

Mitigation Strategies in the Urban Context of Sydney, Australia

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Abstract : One of the worst environmental dangers for people who live in cities is the Urban Heat Island (UHI) impact which is anticipated to become stronger in the coming years as a result of climate change. Accordingly, the key aim of this paper is to study the interaction between the urban configuration and mitigation strategies including increasing albedo of the urban environment (reflective material), implementation of Urban Green Infrastructure (UGI) and/or a combination thereof. To analyse the microclimate models of different urban categories in the metropolis of Sydney, this study will assess meteorological parameters using a 3D model simulation tool of computational fluid dynamics (CFD) named ENVI-met. In this study, four main parameters are taken into consideration while assessing the effectiveness of UHI mitigation strategies: ambient air temperature, wind speed/direction, and outdoor thermal comfort. Layouts with present condition simulation studies from the basic model (scenario one) are taken as the benchmark. A base model is used to calculate the relative percentage variations between each scenario. The findings showed that maximum cooling potential across different urban layouts can be decreased by 2.15 °C degrees by combining high-albedo material with flora; besides layouts with open arrangements(OT1) present a highly remarkable improvement in ambient air temperature and outdoor thermal comfort when mitigation technologies applied compare to compact counterparts. Besides all layouts present a higher intensity on the maximum ambient air temperature reduction rather than the minimum ambient air temperature. On the other hand, Scenarios associated with an increase in greeneries are anticipated to have a slight cooling effect, especially on high-rise layouts.

Keywords : sustainable urban development, urban green infrastructure, high-albedo materials, heat island effect

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