



Public seminar Annex 67 - Energy Flexible Buildings

Neogrid Technologies ApS

Outline

- ✓ Who is Neogrid
- ✓ Flexibility in buildings
- ✓ Neogrid focus
- ✓ PreHEAT product idea
- ✓ Buildings with district heating
- ✓ Buildings with heat pumps

Neogrid Technologies ApS

Background

Founded in 2009 in Aalborg, today 8 people

Focus areas:

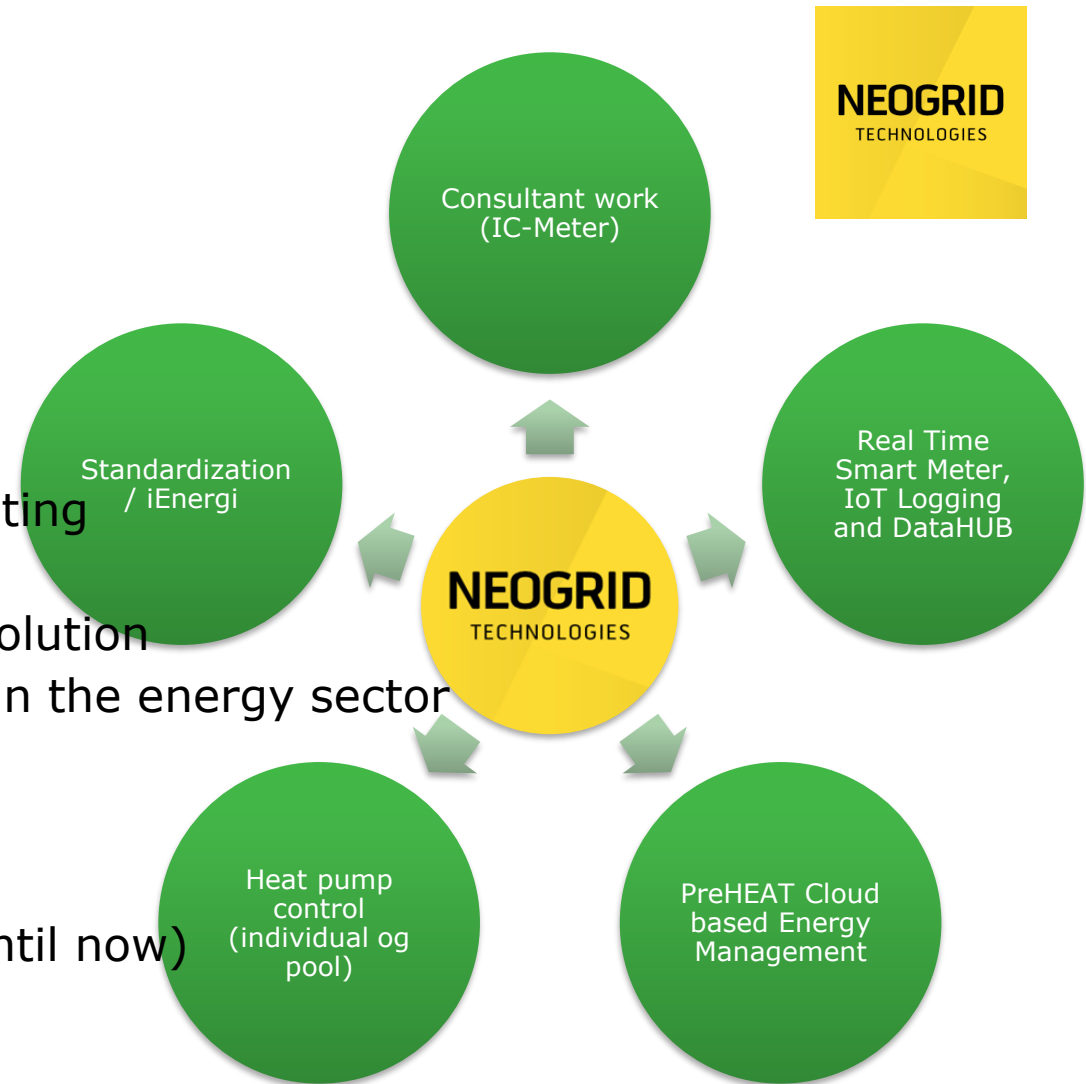
- ✓ Energy-efficiency and energy-flexibility controllers
- ✓ Visualisation and monitoring technology for building heating
- ✓ Data collection from 'smart' meters and IoT sensors
- ✓ Smart-grid controllers for heat-pumps and aggregator solution
- ✓ Custom-made solutions for demonstration projects within the energy sector

Collaboration-oriented

Experienced in research and demonstration (14 projects until now)

Main commercial product: PreHEAT, running since 2016:

- ✓ Heating control and monitoring on +100 buildings



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Flexibility in buildings



NEOGRID
TECHNOLOGIES

Amount of flexibility determined by many factors:

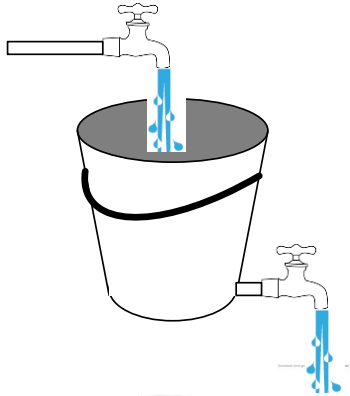
- ✓ Heat capacity (light and heavy construction)
- ✓ Floor heating/radiators
- ✓ Central control heat in all rooms vs local thermostats
- ✓ User involvement - comfort settings

For heat pumps

- ✓ Run and rest time constraints

Generic types of flexible resources

3 types



- Bucket
 - Variable inflow
 - Outflow dependent on water height
 - Flexibility equal to amount of water



- Battery
 - Inflow and outflow free
 - Need a fixed amount of energy within a given time



- Bakery
 - Fixed load profile, cannot be divided
 - Initial timing free

PreHEAT

Cloud based data-driven energy management with 24/7-monitoring

- ✓ Used to control
 - Space heating / -cooling
 - Ventilation
 - Domestic hot water production
- ✓ Type of buildings
 - Summer houses
 - Single family house
 - Apartment building blocks
 - Office buildings
 - Schools
- ✓ Heating source
 - District Heating
 - Heat Pumps by direct control not price signals
 - Gas
 - or a combination of above, i.e. Flexgas

PreHEAT - control

Some details on what is on the market today

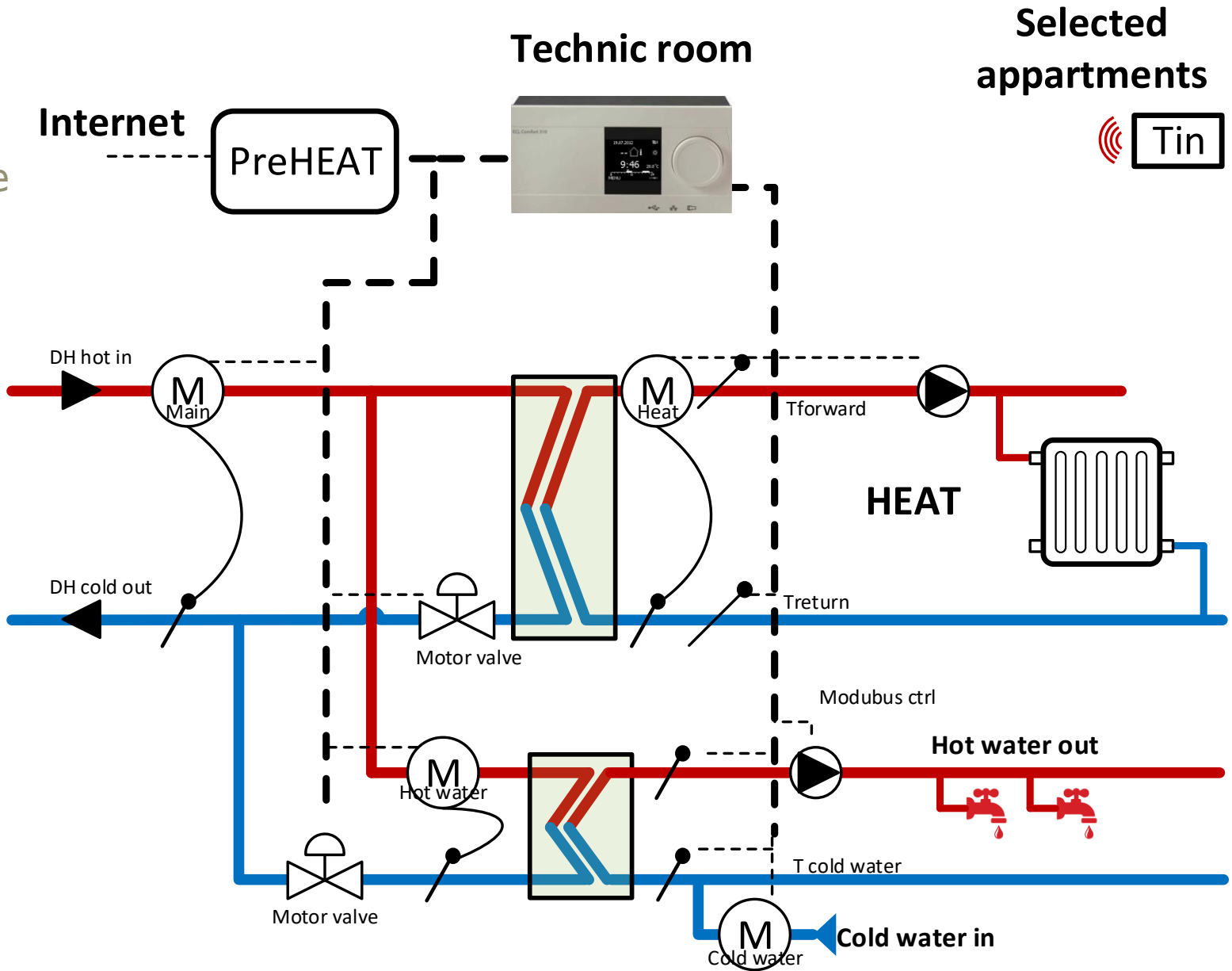
- ✓ PreHEAT for space heating is different than typical weather compensation solutions
 - Based on a zone model of building energy demand including user behaviour
 - Control uses a forecast for wind, sun and outdoor temperature
 - Direct feedback control based on measured temperatures in selected apartments
 - Self-learning and adaptive – across the seasons of the year
- ✓ Energy savings for space heating coming from
 - Reduced pipe losses
 - Better utilization of "free" heating from the sun
 - Less consumption from radiators with defect thermostats or inexpedient use
- ✓ Extensive data collection from meters and sensors used for
 - Online web overview with historical data – supporting download
 - 24/7 monitoring, including alarm
 - Building management services – like kpi reports

PreHEAT

District Heating - setup example

Variants

- ✓ Stand-alone - HVAC control
- ✓ Connect via BMS solutions
 - BACnet (+Bacnet IP)
 - Modbus (+Modbus IP)
 - Weather compensation systems, like Danfoss ECL



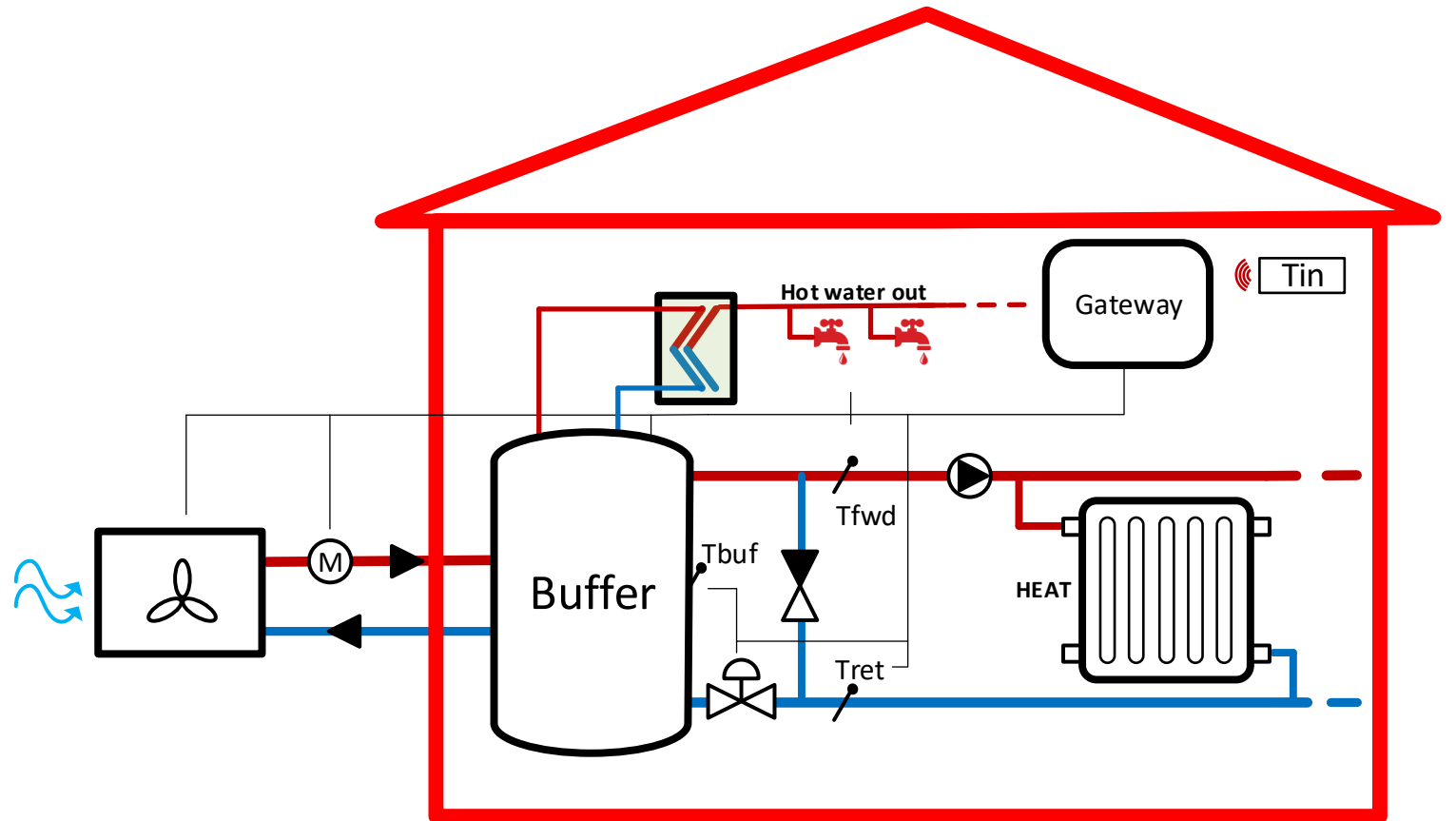
PreHEAT

Heat pump - setup example

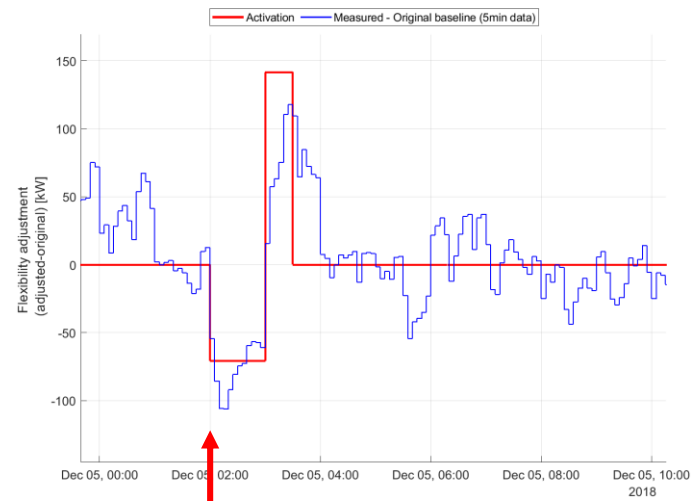
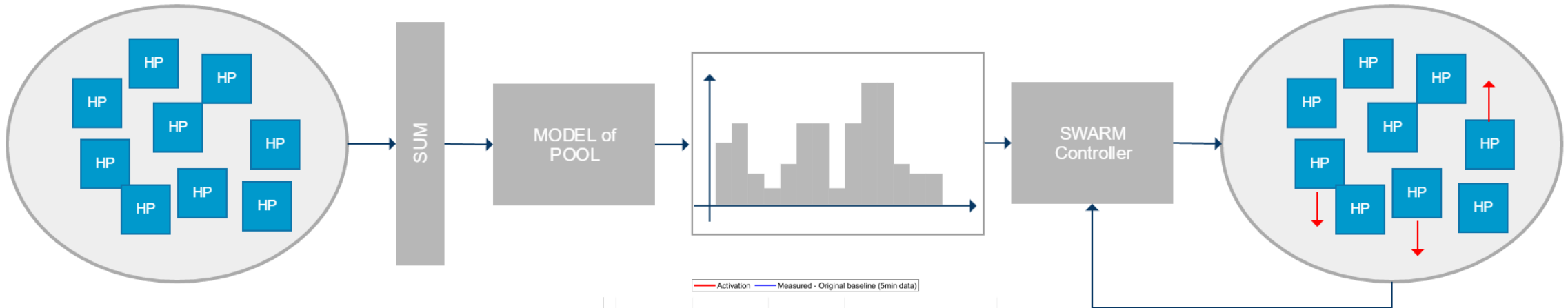


Variants

- ✓ w/o buffer tank



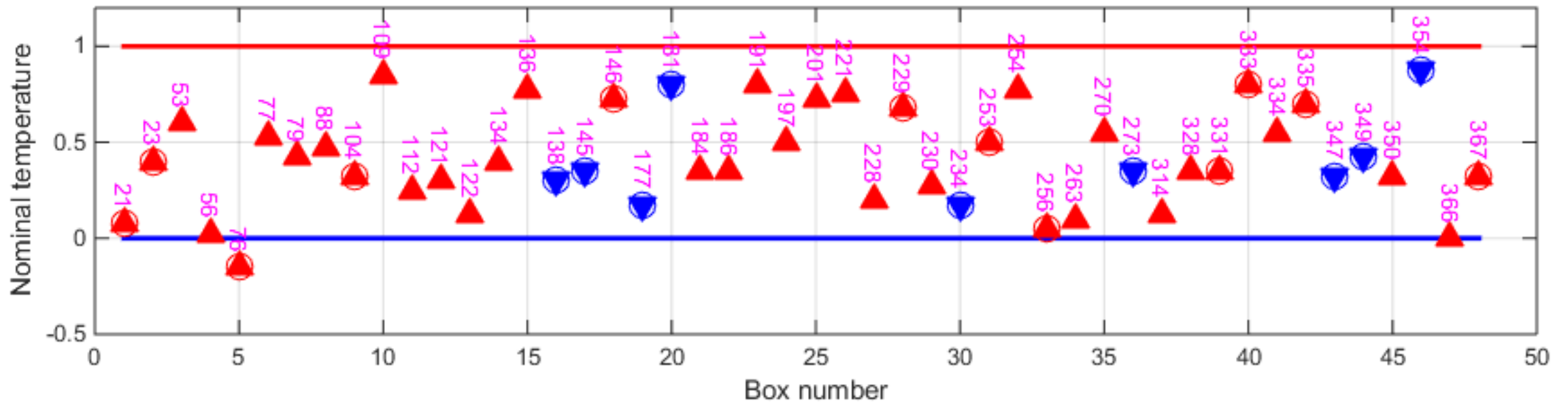
Aggregator solution for pools of heat-pumps



Activation of demand

PreHEAT

Swarm controller



PreHEAT

Types of operation

- ✓ District heating
 - Pool control/Swarm control
 - **serving interest of the network**
 - load forecast
 - flexibility forecast
 - peak shaving
 - load shaping/tracking
 - Single house control
 - Best comfort
 - reduce overheating
 - Lowest Energy consumption
 - Lowest Volume consumption
- ✓ Heat pump
 - Pool control/Swarm control
 - **serving interest of Aggregator/DSO/Aggregator**
 - load forecast
 - flexibility forecast
 - peak shaving
 - load shaping/tracking - preparing for electricity events
 - Single house control
 - Best comfort
 - reduce overheating
 - Lowest Energy consumption
 - Lowest price - taking spot prices and variable tariffs into account

Visualisation on web platform

<https://app.neogrid.dk/>



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