



RIGA TECHNICAL
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Climate adaptive facade system element laboratory testing and mathematical model validation

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Topicality

European Green Deal

The EU aims to be climate neutral in **2050**.

Energy efficiency

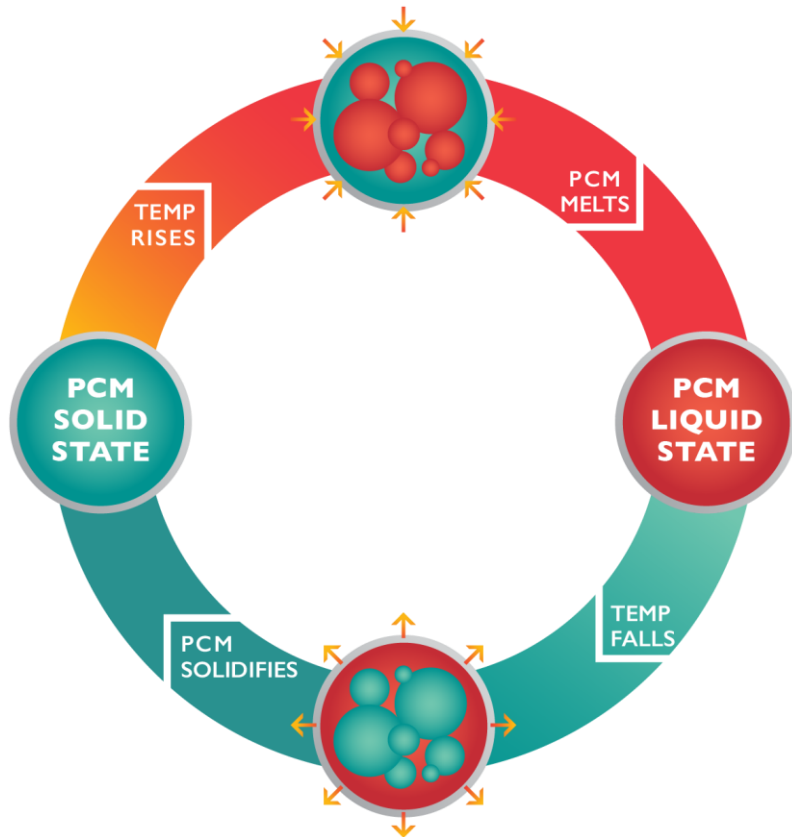
In the EU, buildings consume around 40% of total energy and generate 36% of total carbon dioxide emissions.

A near-complete decarbonisation of the building sector

Focusing on where the emissions reduction potential is the greatest, the existing building envelope.



Goal



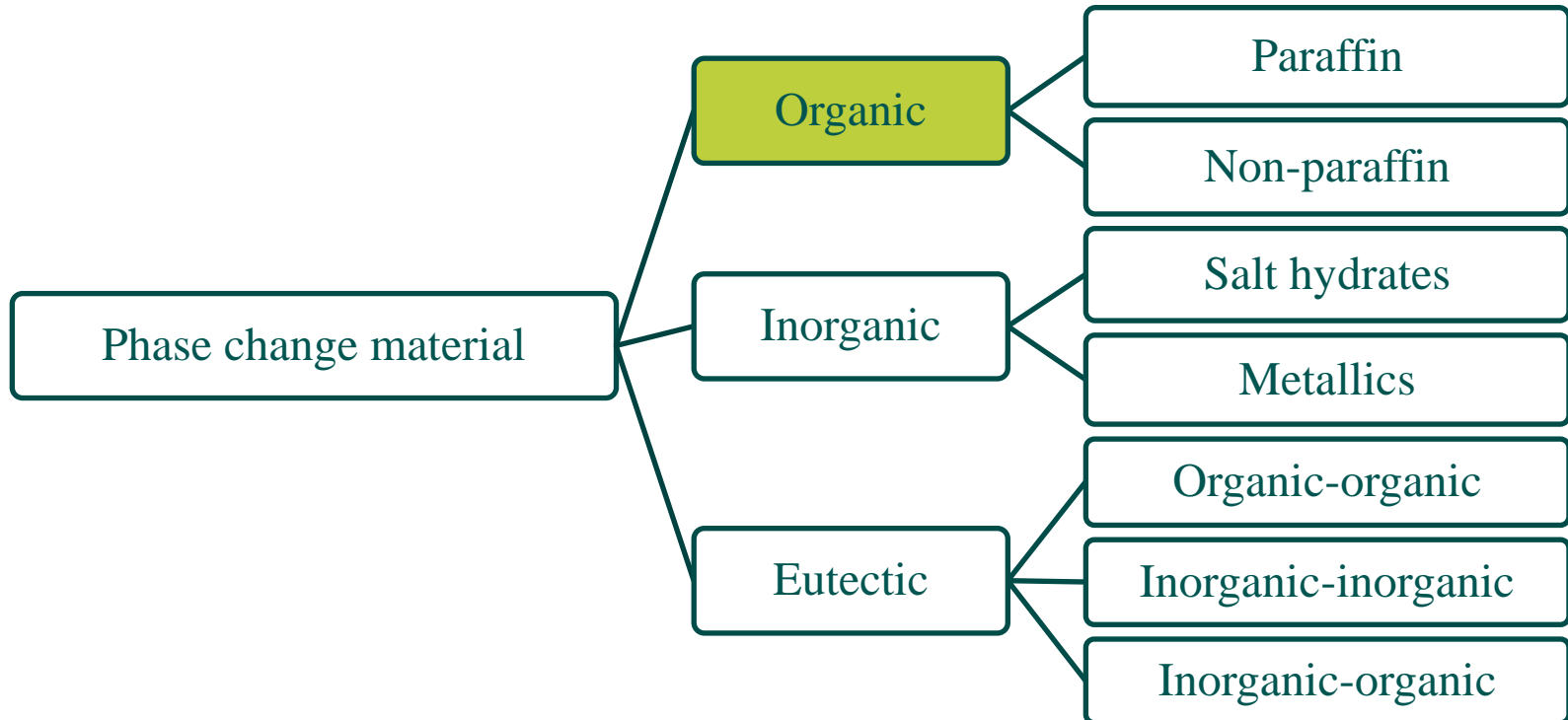
1st part:

Perform experiments in laboratory of Phase Change Material (PCM) samples enclosed into an insulation layers using Hot/Cold Plate apparatus to observe the phase change behavior.

2nd part:

Validate the experiment results with a mathematical simulation model in COMSOL.

Phase Change Materials

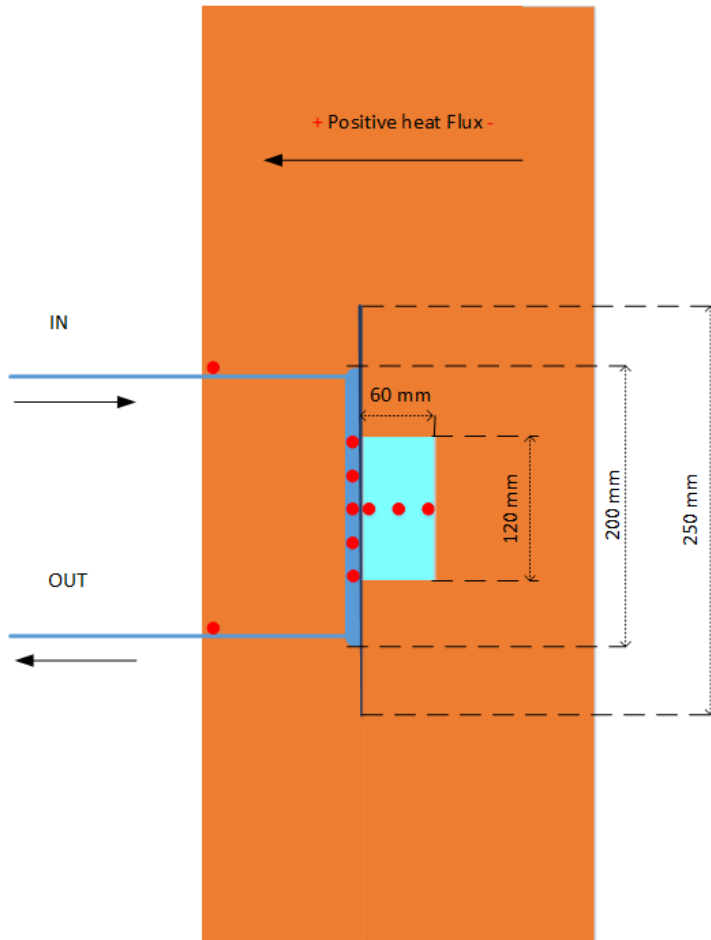


In this study and experiments the PCM «RT21HC» from Rubitherm Technologies GmbH is used.

Experimental setup (I)

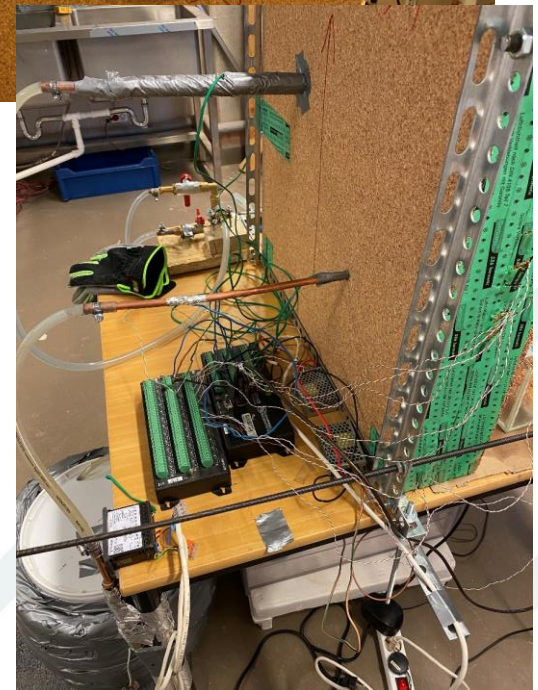
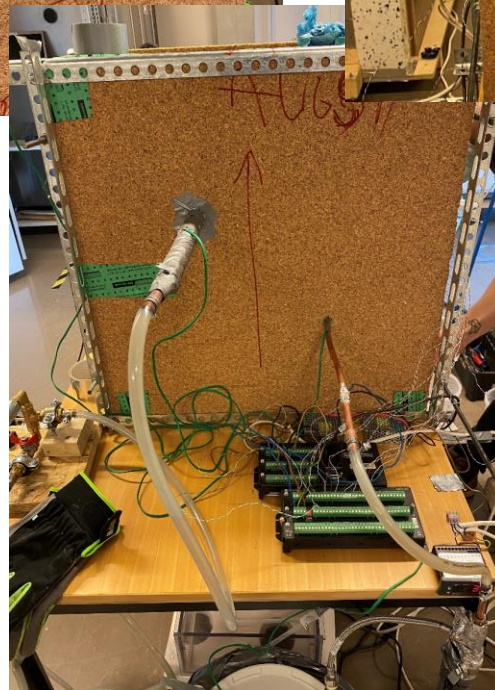
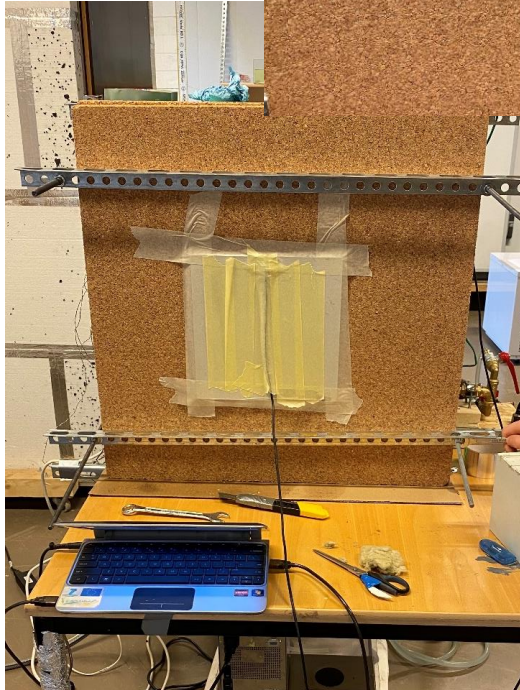
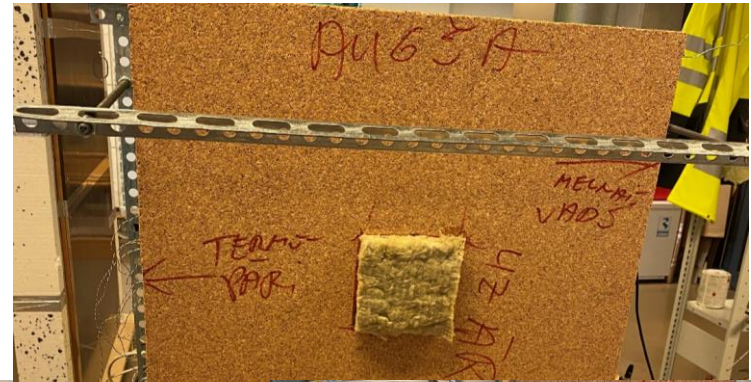
2D model of the test stand with the PCM sample in the center and Hot/Cold plate right next to it.

Including 7 temperature measurement points outside the sample and 3 inside for better precision.



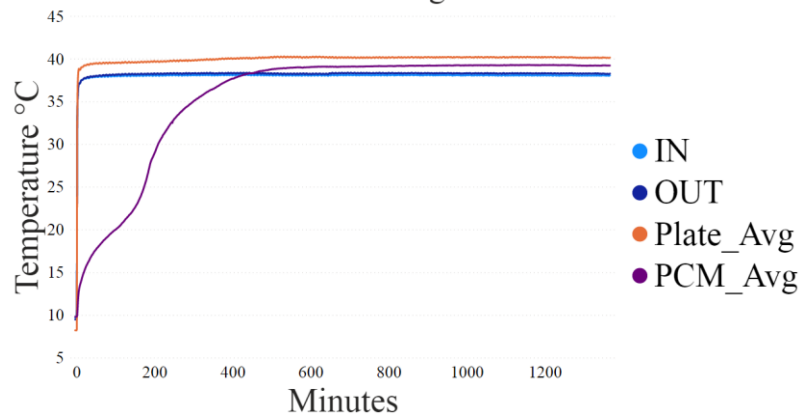
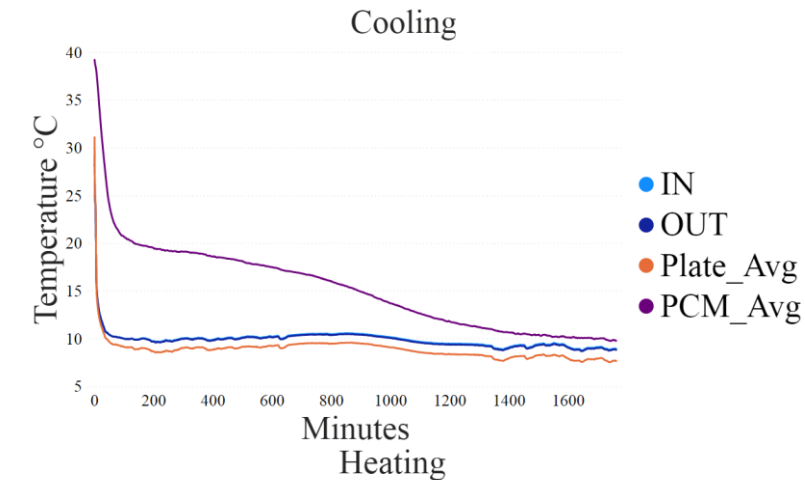
- Temperature measurement points
- HOT/COLD Plate
- Heat Flux sensor
- Test sample
- Insulation/cork

Experimental setup (II)

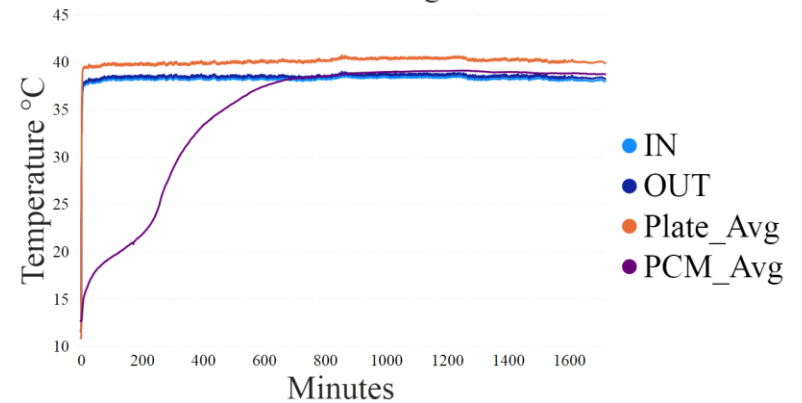
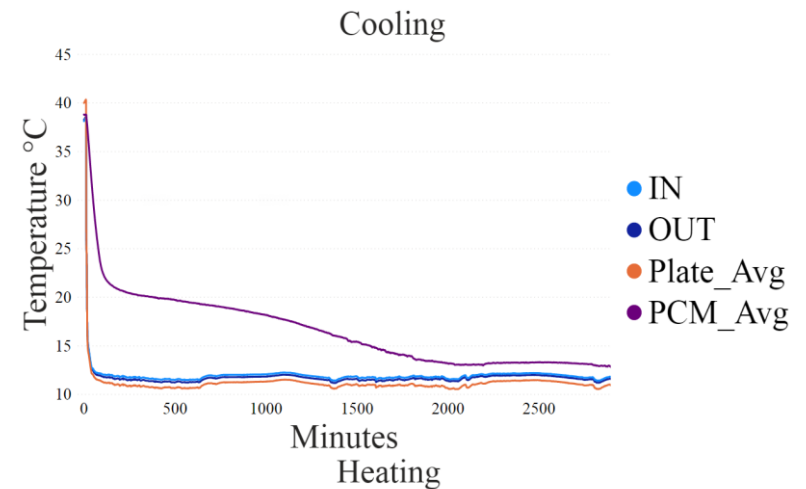


Data analysis

PCM with heat accelerator (copper wire)



PCM without heat accelerator (plain material)



COMSOL simulation

Next part is to create a mathematical simulation model of the PCM sample parameter data and their phase change behavior in COMSOL to validate the test results.





LET'S BUILD SMART!

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