

## Green walls for sustainability in buildings: Evaluating the thermal performance in tropics

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### Abstract

Research on vertical greening has the potential of promoting green application in building design to address the need for climate change adaptation and mitigate heat island effect. The paper presents evaluation of vertical greening for thermal comfort in tropical context. The methodology involved on site field investigations and a Design Builder Simulation study investigating thermal effect and energy performance of Vertical Grass Modules (VGM) designed using Malaysian grass spp. This grass species was selected for its fiber root and draught tolerant characteristic. A ten-storied building was simulated for the temperature behavior with different green coverage keeping the base case as reference. The work highlighted the vertical green system contributed in reducing the internal heat gain thus reducing the cooling loads significantly. Results provide evidence of reduction in internal air temperature up to 2° C in a typical day depending on the green coverage while outside temperature is lessened by 5° C. Indoor air temperature measurements of each space were found to be lower than the ambient air temperature whereas the indoor air temperature of the space integrated with the green panel was lower than space without the green panel. Building with the highest grass coverage showed the best performance in thermal evaluation. The final intervention with green walls introduced at all four sides proved to be most effective in terms of 8.6 °C indoor air temperature reduction which lessening cooling load. Findings show evidence on potential of VGM in increasing the thermal comfort thus saving of energy and cost by reducing cooling load. Although 1.5 million of initial cost was estimated for ten-storied building, reduction of energy cost over 30 years far outweigh this initial effort. Further research is needed to analyze life cycle and long term benefits, contribution of different species of plants and practical application in tropical context.

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