

Assessment of the visual and thermal comfort of static vs thermochromic double-glazing systems

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THERMOCHROMIC GLAZING (TCG)

- Innovative smart glazing technology
- Autonomous and reversibly changes its thermal and solar-optical properties depending on its temperature (high temperature → dark state) [1]

WHY STUDY IT?

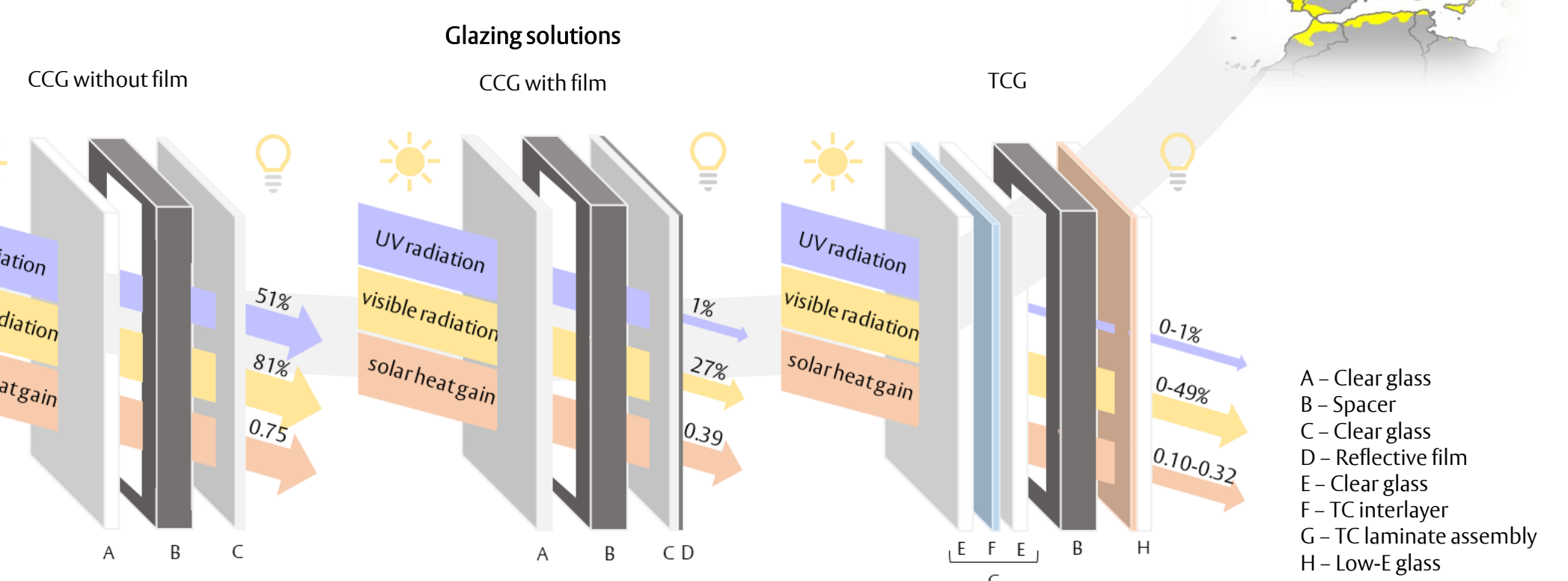
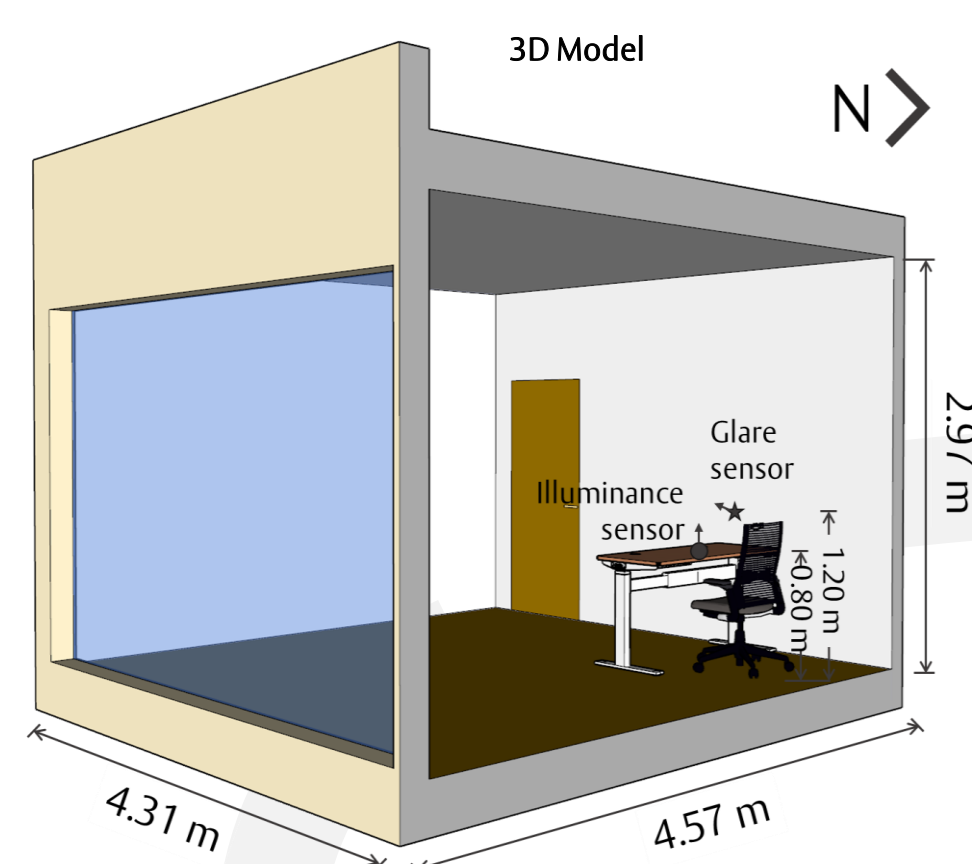
- Poor performance of conventional clear glazing (CCG) [2]
- TCG is a promising alternative to improve indoor comfort, particularly in hot climates

OBJECTIVE

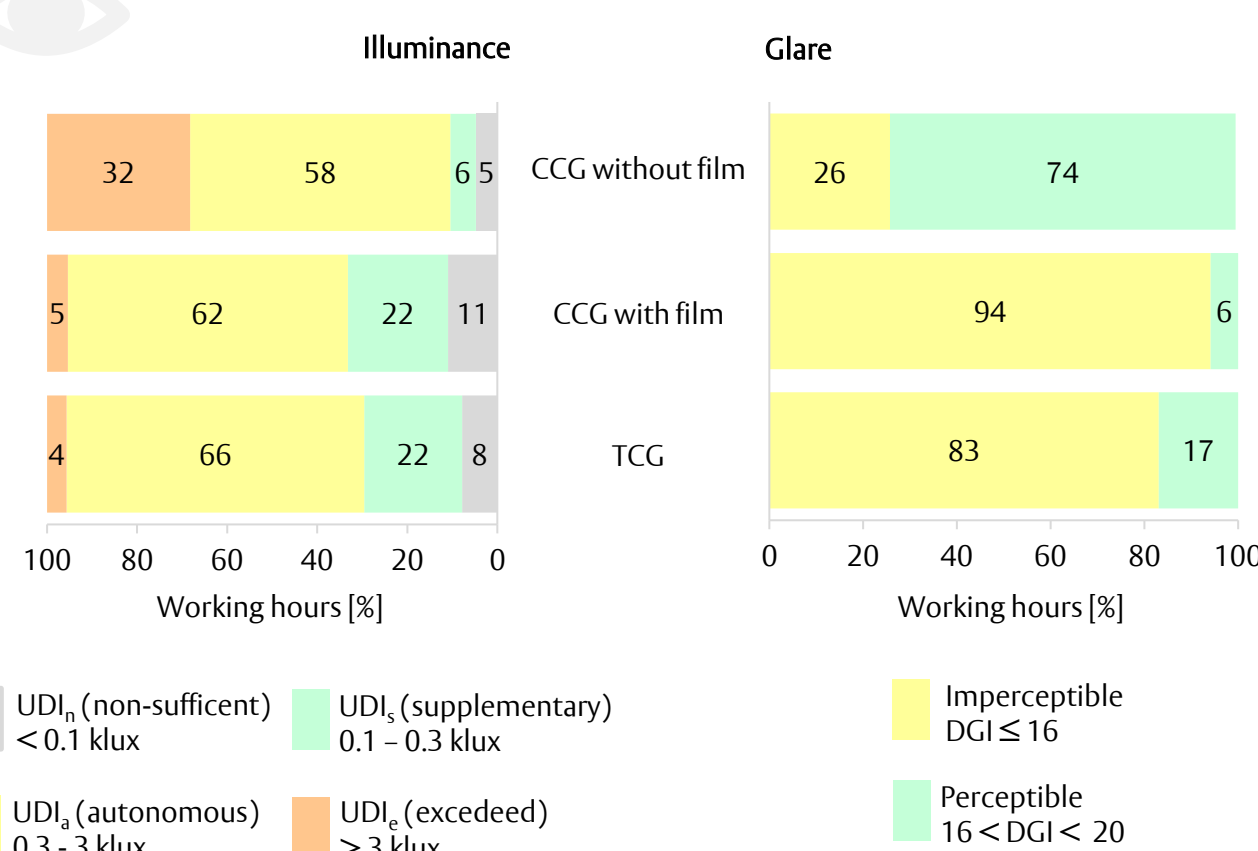
- Assess indoor visual and thermal comfort of a TCG against a CCG with and without a reflective solar control film

METHODOLOGY

- Calibrated simulation model of an office room
- Visual comfort: daylight glare index (DGI) and useful daylight illuminance (UDI) metrics
- No artificial lighting and climate control systems
- Thermal comfort: Portuguese legislation



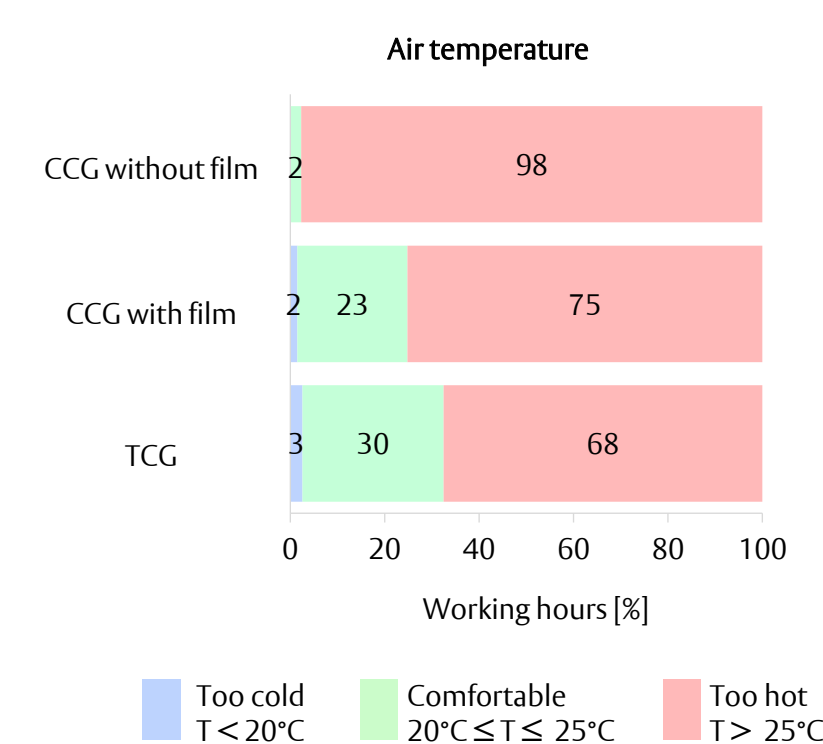
VISUAL COMFORT



RESULTS

- 88% of working hours with useful illuminance levels obtained with the TCG
- 32% of working hours with excessive illuminance levels with the CCG without film
- 94% of working hours with imperceptible glare in the presence of the reflective film
- 30% of working hours within thermal comfort

THERMAL COMFORT



CONCLUSIONS

- Similar visual performance in terms of illuminance levels between the CCG with film and the TCG, with a slightly better performance for the dynamic glazing
- Improved glare control with the reflective solar control film
- Working hours within thermal comfort increased to 30% with the TCG

References

- Teixeira, H., Glória Gomes, M., Moret Rodrigues, A., & Aelenei, D. (2022). Assessment of the visual, thermal and energy performance of static vs thermochromic double-glazing under different European climates. *Build. Environ.*, vol. 217, p. 109115. doi: 10.1016/j.buildenv.2022.109115
- Teixeira, H., Glória Gomes, M., Moret Rodrigues, A., & Pereira, J. (2020). Thermal and visual comfort, energy use and environmental performance of glazing systems with solar control films. *Build. Environ.*, vol. 168, p. 106474. doi: 10.1016/j.buildenv.2019.106474

FUTURE STUDIES

- Visual comfort assessment using the daylight glare probability metric
- Thermal, visual, economic and environmental performance assessment of TCG against other dynamic glazing technologies

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