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The Impact of Green Building Envelopes on the Urban Microclimate of the Urban Canopy-Case Study: Fawzy Moaz Street, Alexandria, Egypt

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Abstract : The issue of temperature increase in the urban microclimate has been at the center of attention recently, especially in dense urban areas, such as the City of Alexandria in Egypt, where building surfaces have become the dominant element (more than green areas and streets). Temperatures have been rising during daytime as well as nighttime, however, the research focused on the rise of air temperature at night, a phenomenon known as the urban heat island. This phenomenon has many effects on ecological life, as well as human health. This study provided evidence of the possibility of reducing the urban heat island by using a green building envelope (green wall and green roof) in Alexandria, Egypt. This City has witnessed a boom in growth in its urban fabric and population. A simulation analysis using the Envi-met software to find the ratio of air temperature reduction was performed. The simulation depended on the orientation of the green areas and their density, which was defined through a process of climatic analysis made by the Diva plugin using the Grasshopper software. Results showed that the reduction in air temperature varies from 0.8–2.0 °C, increasing with the increasing density of green areas. Many systems of green wall and green roof can be found in the local market. However, treating an existing building requires a careful choice of system to fit the building construction load and the surrounding nature. Among the systems of choice, there was the 'geometric system' of vertical greening that can be fixed on a light aluminum structure for walls and the extensive green system for roofs. Finally, native plants were the best choice in the long term because they fare well in the local climate.

Keywords : envi-met, green building envelope, urban heat island, urban microclimate
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