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Nuove ipotesi progettuali per la climatizzazione di edifici
pubblici nel clima Mediterraneo

*New Design Approaches for the Air Conditioning of Public
Buildings in the Mediterranean Climate*



Paolo Maria Congedo, University of Salento

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Climate change impact:

- alters heating and cooling demands.



Energy consumption in school buildings:

- is affected by climate change.



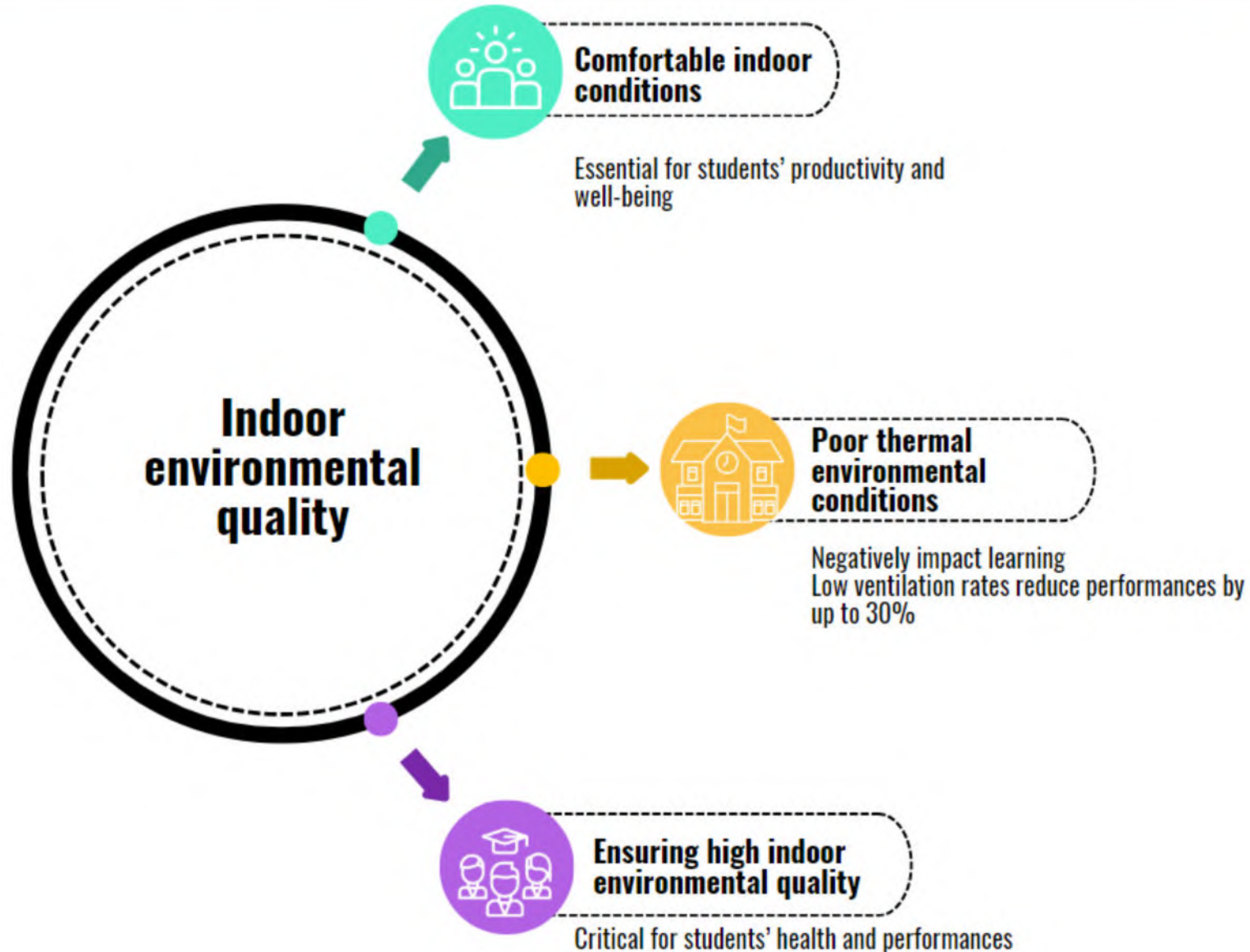
Energy efficiency in school:

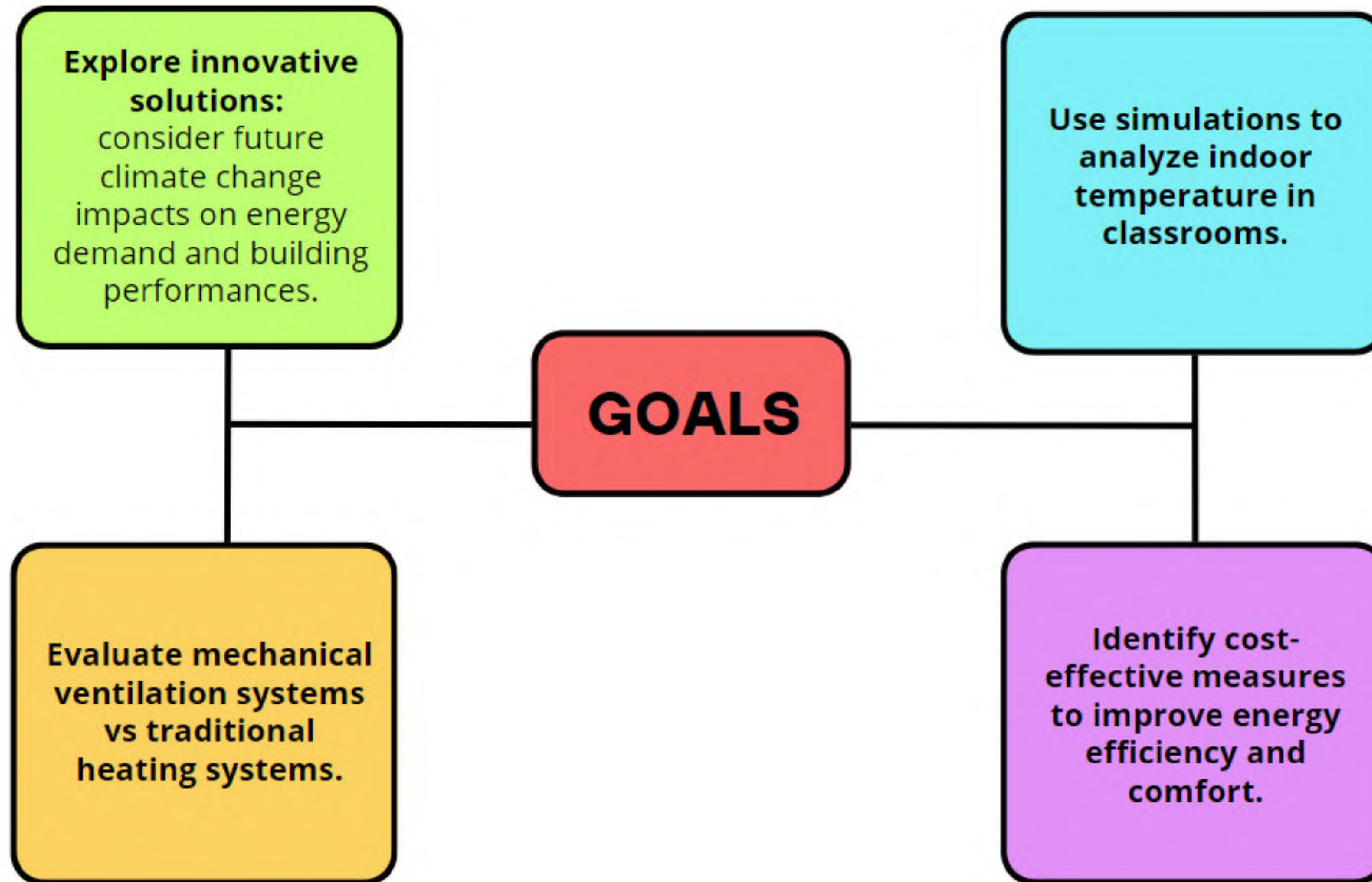
- reduces costs.
- promotes sustainability.



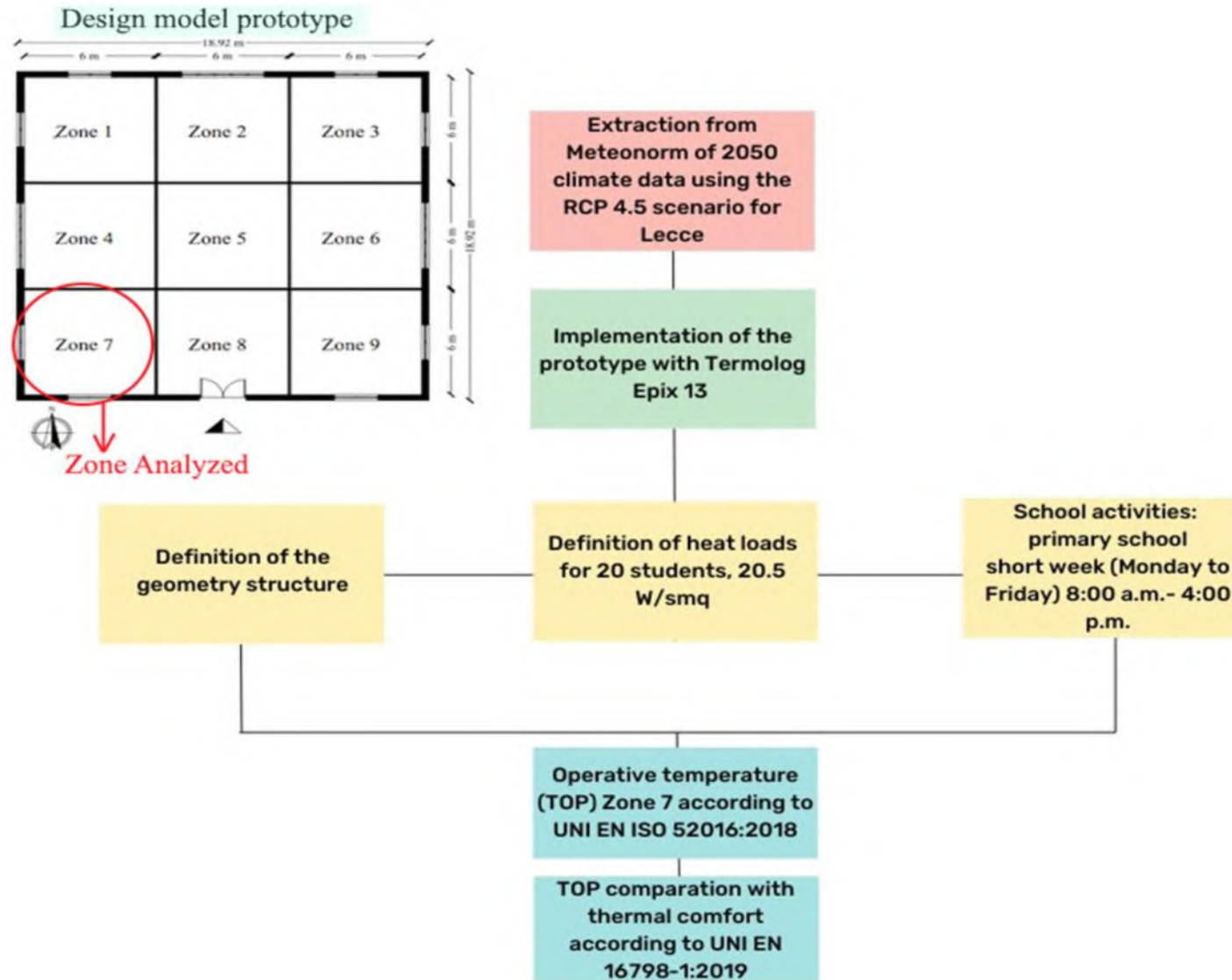
Social aspects:

- involve students in energy efficiency and school sustainability.

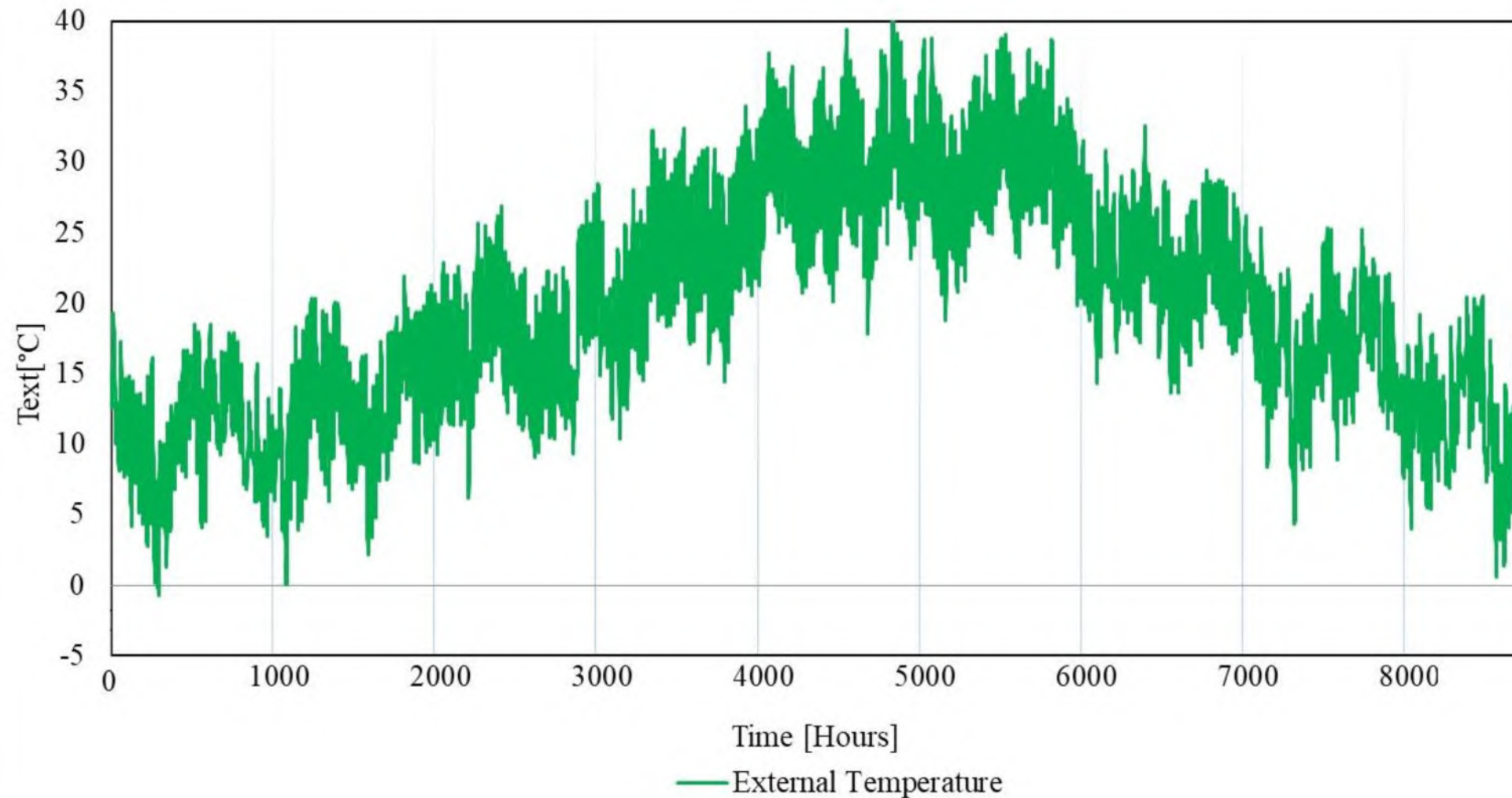




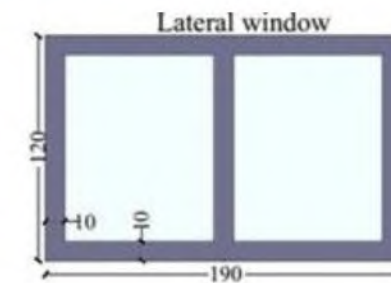
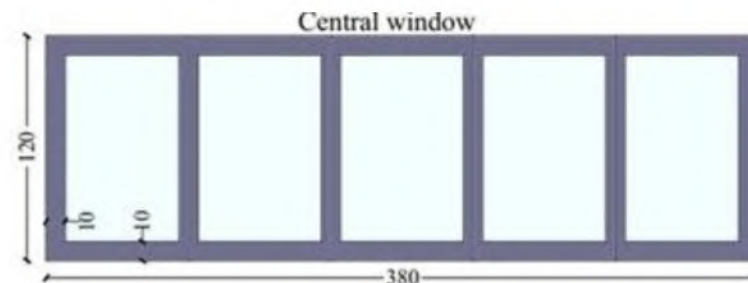
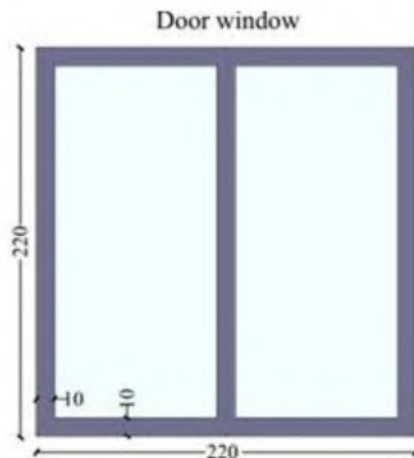
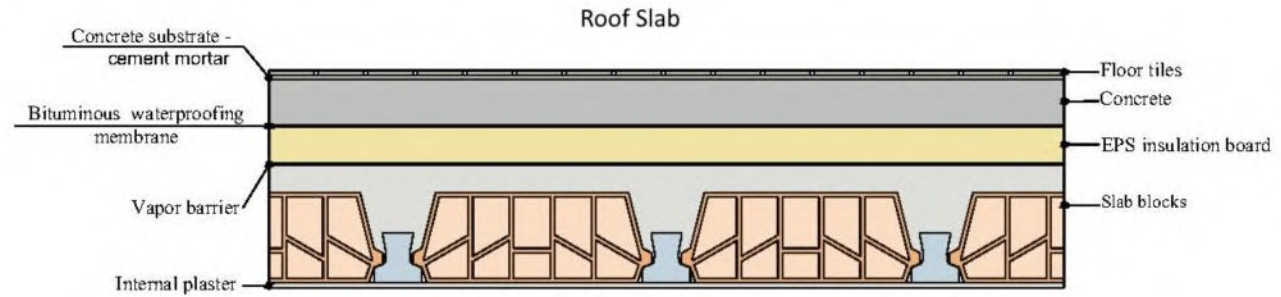
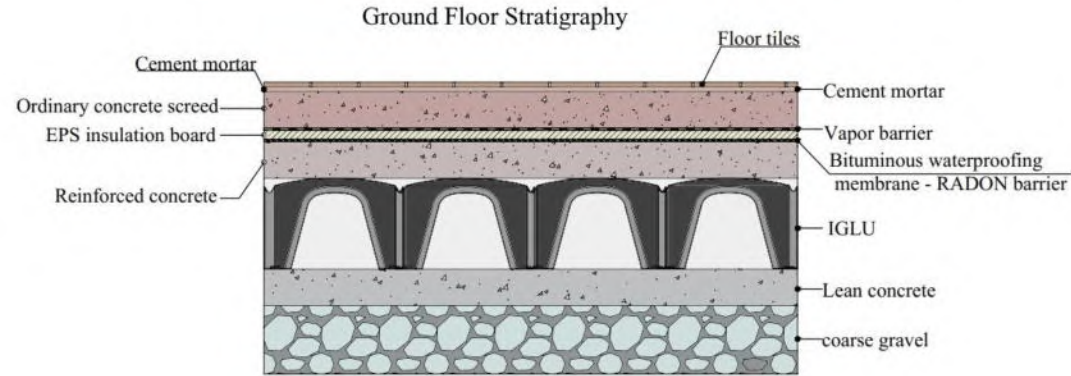
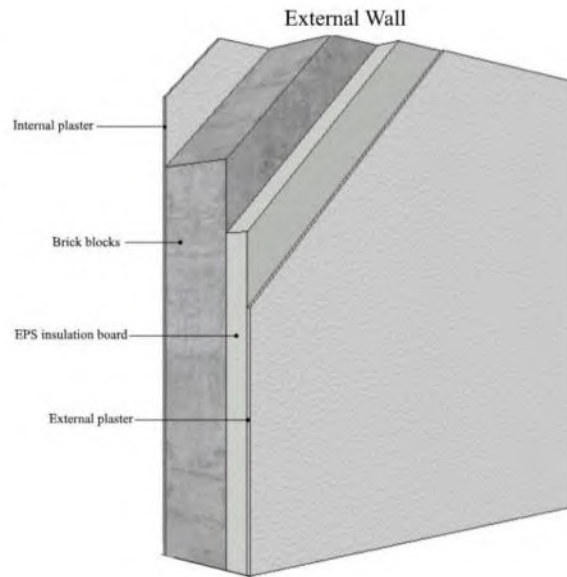
1. Methodology



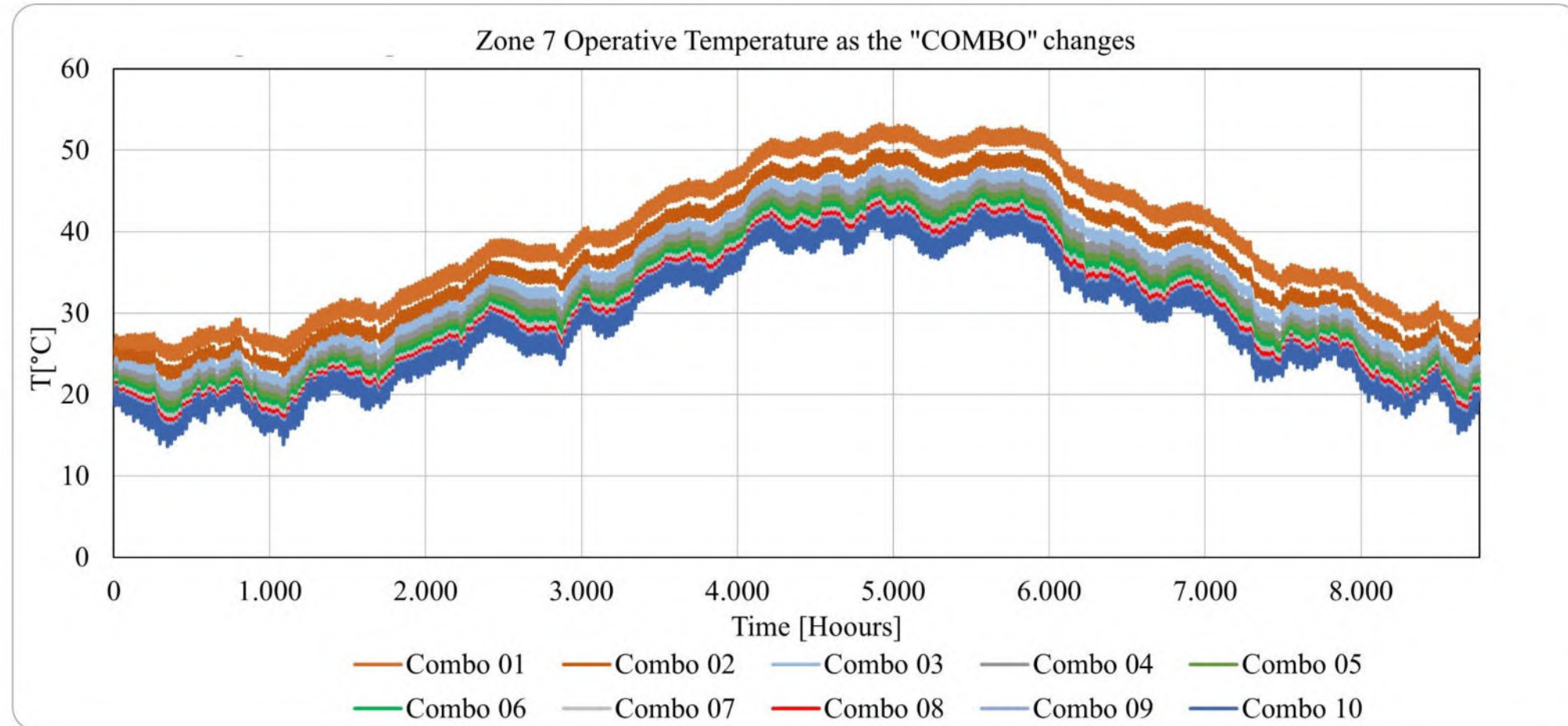
Temperature of Lecce for the year 2050



3. The case study: Building details



4. Indoor Operative Temperature (UNI EN ISO 52016:2018)



5. Study of adaptive thermal comfort in a specific zone according to UNI EN 16987

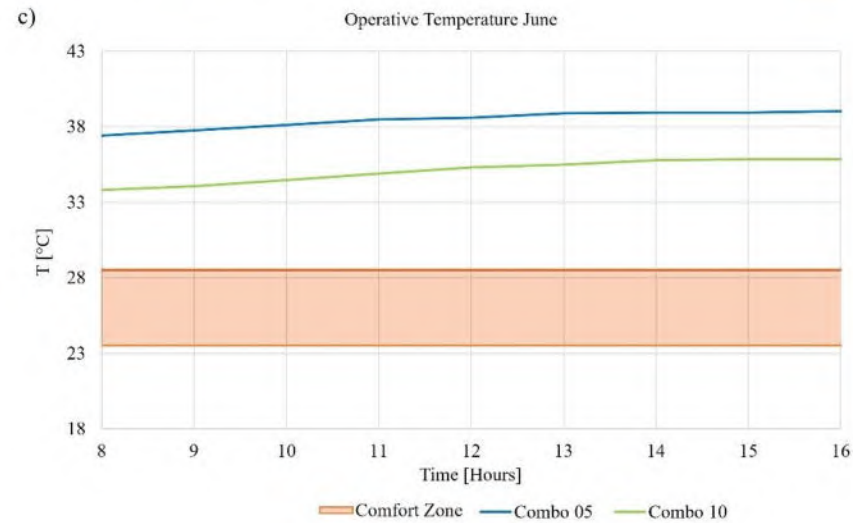
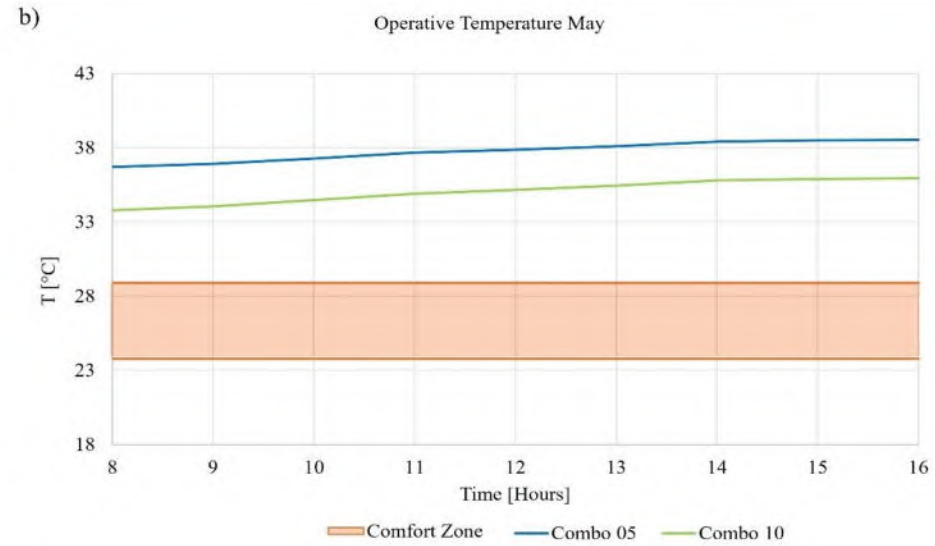
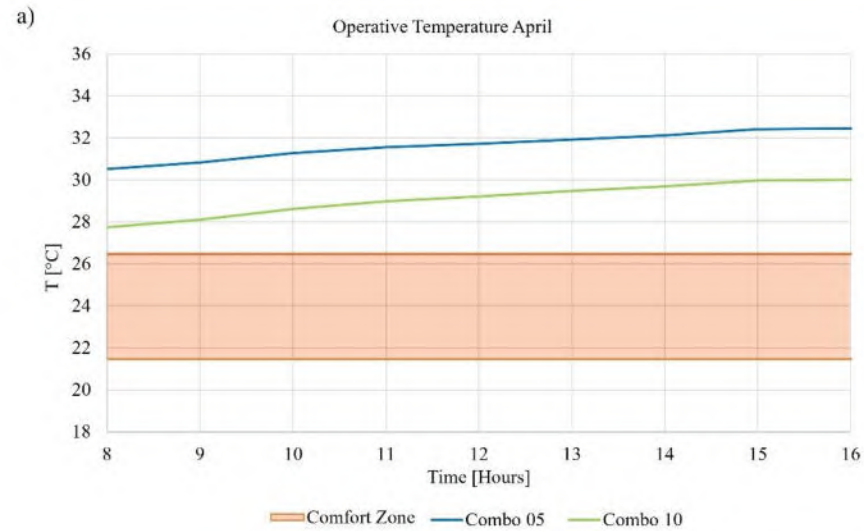
- According to the standard UNI EN 16798-1:2019, thermal comfort in school classrooms must ensure you must guarantee you in HIGH level of quality of comfort
- During winter, the indoor operative temperature should be between 21°C and 23°C
- During the intermediate periods (spring/autumn) and during summer, thermal comfort varies according to the relationship given in standard

$$\text{category I: } \begin{cases} \theta_0 = 0.33 \cdot \theta_{rm} + 18.8 + 2 & \text{Upper limit} \\ \theta_0 = 0.33 \cdot \theta_{rm} + 18.8 - 3 & \text{Lower limit} \end{cases}$$

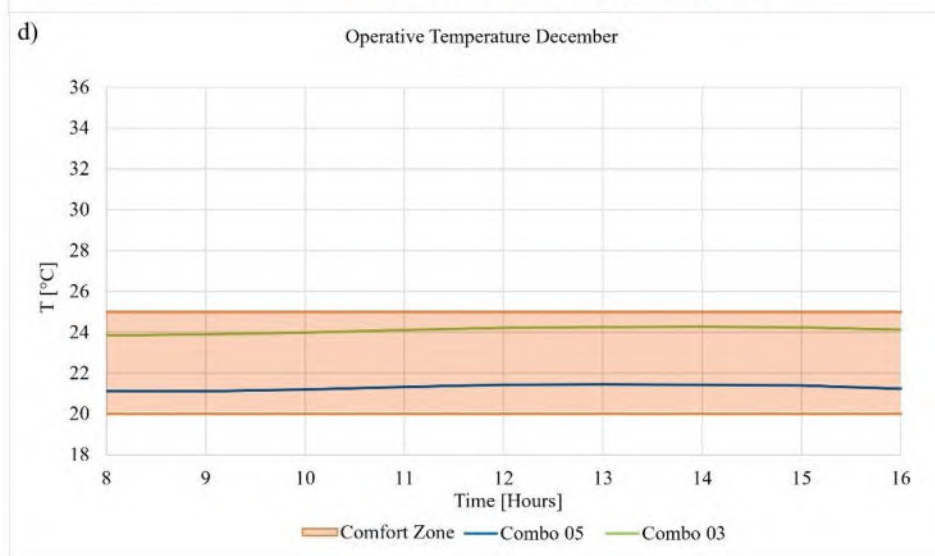
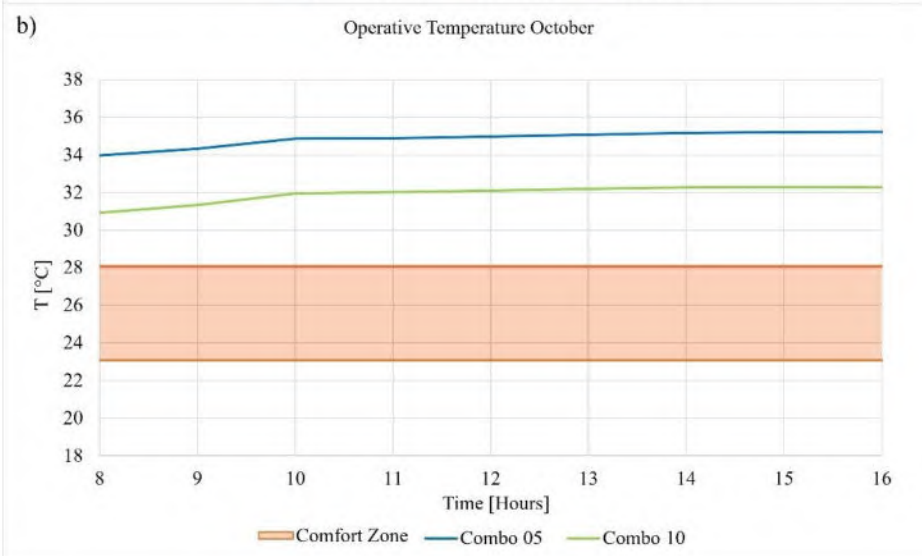
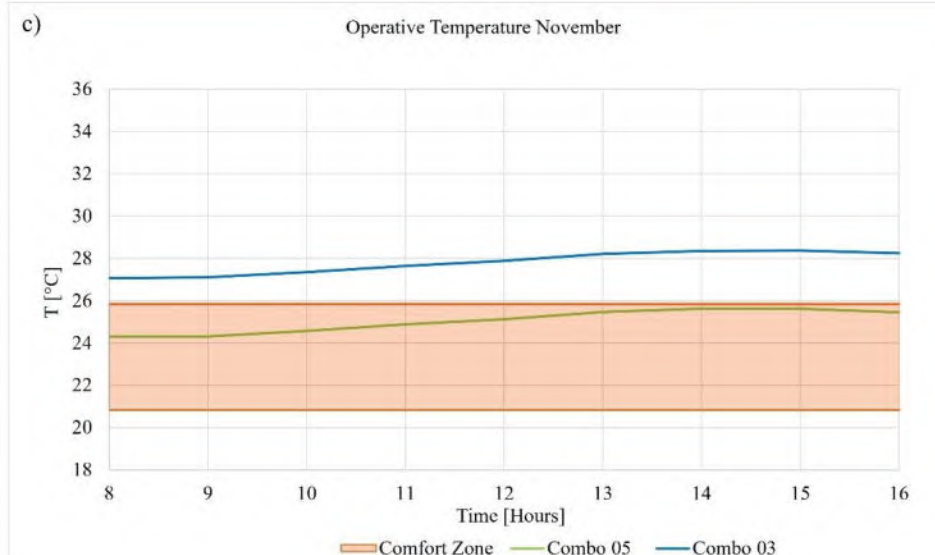
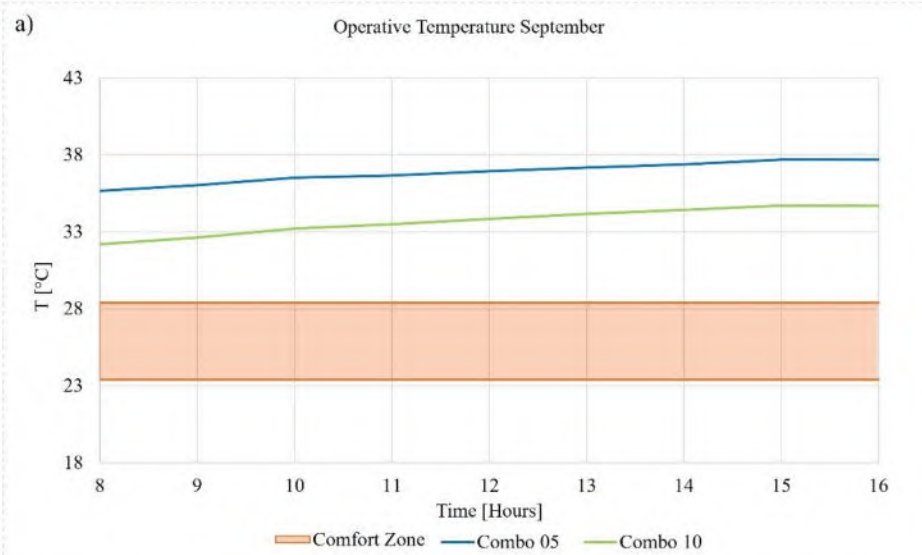
Where:

- θ_0 indoor operative temperature [°C]
- θ_{rm} weighted average external temperature [°C]

7. Results: Spring months



8. Results: Autumn months



In Mediterranean regions, to address challenges related to energy efficiency and environmental comfort, the following solutions can be adopted:

- Discourage the installation of heating systems, considering the temperate climate often renders the use of such systems unnecessary or ineffective.
- Actively promote the adoption of controlled mechanical ventilation (CMV) systems, which allow for precise control of air exchange between the interior and exterior of buildings, improving indoor air quality and reducing the need for heating or cooling.
- Utilize passive technologies for thermal conditioning, such as effective insulation, orienting buildings to maximize solar gain in winter and minimize it in summer and using materials with high thermal capacity to maintain comfortable temperatures without the use of active heating systems.

Thank you for your attention!
paolo.congedo@unisalento.it