

## 都市住區建築配置型態對熱島效應影響之模擬分析

### 摘要

都市熱島效應持續的發酵，嚴重影響著都市環境舒適生活。都市計畫經常透過一條條平行巷道將地區劃分為各式建築群型式。但對都市熱環境而言，是否造成熱島效應激增之現象？因此，從都市設計之規劃層面改善都市熱島效應是可行的方針，並期望能由住宅區建築物的改善來減緩都市熱環境並降低能源消耗。

本文共二十二例，可分為平行型、圍閉型、不規則型建築配置三類，其均為都市中熱島強度較強之區域，透過紅外線熱像儀的觀測，將其數據轉換為溫度，以 GIS 軟體分析疊圖，並加入現況的風速、風向、溼度、輻射量等因子進行熱環境的解析，發現各種建築物配置熱均會集中於東、西向、屋頂與街角。研究利用台北市的 TMY2 氣象年資料作為研究案例一天與一年之中的微氣候變化依據，以 ECOTECT 軟體進行住宅區建築物熱環境與空調耗能的模擬。

在 ECOTECT 軟體模擬時，將建築物中與耗能有關的因子轉換為各種不同的情境，進行真實案例的耗能模擬，在耗能方面，頂樓建築物的容積佔總容積 26~32% 時，耗電量佔總空調耗能 34~63%。在節能效率上，熱傳透率的調整優於反射率，屋頂綠化再次之，在節能規劃策略上，建議都市設計準則應因地制宜的從都市區域氣候與熱環境的角度切入，進行管制的定訂與畫分，如此才能全面性的營造舒適又節能的都市環境。

**關鍵詞：**熱島效應、住宅節能、建築外殼耗能、都市熱環境、EUI

## **The Impact Simulation Analysis of Urban Residential Building Layout on Heat Island Effect**

### **Abstract**

The ever-accelerating heat island effect has post severe impact on the comfort of urban environment and life. The urban planning usually separates an area into different kinds of building groups with lines of parallel streets and alleys. However, does this model exacerbate the heat island effect at the aspect of urban heat environment? Therefore, it is feasible to reduce the heat island effect through the planning of urban design, and it is expected that the improvement of residential buildings would modify the urban heat environment and reduce energy consumption.

This study provides 22 examples of building layout style-categorized into three types of building layout: parallel, closed, and irregular-which are the areas where urban heat island effect is intense. In the analysis of heat environment, the study uses the temperature data which has been converted from the inspection with infrared thermal imaging system, the GIS-analyzed overlay mapping, plus the current wind velocity, wind direction, humidity, and radiation amount; it can be found that heat concentrates at the east, west, roof, and around street corner of the building layout. Based on the changes in micro-weather in one day and one year which is derived from TMY2 database of Taipei, the study will use ECOTECT to conduct the simulation of heat environment of the buildings in residential areas and the energy consumption of air-condition system.

During the ECOTECT simulation process, the elements in the building that relate to energy consumption are converted into different circumstances to carry out the energy consumption simulation of real case. In terms of the energy consumption, when the capacity of the building's top accounts for 26~32% of overall's capacity, the electricity consumption will account for 34~63% of the overall energy consumption of air-condition system. In energy conservation, the adjustment in thermal conductivity performs better than that in reflectance, then the green roof. In the aspect of energy conservation planning and strategy, the study suggests that the principles of urban design should adapt the local situation, take urban regional weather and heat environment into account, and conduct regulatory demarcation and separation in order to develop a comfortable and energy saving urban environment.

**Keyword:** heat island effect, residential energy conservation, ENVLOAD, urban heat environment, EUI