Green Roof Implementation in High-Rise Buildings of Nairobi: Energy Savings and Air Quality Enhancement Replication Study

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Abstract

Green roofs are increasingly recognised for their potential to enhance urban environments by reducing energy consumption and improving air quality. The replication study employed existing data from the original research, analysing energy usage and pollutant levels before and after green roof installation across multiple building types. A significant reduction in cooling energy consumption was observed ($p < 0.05$), with a mean decrease of 23% compared to baseline conditions. The replicated study confirms the effectiveness of green roofs in high-rise buildings, contributing to sustainable urban development efforts. Further research should explore scalability and cost-effectiveness across different climates and building materials. Green Roofs, High-Rise Buildings, Nairobi, Energy Savings, Air Quality Improvement Model estimation used $\hat{\{}\theta\}=argmin\{\theta\}sumiell(yi,f\theta(\xi))+\lambda lVert\theta rVert2^{2}$, with performance evaluated using out-of-sample error.

Keywords: *African Geography, High-Rise Architecture, Energy Modelling, Vegetation Impact Studies, Biometeorology, Climate Adaptation Strategies, Urban Sustainability Analysis*

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