

STORM – smart network controller

Hubs4Circularity Community of Practice Webinar
D. Vanhoudt
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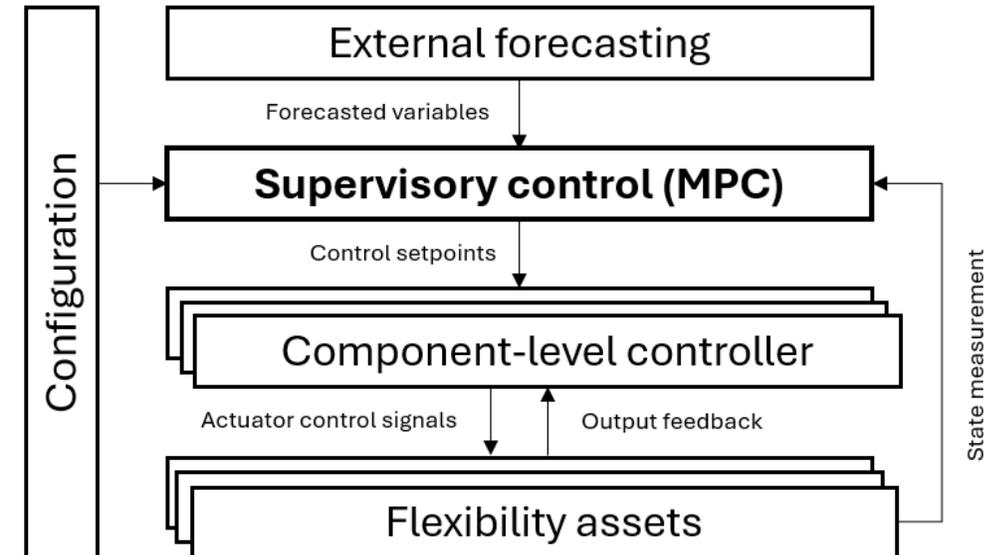
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STORM – What is it?



- **Real-time optimization and coordination** of the buildings' heat demand ('**demand response**'), while maintaining indoor thermal comfort
 - Heat demand is **manipulated** by means of the secondary supply temperature setpoint
 - Either directly, if permitted by the existing installation, or indirectly by **overriding the outside temperature measurement**
- Smart control is implemented as an additional **supervisory control layer** that integrates and interacts with the existing control systems
- As such, the controller **does not replace the existing control** systems in the DH network and the buildings, but rather optimizes the setpoints of these control systems
- Control objectives demand response: **peak shaving**, return temperature minimization



- Model-based predictive control (MPC):
- Controller models predict future behavior
 - Control signals calculated to optimize future performance
 - Updates regularly (15 min) to address modeling error and disturbances

What can it achieve? A real-life case study



The demo site: DH network in Brescia

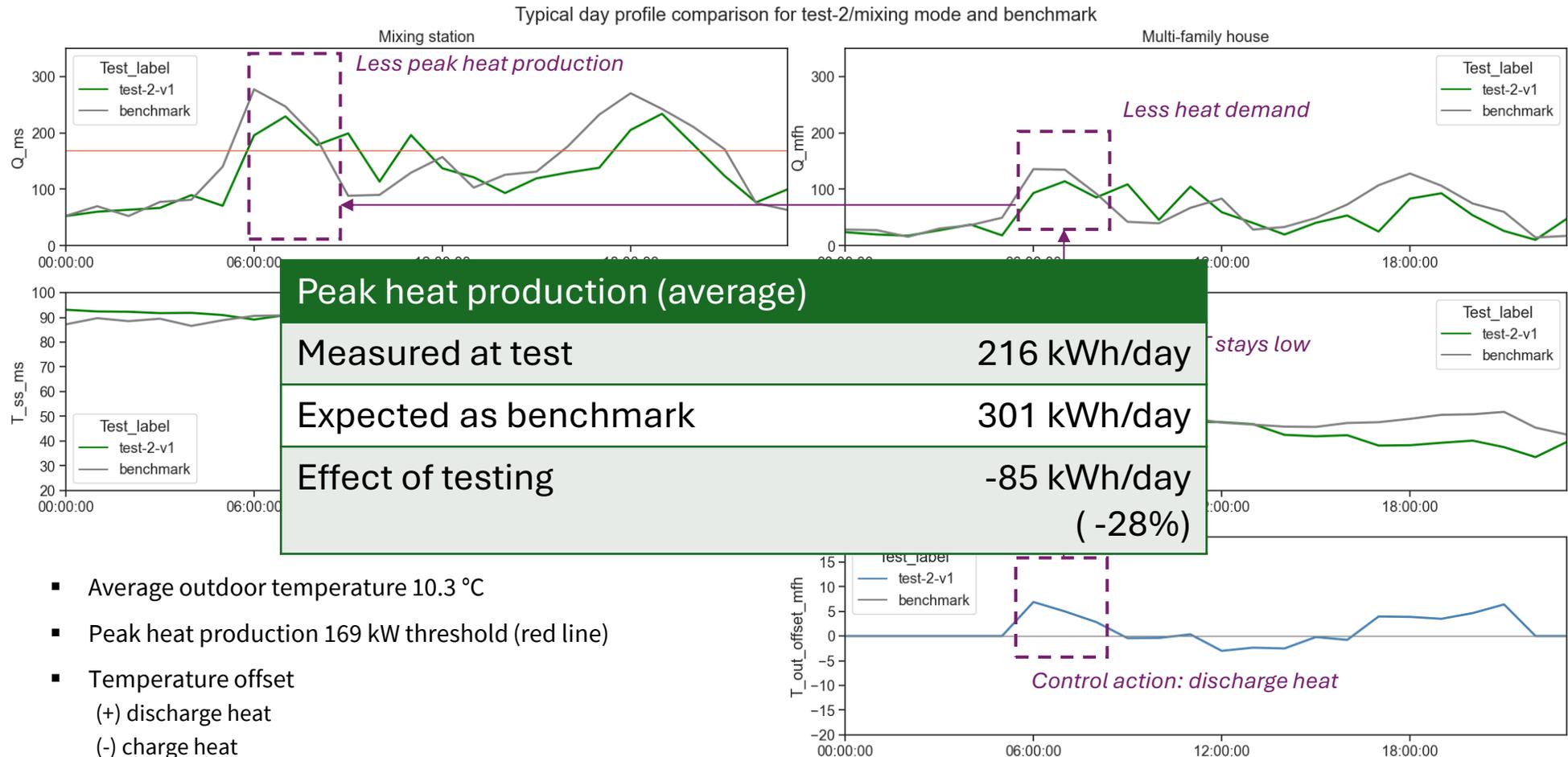
- Owned and operated by A2A Calore e Servizi
- Block of apartments (43 flats) and more than 30 single family houses in a small area
- Installation of around 100 m of new pipes to create a subnetwork
- Nearby available area where to install a mixing station to lower the supply temperature
- **Goal (amongst others): peak shaving through demand response at the apartment building**



Case study – results for demand response for peak shaving



Typical daily test profile & indicative comparison with benchmark



STORM developments in HURRICANE



The goal: application of demand response at the DH network at the ArcelorMittal site, with the aim to:

- **Replicate** the demand response algorithms to other buildings
- **Scale** the demand response algorithms to more buildings
- Testing of **coordinated control** of demand response actions amongst different buildings

Control objective: **peak shaving** to maximize the excess heat delivery using the limited capacity of the DH network

ArcelorMittal Belgium's district heating network



Heat consumers

- Direct space heating (and hot tap water) for buildings:
 - Offices
 - Canteens
 - Archive
 - Workshop hall
- Heat pump for the heating of the halls of the cold rolling mill
- In total 13 substations

Heat source

- Residual heat of the walking beam furnaces of the AMB's hot rolling process
- Up to 20 MW
- steam net as backup
- DHN at 69,5 °C
- Installation of 6.6 MW HEX for heat delivery to the network – phase 1

Done: building selection for demand response

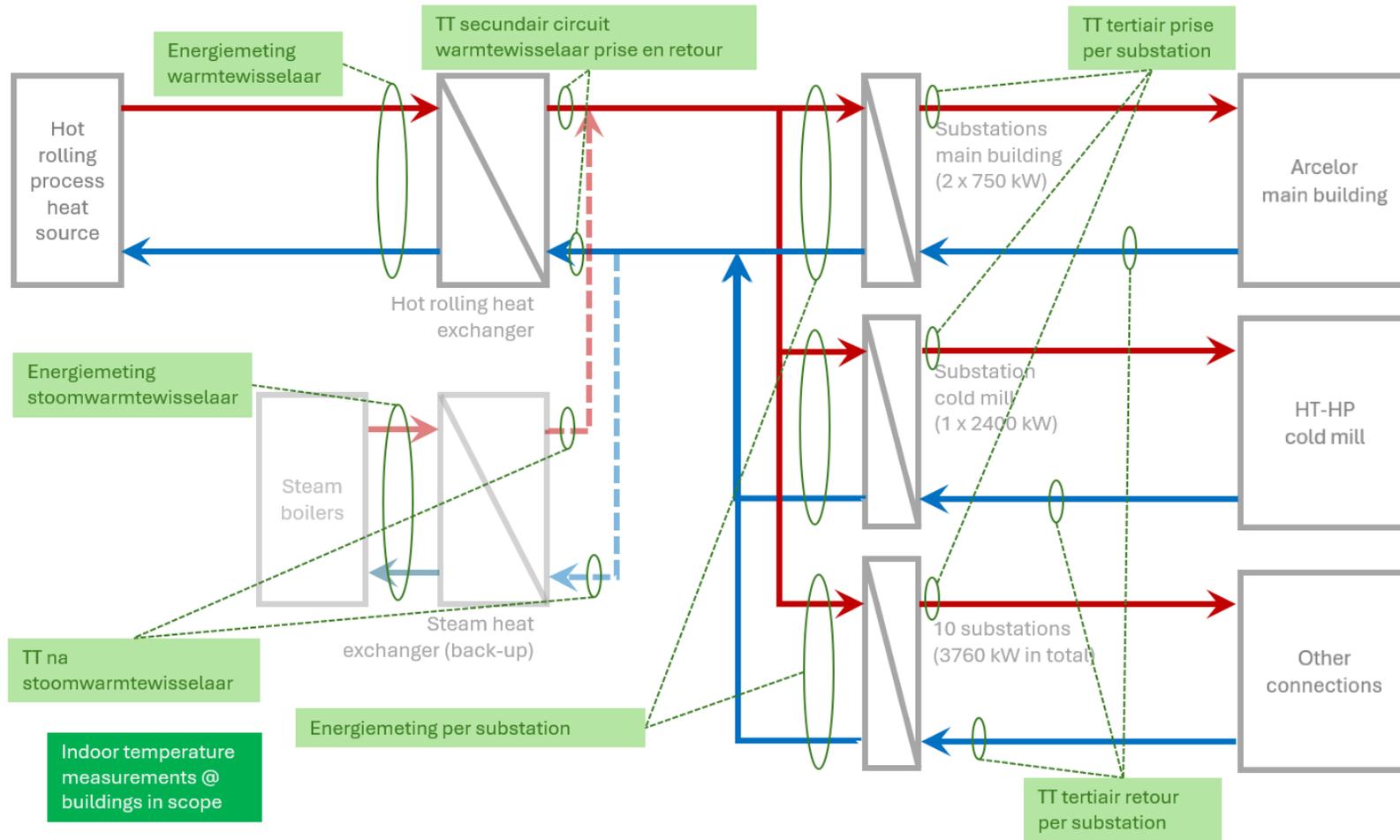


- AMB main building
 - ~20.000 m² heated area
 - Currently heated by 3 light fuel boilers
 - Annual heat demand ~2.3 GWh
 - 11 heating circuits with radiators, 1 circuit with air handling units
 - DHW via electric boilers
 - Conversion to DH: 2 substations of 750 kW each
- Cafeteria carpentry
 - Conversion to DH: substation 440 kW



➔ In total: 1940 kW peak power to activate (~20% of total peak power)

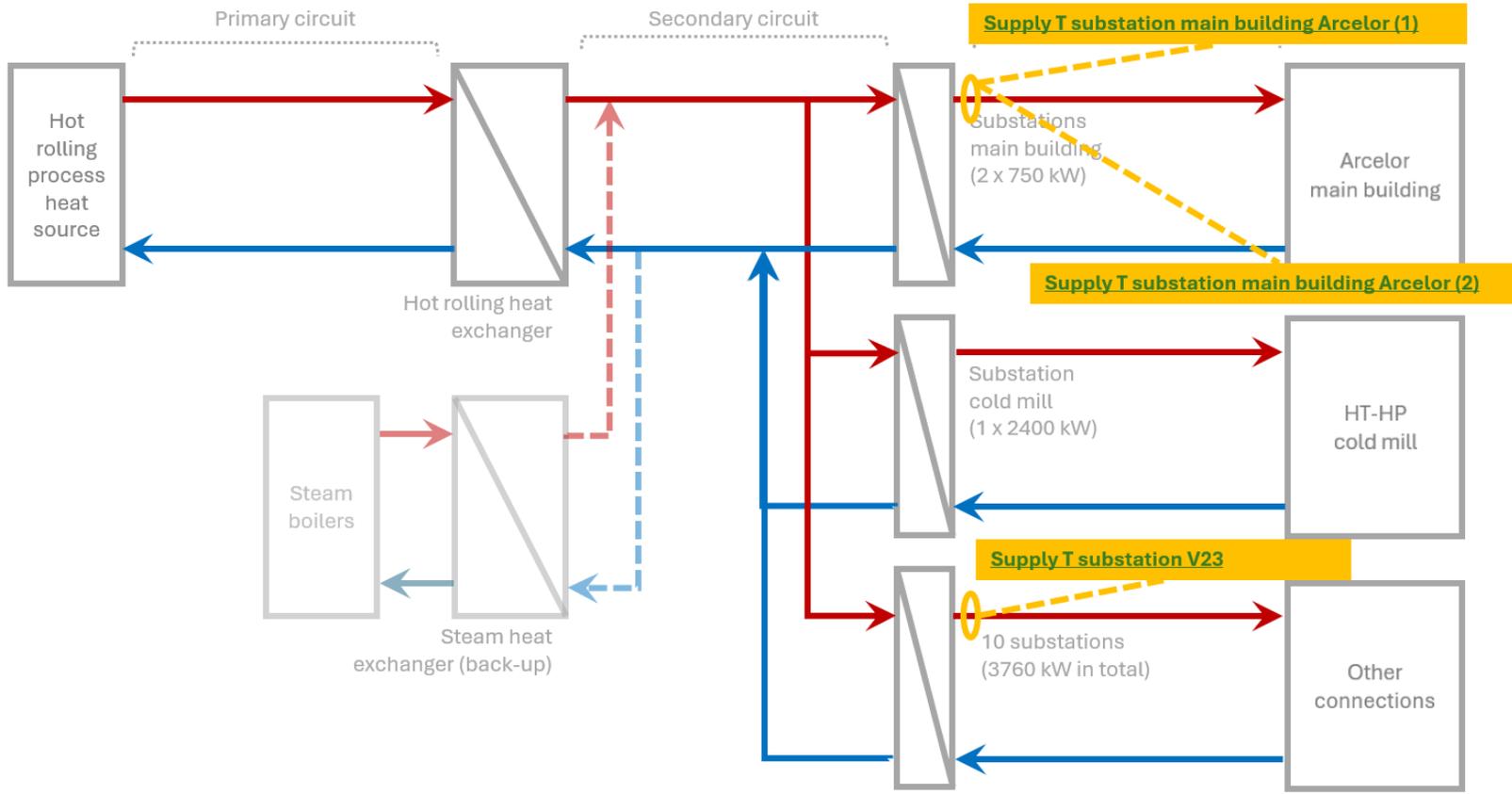
Ongoing: installation of sensors



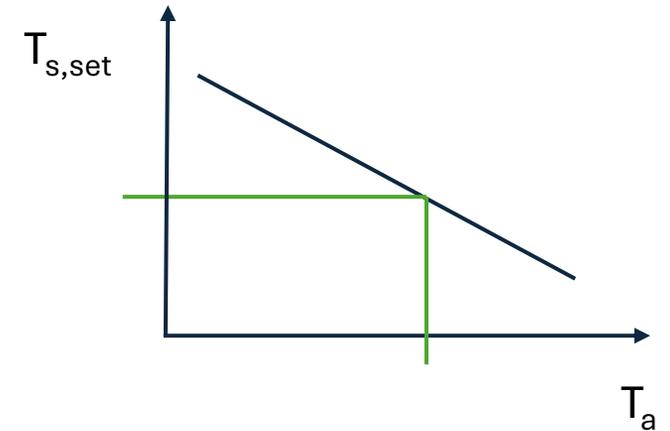
Measurements, real time, 15 min. resolution:

- Heat source (+ backup)
 - Energy meters in the substations (supply & return temp + flow rates)
- DH network
 - Network temperatures (supply & return temp)
- Buildings:
 - Energy meter substations (supply & return temp + flow rates)
 - Sec. side temperatures (supply + return)
 - Indoor temperature sensors

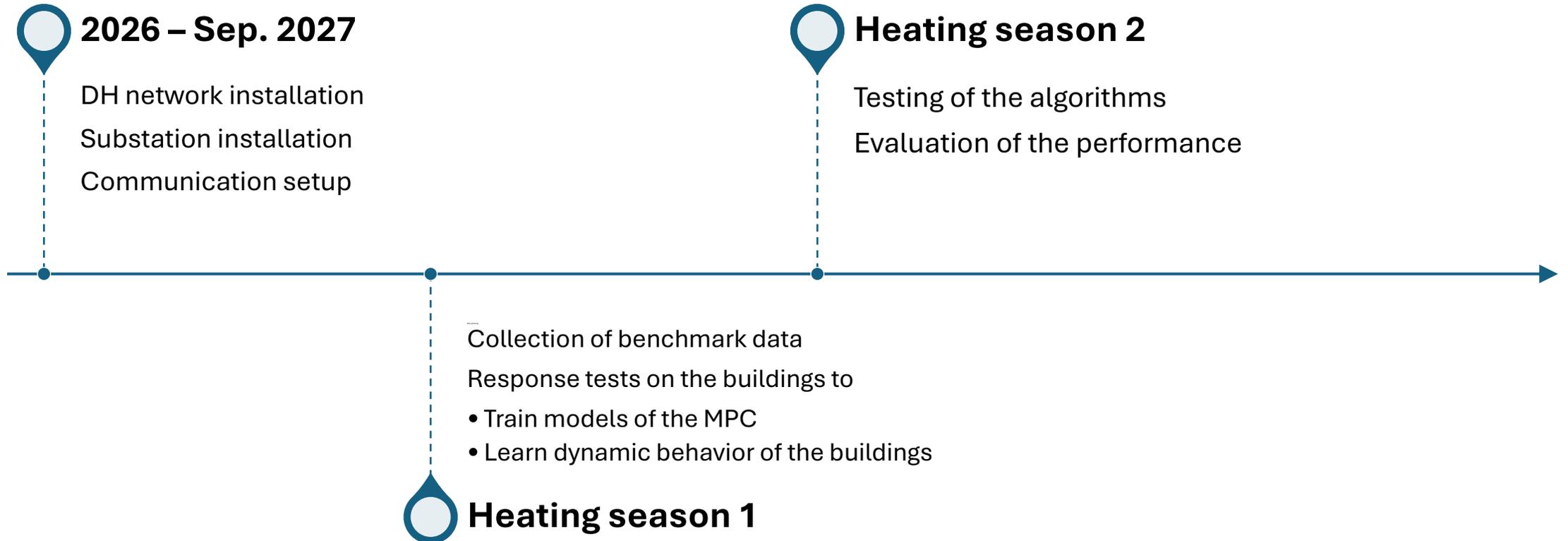
Ongoing: set points to influence



Offset to add to standard supply temperature set point of the heating circuit controller



Outlook project timing



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Harnessing Industrial Waste Heat for Resource Efficiency and Circular Economy

We are dedicated to transforming the industrial landscape through innovative solutions that promote energy efficiency, water efficiency, and circularity.

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HURRICANE Project

Sector-coupling hub for circular use of thermal and industrial waste | EU-funded Horizon Europe Project
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Overview

HURRICANE transforms traditional steelmaking plants into multi-sectoral circular hubs, pioneering a sector-coupling initiative at the Ghent site of ArcelorMittal Belgium. Our mission: revolutionize industrial resource management through innovative waste heat recovery and utilization.

We aim to reduce energy, water, and raw material consumption through novel heat recovery solutions and district heating networks, connecting industry with local communities.

Website: www.hurricane-hub.eu

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Website
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Thank you!

Dirk Vanhoudt
VITO
dirk.vanhoudt@vito.be



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