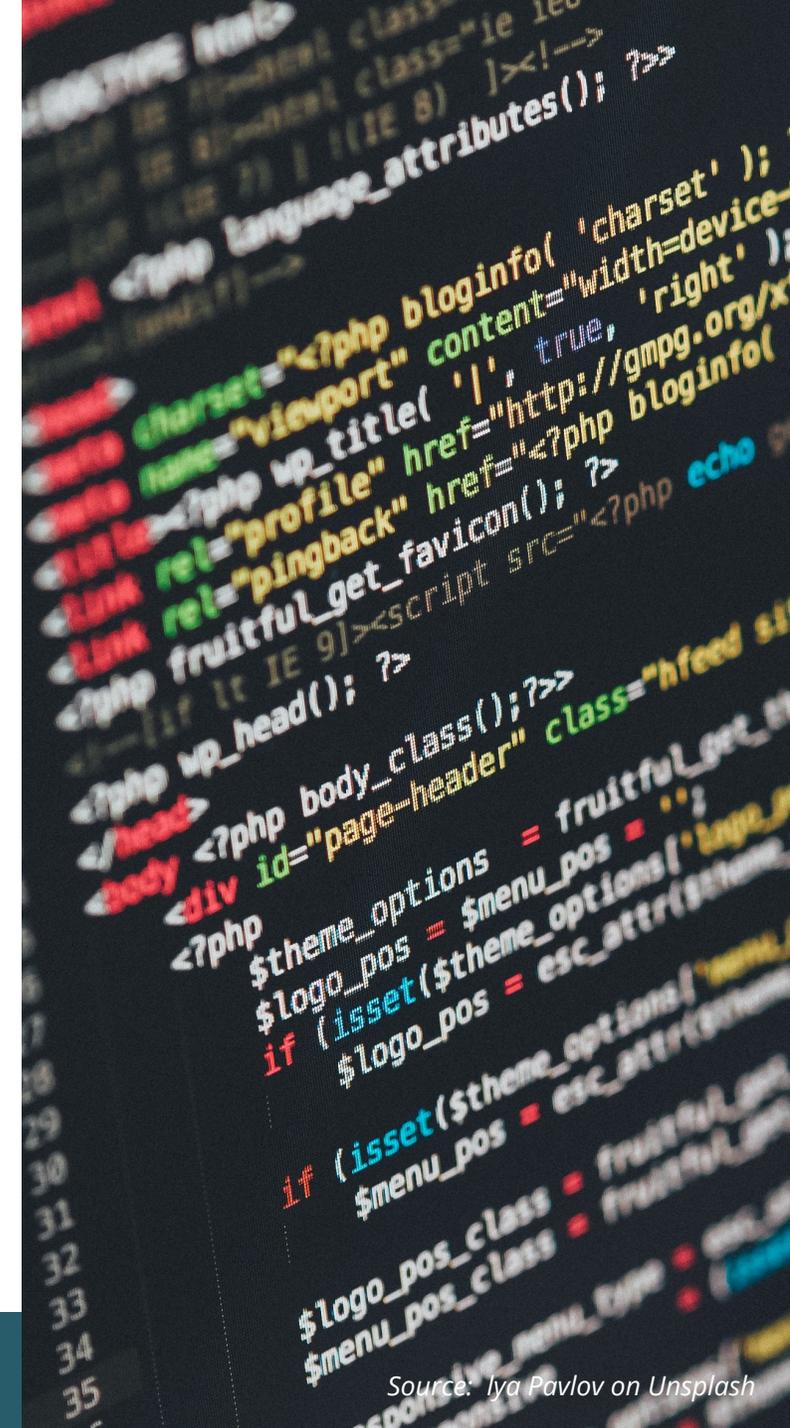


# Specific Objectives

## TO DEMONSTRATE DIGITALISATION SOLUTIONS ALLOWING TO OPTIMISE THE MANAGEMENT OF THE DHC NETWORK

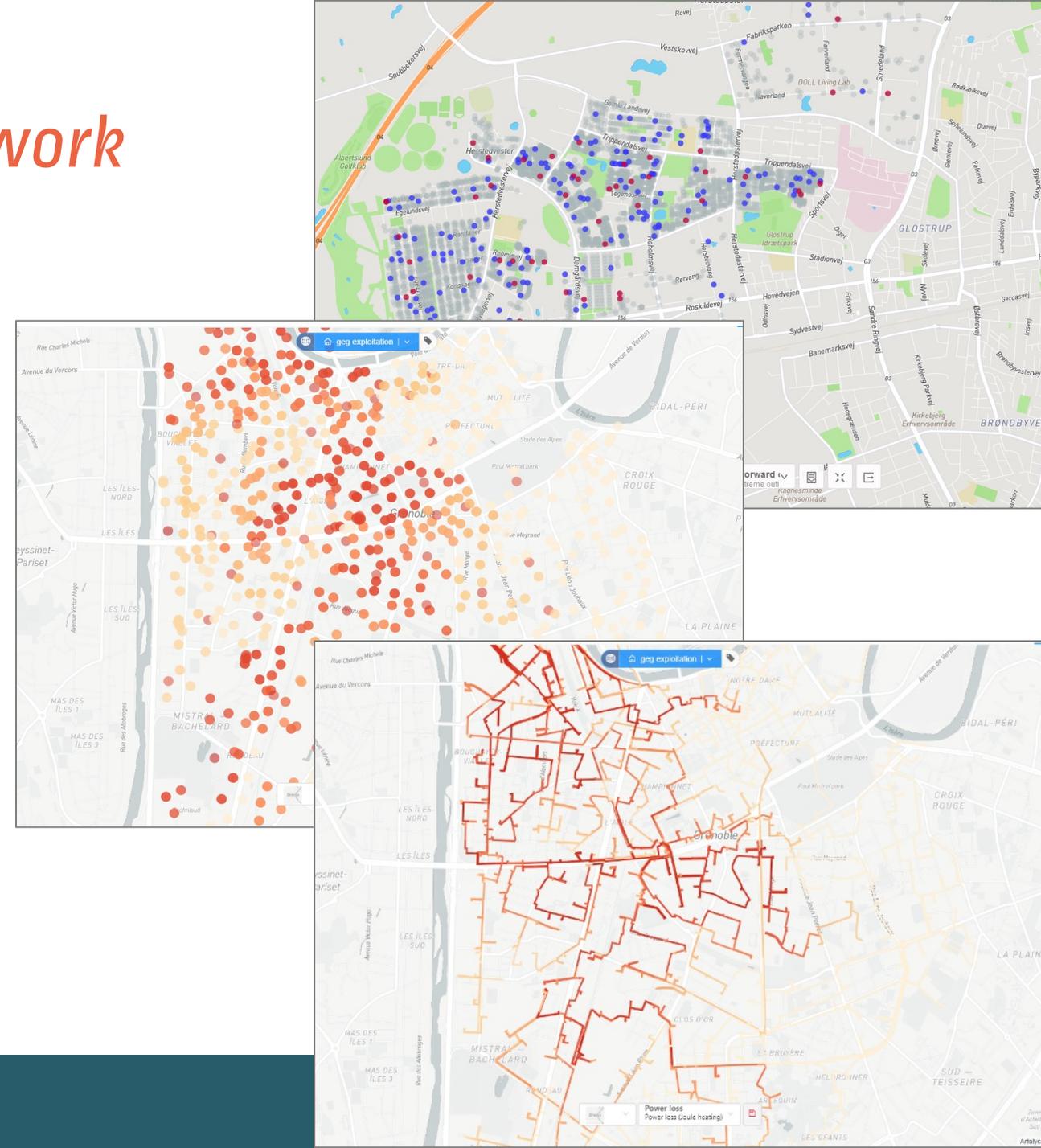
In REWARDHeat, storage capacity and control will be used synergically to manage the system.

- Smart metering communicating real-time
- Data-mining platform will permit to manage communication with smart meters and to handle controls
- Fault detection and expert control strategies elaboration for optimisation and electricity grid coupling



# Digitalisation of the DHC network

- Data mining and user interfaces for assets' real-time monitoring
- Real-time performance analysis and KPIs calculation for wise management of the network
- Smart controls based on model-prediction of loads for next hours and days under elaboration



# Specific Objectives

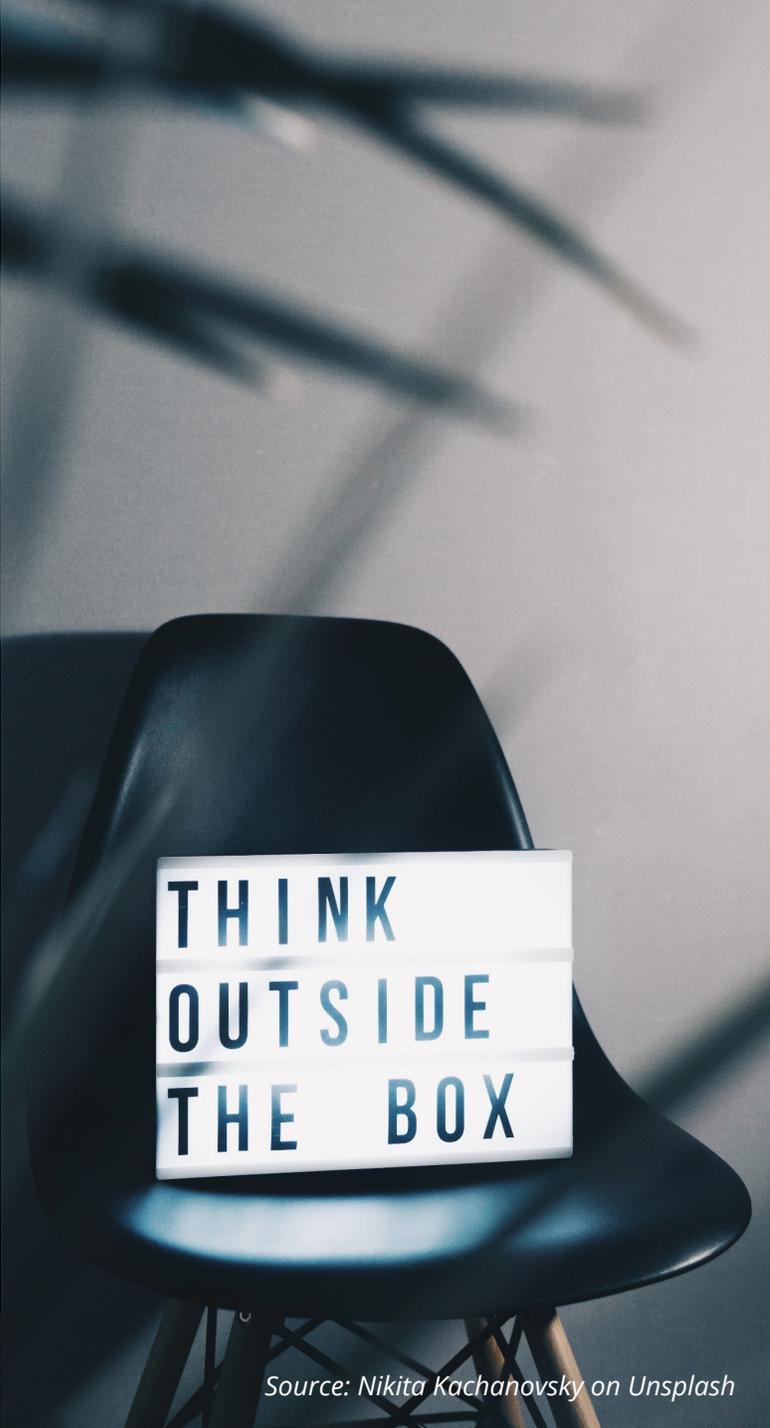
## TO DEVELOP BUSINESS MODELS AND FINANCIAL SCHEMES ATTRACTING LARG

### **Private customers:**

- Heat sold as a service

### **Waste Heat recovery - Barriers to overcome:**

- Split between property owner and Waste Heat owner, hence split of interest
- Hard to calculate economic benefit for utility company due to risk of Waste Heat owner leaving and different financial cycles compared to industries and services
- RED and EED do not price Waste Heat as renewable energy and do not provide clear definitions and methods



THINK  
OUTSIDE  
THE BOX



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*Thank you*

[www.rewardheat.eu](http://www.rewardheat.eu)



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