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Vertical greenery systems for energy savings in buildings: a comparative study between green walls and green facades

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Abstract

During the last decade, vertical greenery systems are increasing their presence in building designs, providing several urban ecosystem services. One of them is the potential to provide energy savings in buildings, which develops an important role, however, data about its performance during winter periods is still scarce. Therefore, the main objective of this paper is to compare at real scale the thermal performance of two different vertical greenery systems implemented in experimental houses-like cubicles for both cooling and heating periods. A double-skin green facade has been installed in the first cubicle that uses deciduous creeper plants, while the second one is designed with green walls made with evergreen species. Finally, a third identical cubicle without any green coverage is used as reference. Two different types of experiments have been carried out to test the performance of the house like-cubicles. One consists of controlling the internal ambient temperature providing heating or cooling to maintain the desired comfort conditions. On the other hand, to study the thermal response of the construction system, the heating, ventilation and air conditioning system was disconnected and the cubicles were tested under free floating condition. First results showed a high potential for energy savings during cooling season for green wall (58.9 %) and double-skin green facade (33.8 %) in comparison to the reference system. On the other hand, for heating periods no extra energy consumption was observed for evergreen system.

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