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Thermal evaluation of large green roofs in comparison to other flat roofs (With the upper layer of silver and white)

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Abstract

About 40% of the world's energy consumption is attributed to the cooling and heating of residential buildings. This has led researchers to reduce the amount of energy consumed in the field by using modern materials and techniques. One of the most effective architectural and construction solutions in this regard is the use of suitable materials in the design and construction of the buildings, with regard to outdoor space and the impact of climate and climate change on heat transfer between outdoor and indoor. The interior of the building was of great importance. So the positive impact of using proper roofing to reduce energy consumption of buildings has been proven, but how much of each of the conventional roofing materials has reduced the amount of energy wasted and consumed in the heating and cooling areas along with This is a subject that has been analyzed and addressed in this article. Green roofing is one of the new approaches of architecture and urbanization and derives from the concepts of sustainable urban development that can be used in roofing vegetation. Green roofs are not originally a new invention; grass roofs are a traditional construction technique in many parts of the world. The difference between a new green roof and a traditional green roof is due to the different purposes and materials used in these two types of roofs. The main purpose in the past has been to use grass to insulate and remove the sealing layer that is often applied to birch bark. But nowadays, green roofs are aimed at environmental, economic, and health-related improvements to surface sewage management in the city and to address aesthetic issues. The increasing use of the green roof system in recent decades, especially in developed countries, high land prices, population growth and low green space, has led to improvements in the current state of energy consumption, Become more important than ever. Green roofs have grown substantially in recent years, but have not yet developed significantly in terms of performance in reducing energy use and its operational phase. Several innovative construction methods are being used to reduce the energy consumption of buildings, among which green walls and green roofs are increasingly used in buildings, with green roofs effectively improving urban ecology. And provide a useful solution to environmental problems caused by construction. To this end, the present study investigates the thermal performance of three types of roofing (green, white and silver) in three different climatic conditions in Iran to simulate the structure and properties of each type of roofing in Design builder software. Design Builder will examine and compare their performance in the three climates in question. The results show the different impact of each roofing in three different climates and cities (Isfahan, Tehran and Bandar Anzali). The present study found that the use of white roofing is a reasonable choice for hot and dry climates, whereas in temperate and humid climates, the performance of green roofs was evaluated better than other roofs. These results emphasize on the necessity of considering the climatic conditions of the regions in order to select the appropriate materials.

Keyword: Sustainable architecture, Green roof, Energy efficiency optimization, Silver roof, White roof

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