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Decarbonisation of existing building stock through low-temperature district heating network

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Context and objectives

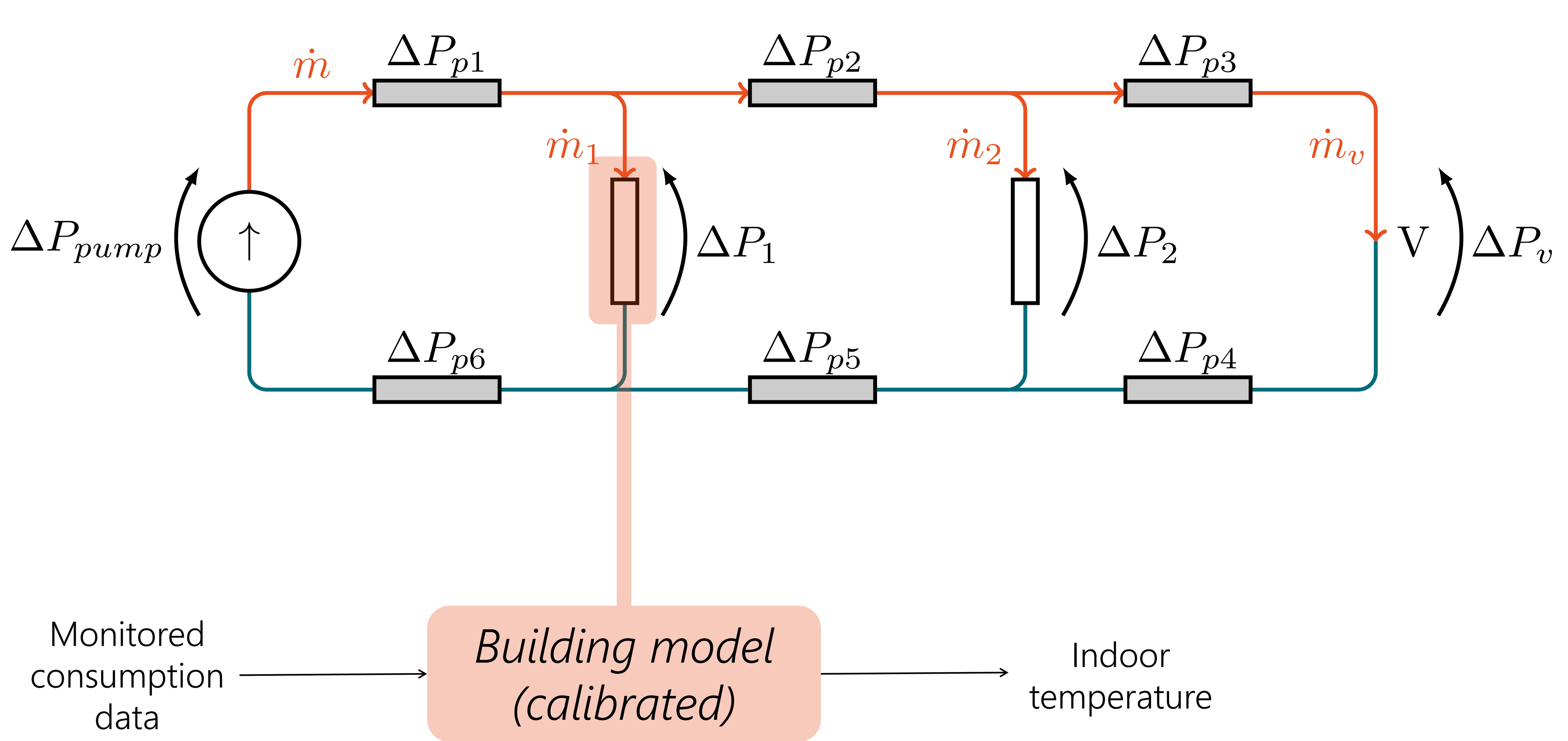
- Operation strategies
- Types of heat sources and thermal storage
- Network design
- Buildings refurbishment

Low-temperature district heating network challenges

→ Develop an **integrated dynamic model of the network and buildings**, accounting for the thermal inertia of both.

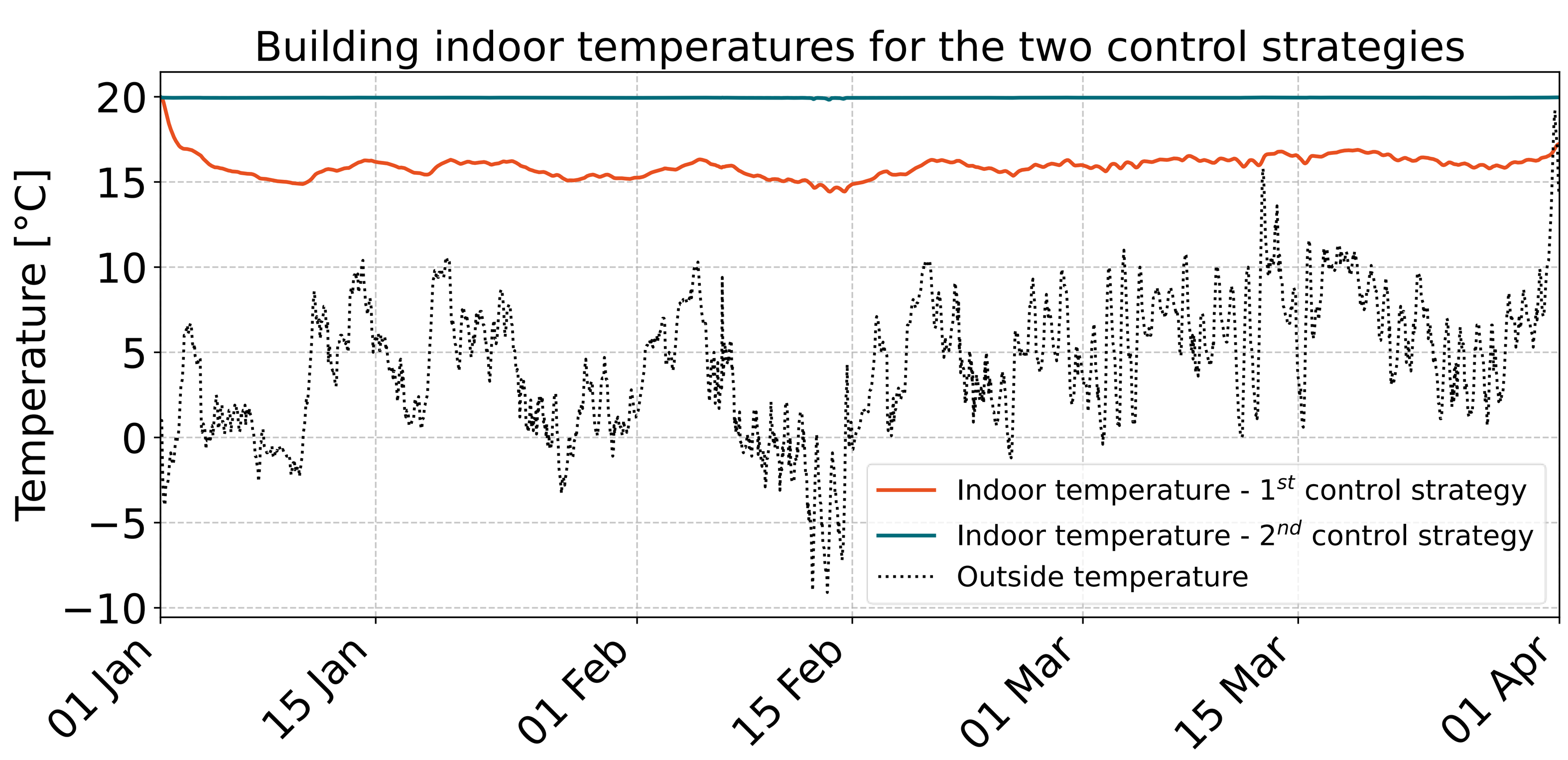
→ Study control strategies to **ensure thermal comfort** under both design and operational conditions.

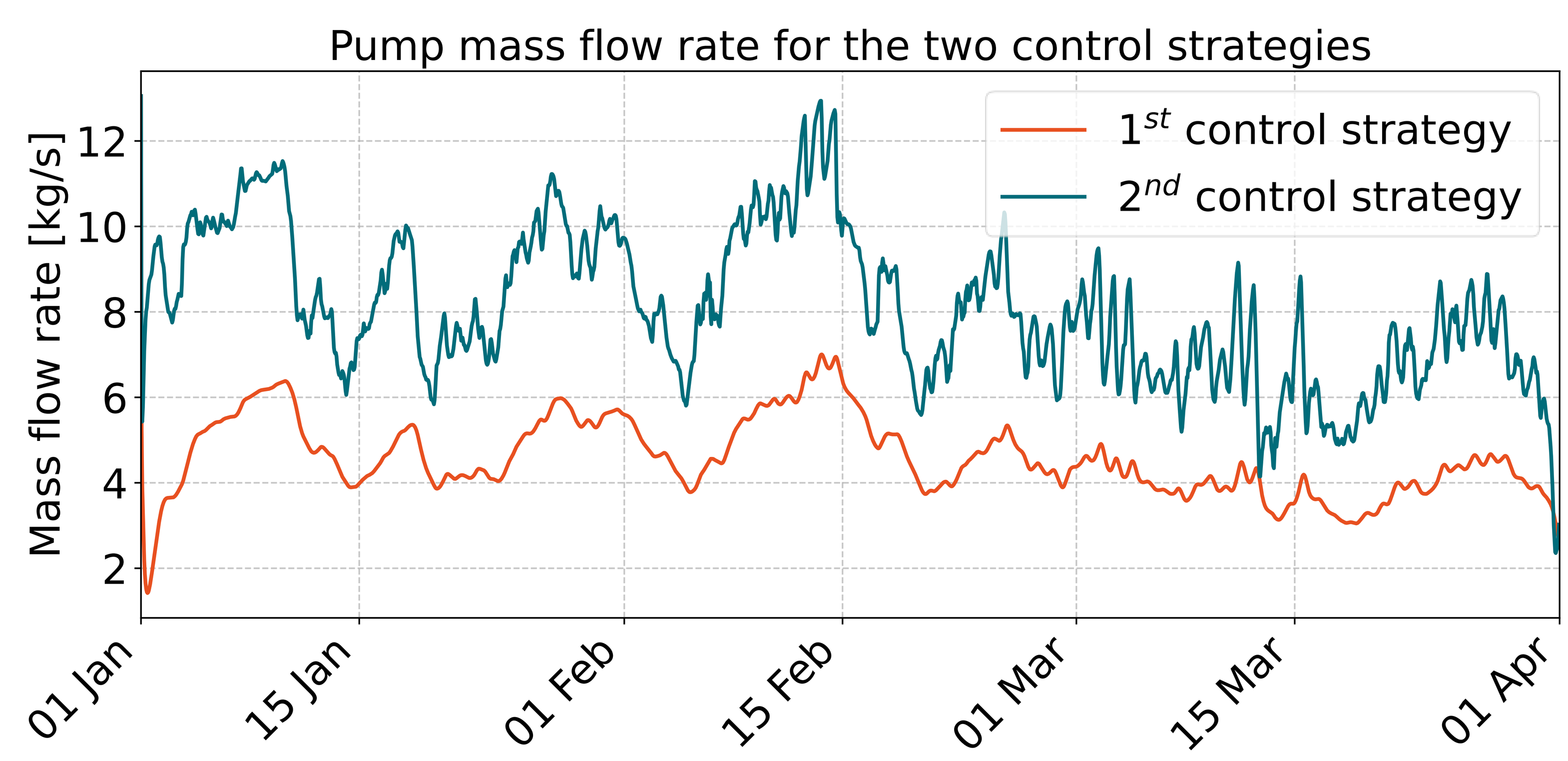
Methodology and modelling



- **Integrated design** (thermal network and buildings)
- **Dynamic simulation** (mass and thermal inertia)
- "Simple" return temperature **control strategies** (based on measured data)
- Dymola and Modelica IDEAS Library

Results





1st control strategy: Pump speed based on **heat source return temperature**

2nd control strategy: Pump speed based on the **return temperature of the most critical consumer**

Conclusion

- Highlights low-temperature network's challenges
- Thermal comfort studied through control strategies

➔ Integrating building models and DHN models is crucial to avoid design, control or refurbishment errors when implementing low-temperature networks

Future work

- Coupling building models to a Geographic Information System
- Improve model's fluidity between design and operation
- Study control strategies
- Increase number of buildings and heat sources

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