

1. CONTEXT

Since the exceptional summer of 2003, extreme events like heatwaves are likely to become more frequent by the end of this century & there is a growing opportunity for the designers to improve the thermal comfort & energy efficiency of the Belgian buildings.

Solutions to improve building performance should minimize maintenance & operational costs. Hence, the Belgian construction sector can generate new income streams by providing climate adaptation expertise, frameworks, & cooling solutions for retrofit & construction projects.

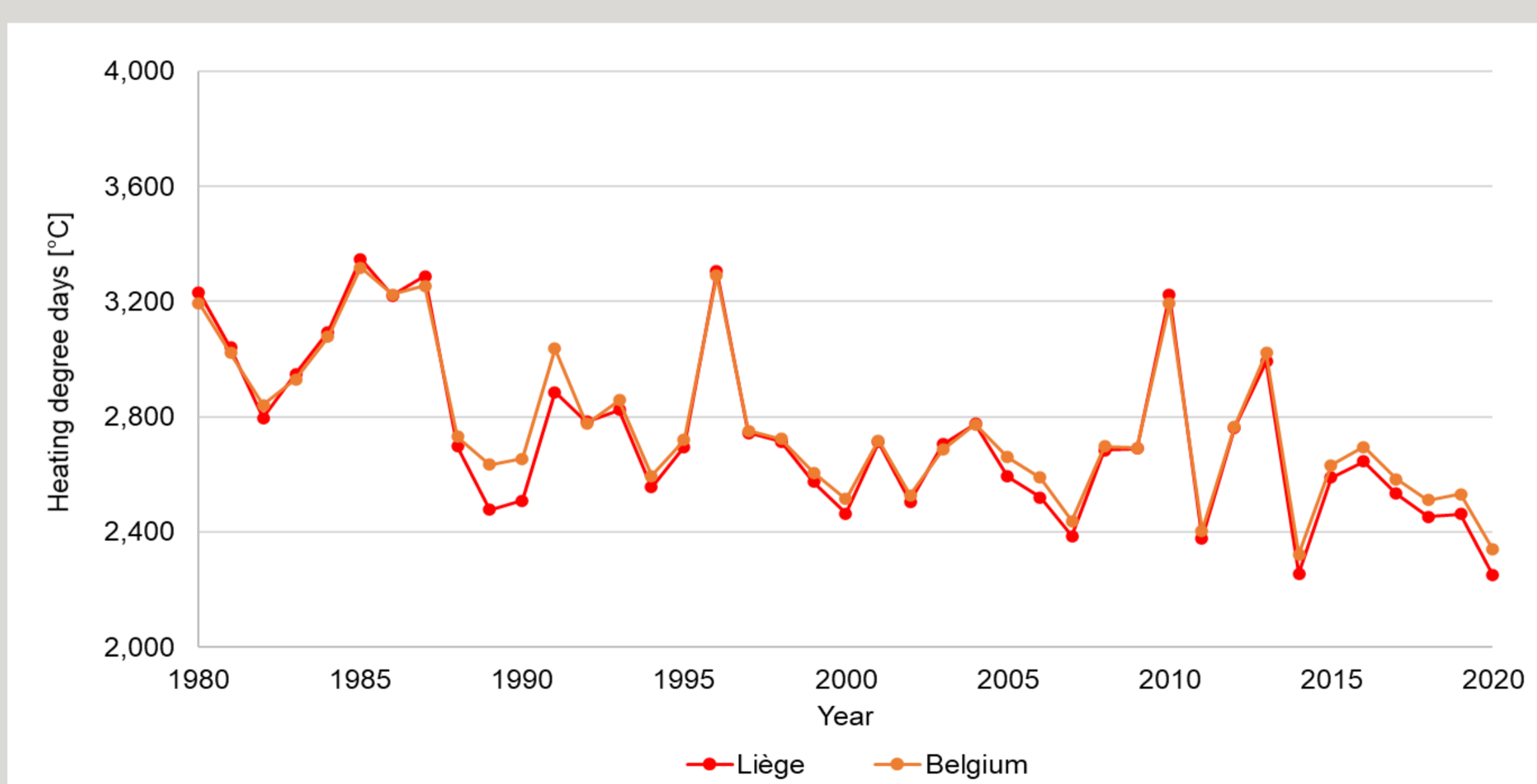
2. OBJECTIVES

To increase the competitiveness of the building service sector in Wallonia.

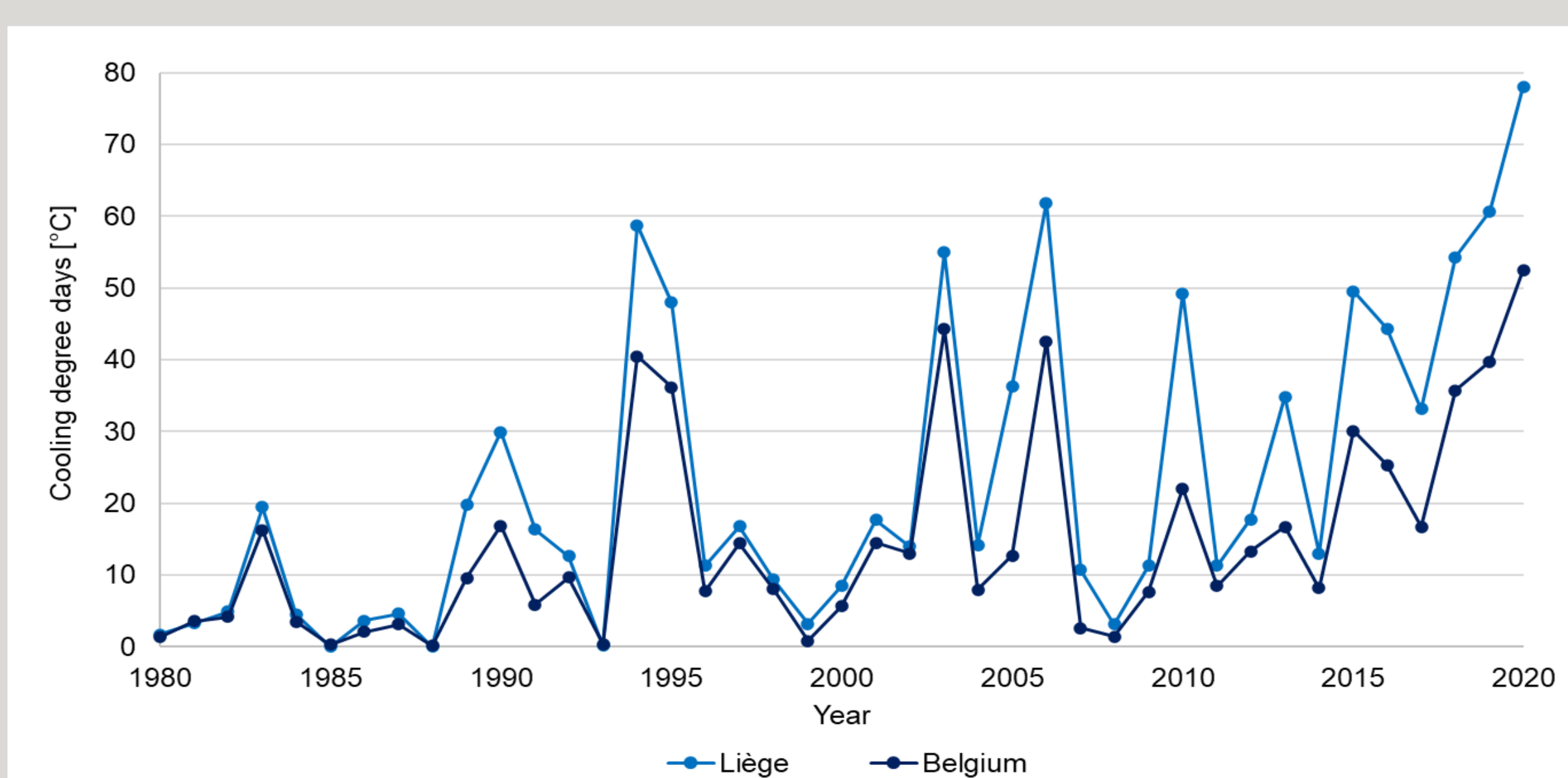
- Design a climate change-sensitive overheating indicator.
- Create a framework & protocol with low input uncertainty & high-risk assessment.
- Develop cost effective measurement method & field measurement kit.

4. STUDIES

For Liege & Belgium (average), HDDs are studied & show a decreasing trend from 1980 to 2020. In addition, HDD for Liege is lower compared to Belgium average & indicates warmer winters.

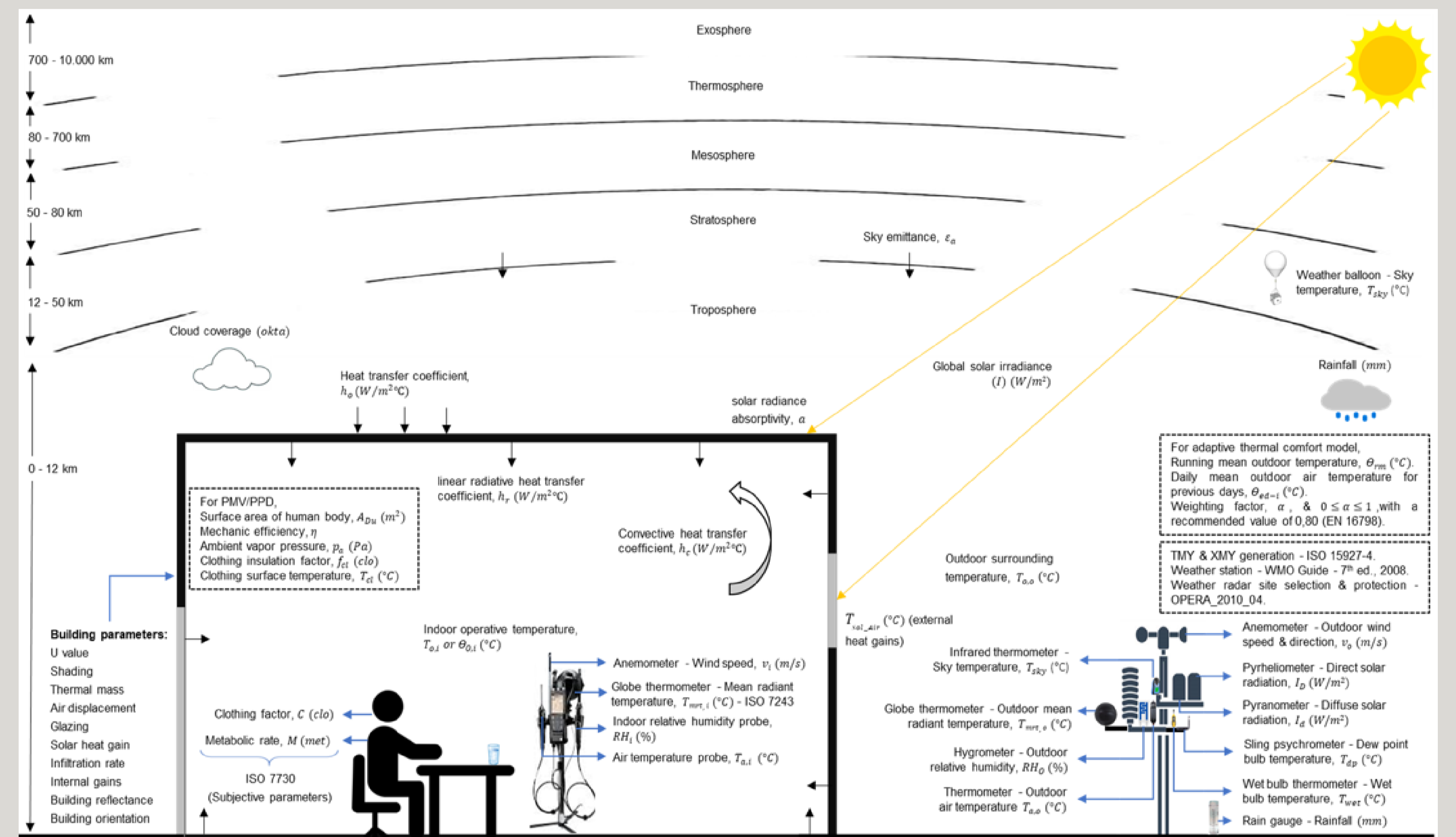


CDDs for Liege & Belgium (average), are studied & show an increasing trend from 1980 to 2020. In addition, CDD for Liege is higher compared to Belgium average & indicates hotter summers.



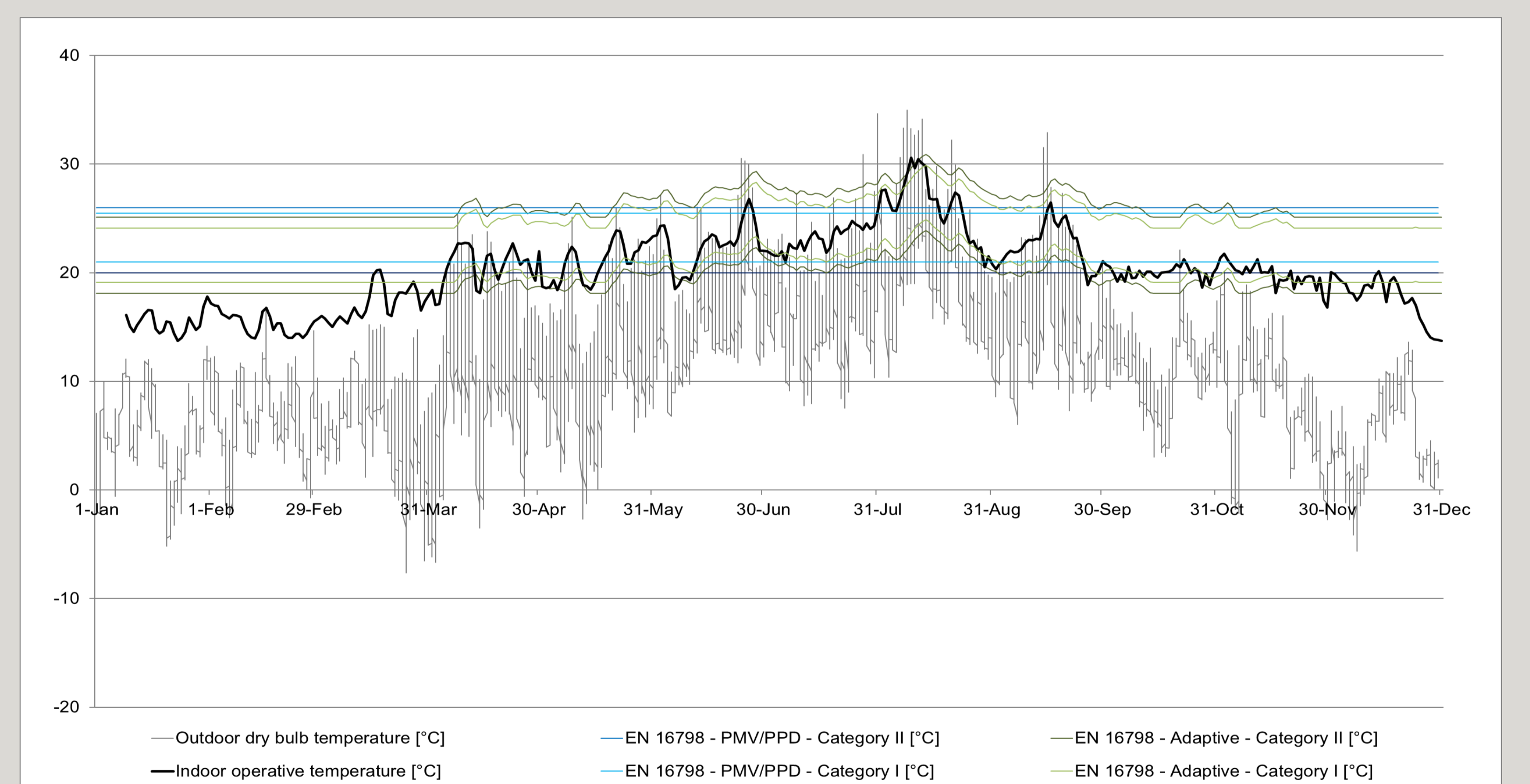
3. THERMAL COMFORT

ASHRAE 55 (2020) defines thermal comfort as “the condition of mind that expresses satisfaction with the thermal environment & is assessed by subjective evaluation”. The external & internal parameters that influence indoor thermal comfort & their respective measurement devices are shown in the figure. The figure includes PMV/PPD & adaptive thermal comfort model parameters according to EN 16798 (2019).



5. ANALYSIS

Indoor operative temperature (T_{op}) & outdoor air temperature (T_{out}) from a free-running apartment located in Outremeuse, Liege, Belgium, are overlaid on upper & lower limits of categories I & II as per EN 16798 for 2020. T_{op} range exceeds the PMV/PPD & adaptive thermal comfort limits.



Another important effect to be noted here is that the adaptive model limits tend to exceed 30 °C & more. These limits in real scenarios are not comfortable as per existing studies. This drawback is to be considered in detail for future developments.

DISCUSSIONS

- 1 The climate & weather patterns in Liege indicate warmer winter & hotter summer in the future.
- 2 There is a significant need to develop an overheating calculation method & discomfort indicator.