Possibilities and constraints for the widespread application of solar cooling integrated façades

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Possibilities and constraints for the widespread application of solar cooling integrated façades

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Cooling demands in buildings have drastically increased in recent decades and this trend is set to continue into the near future, due to increasing standards of living and global climate change, among the most relevant factors. Besides energy consumption, the use of refrigerants in common vapour compression cooling technologies is a source of concern because of their environmental impact. Hence, there is a need to decrease cooling demands in buildings while looking for alternative clean technologies to take over the remaining loads. Solar cooling systems have gained increased attention in recent years, for their potential to lower indoor temperatures using renewable energy under environmentally friendly cooling processes. Nonetheless, their potential for building integration has not been fully explored, with the exception of scattered prototypes and concepts. This paper aims to address these knowledge gaps by presenting the results of the PhD research project 'COOLFAÇADE: Architectural integration of solar technologies in the building envelope'. The research project explored the possibilities and constraints for architectural integration of solar cooling strategies in façades, in order to support the design of climate responsive architectural products for office buildings, driven by renewable energy sources. This paper explores different aspects related to façade integration and solar cooling technologies, in order to provide a comprehensive understanding of current possibilities for façade integration, while drafting recommendations based on identified barriers and bottlenecks at different levels.

Keywords: solar cooling, integrated façades, façade design, renewables, barriers

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