

## A Simple Approach to Establish Urban Energy Consumption Map Using the Combination of LiDAR and Thermal Image

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**Abstract :** Due to the urban heat island effect caused by highly development of city, the heat stress increased in recent year rapidly. Resulting in a sharp raise of the energy used in urban area. The heat stress during summer time exacerbated the usage of air conditioning and electric equipment, which caused more energy consumption and anthropogenic heat. Therefore, an accurate and simple method to measure energy used in urban area can be helpful for the architectures and urban planners to develop better energy efficiency goals. This research applies the combination of airborne LiDAR data and thermal imager to provide an innovate method to estimate energy consumption. Owing to the high resolution of remote sensing data, the accurate current volume and total floor area and the surface temperature of building derived from LiDAR and thermal imager can be herein obtained to predict energy used. In the estimate process, the LiDAR data will be divided into four type of land cover which including building, road, vegetation, and other obstacles. In this study, the points belong to building were selected to overlay with the land use information; therefore, the energy consumption can be estimated precisely with the real value of total floor area and energy use index for different use of building. After validating with the real energy used data from the government, the result shows the higher building in high development area like commercial district will present in higher energy consumption, caused by the large quantity of total floor area and more anthropogenic heat. Furthermore, because of the surface temperature can be warm up by electric equipment used, this study also applies the thermal image of building to find the hot spots of energy used and make the estimation method more complete.

**Keywords :** urban heat island, urban planning, LiDAR, thermal imager, energy consumption

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