GEOFIT
SMART GEOTHERMAL

Evaluations of a high-temperature cooling system performance in retrofitting practice of an office building in Mediterranean climate

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What is GeoFit?

- Novel geothermal systems, technologies and tools for energy efficient building retrofitting
- Goal: Increase renewable energy use and cut CO_2 emissions in EU building stock through more efficient and economical heating and cooling solutions while improving thermal comfort
  - Targets for LTH and HTC:
    - 12-18% improvements to the COP of GSHP
    - 25% final energy savings by replacing existing H/C components with LTH/HTC components
    - Improved thermal comfort

Pilot Sant Cugat – Constructed 3D Simulation Model

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Simulated building

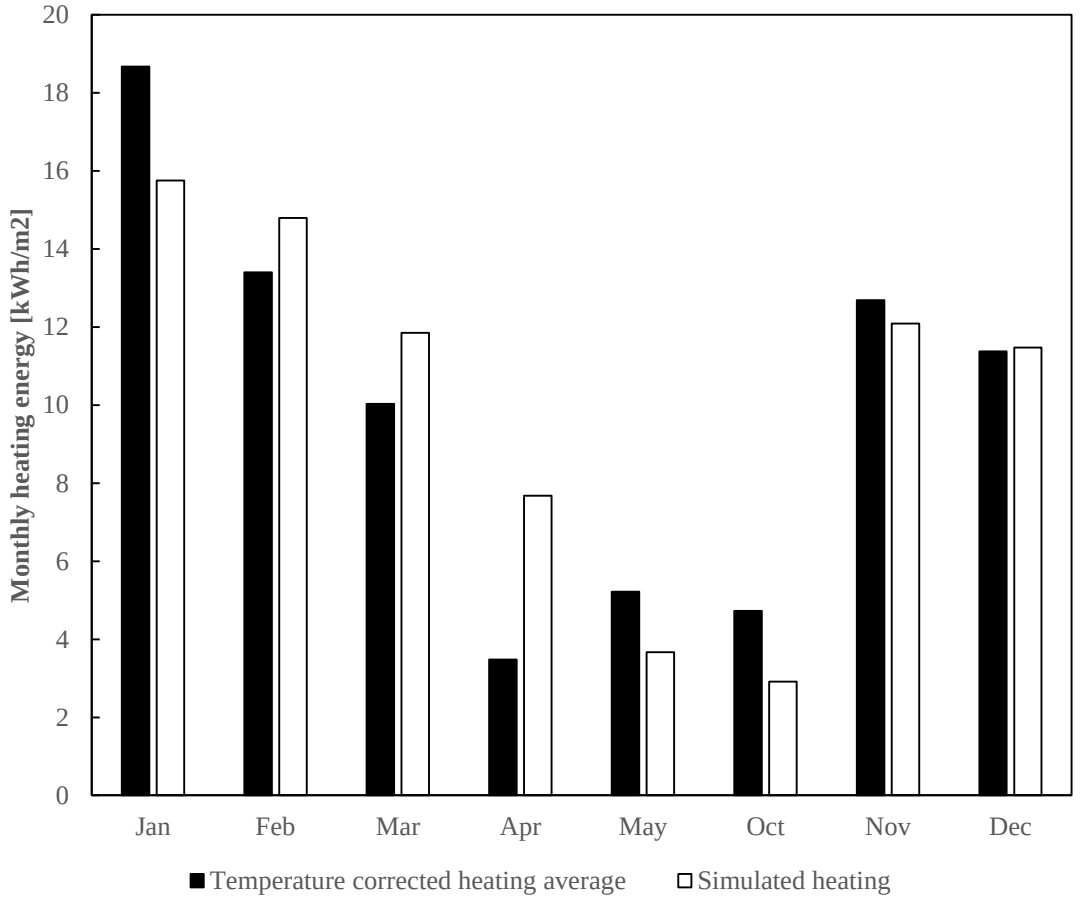
- An office building that is a part of a 3 building complex built in 1975

Parameter	Value
Heated area	288 m^2
Number of occupants	8
Lighting	1.6 W/m^2
Equipment	12 W/m^2
DHW	4 l/person/d
Infiltration	2.7 $m^3/h/m^2$

Model validation

- Simulated heating demand compared with measured demand (no data on cooling demand)
- Yearly energy consumption a good match, but big monthly variations
  - Temperature corrected average: 79.6 kWh/m²y
  - Simulated heating: 80.2 kWh/m²y

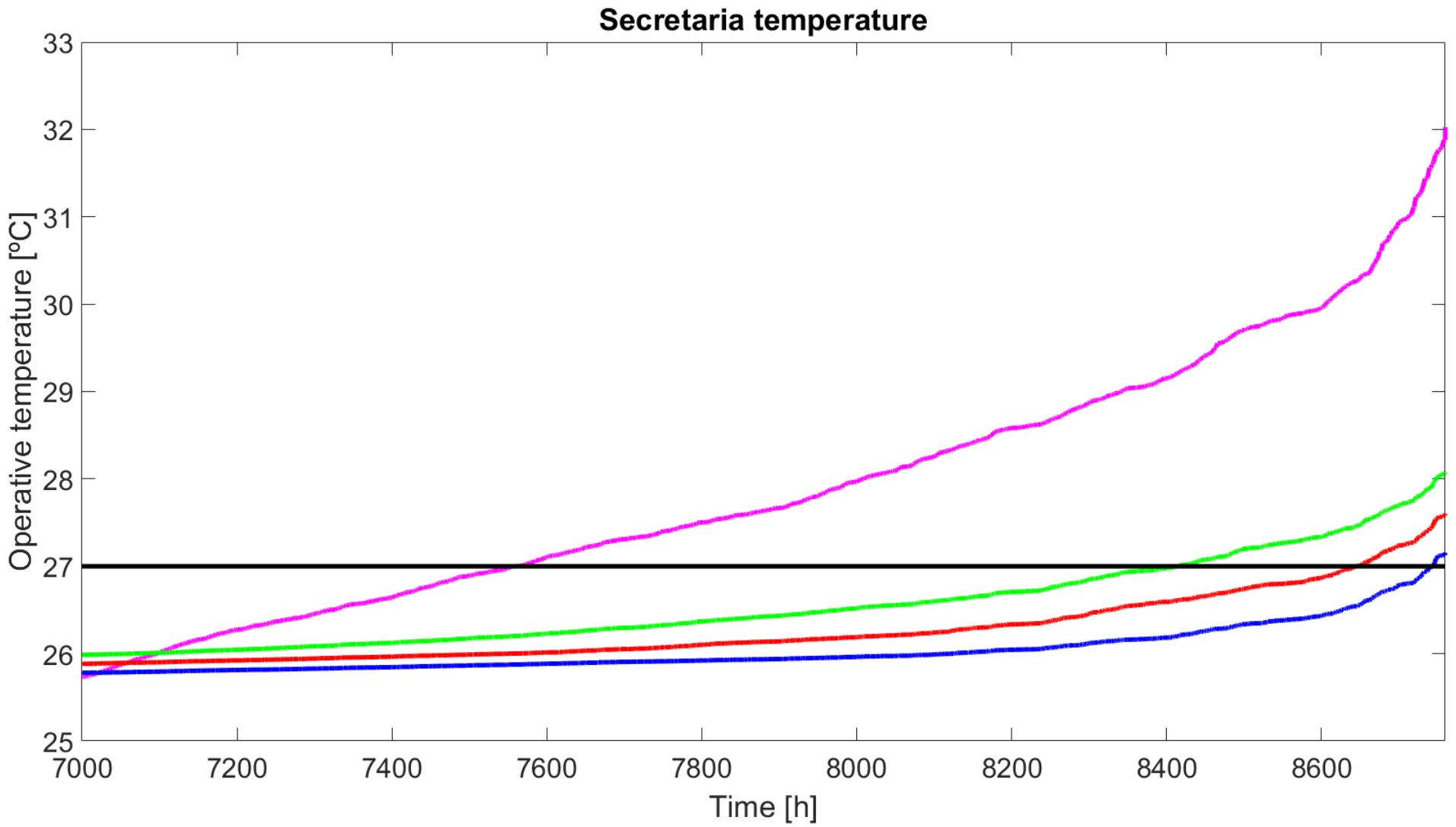
→ Error < 1%



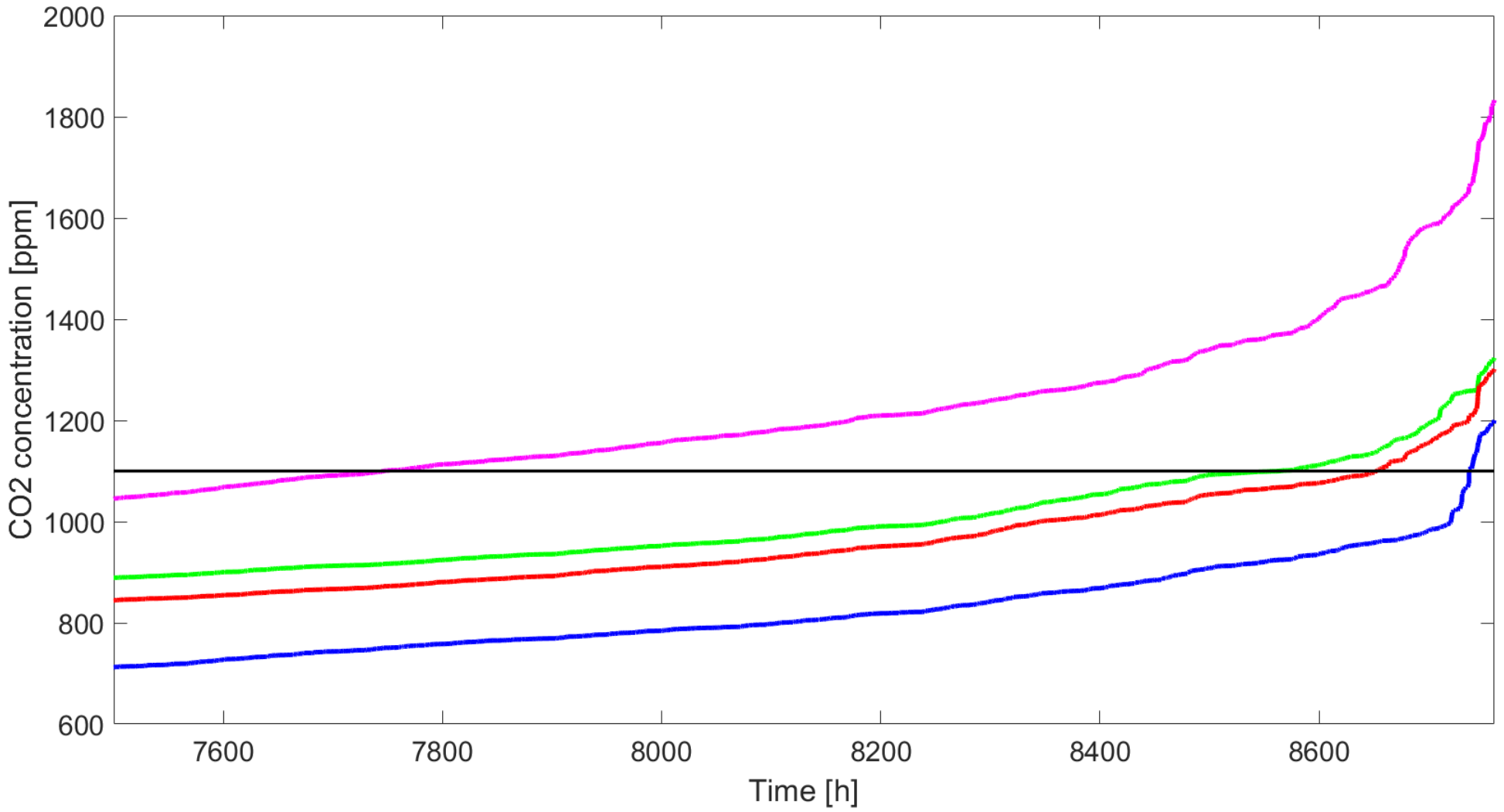
Studied systems

- Novel HTC system for administrative building compared with building in it's current state as a baseline system
- System simulated with various cooling water supply temperatures and ventilation air flows
  - Supply temperatures: 20 °C, 22 °C and 24 °C
  - Supply air flows: 11 l/s/p (ASHRAE), 15 l/s/p (EN15251 CAT III) and 27 l/s/p (EN15251 CAT II)

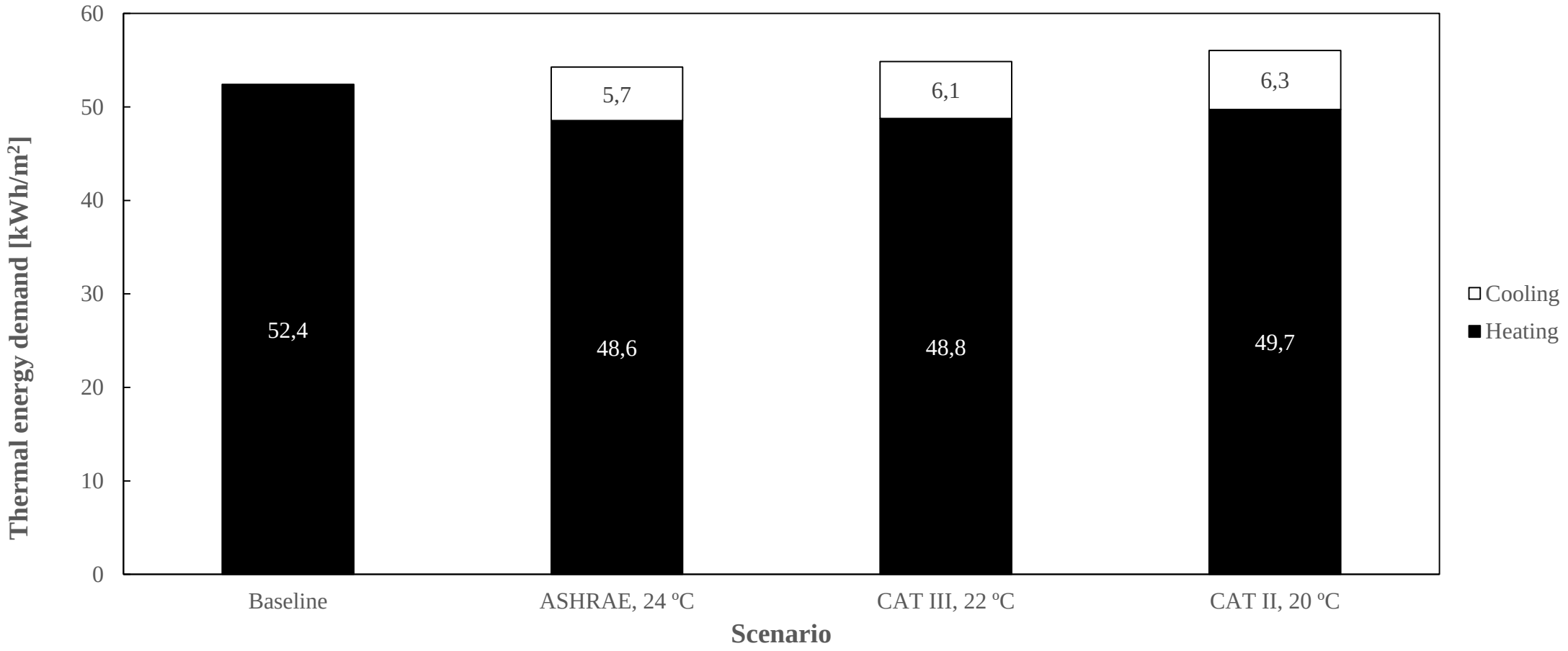
Comparison of global thermal comfort



Comparison of indoor air quality



Cooling demand



Thank you for your attention

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