

عنوان مقاله:

The effect of external and internal shading devices on energy consumption and CO₂ emissions of residential buildings in temperate climate

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خلاصه مقاله:

The use of shading devices to reduce energy consumption can be considered one of the more common methods, its efficiency and impact on reducing carbon emissions have been less considered. the purpose of this study is to evaluate the energy consumption and efficiency of internal and external shading devices that are currently widely used in residential buildings and consequently their effect on reducing carbon emissions. To investigate this, a typical residential building in Gorgan was modeled. At the base of this, two types of interior shading of curtains and roller shades and two external shades overhangs and mat roller shades were examined. In this research, a model with ۲۰ shading device modes was simulated. The modeling and the energy simulations were performed by Design-Builder (Version ۶.۱.۶.۰۰۵). According to the base-design geometry of the building appropriate shading options were proposed for the south façade and windows were double-glazed (DG). The output data showed that a white curtain with a medium-density openness factor of ۳% has the highest efficiency in reducing energy consumption. However, purpose shading could save the annual energy consumption of the building by ۴.۳% compared to the base case, thus potentially saving up to ۹.۷۴ kg of CO₂/m² in the hottest months of the year and ۲.۴۵ kg of CO₂/m² annually. While most researchers are looking for sophisticated technologies, some simple methods such as the use of proper shadings can play a significant role in reducing carbon emissions and environmental sustainability.

کلمات کلیدی:

Internal shading device, External shading device, Energy efficiency, Residential building, CO₂ emissions

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