

Pattern of Electricity Consumption in Consecutive Hot Days with respect to Microclimate, a case study of Taipei city

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Electricity consumption (EC) is highly related to the weather variation owing to utilization of air conditioner (AC) and its embedded design logic. As long as the relationship between electricity and microclimate or meteorological information could be examined and verified, the electricity saving potential could be found and responsive policy could be proposed to improve the situation and make contribution for reducing carbon emission. Cities with huge population and EC will become significant role on mitigating climate change. Taipei, a city with frequent commercial activities and basin-subtropical geographical features was set as the researching target because the ACEC here is considerable with its specific background. Weather data from observing station and electricity variation from electric substations were used in the analysis for examining the temporal and spatial pattern relationship. The variation of EC was compared with variation of temperature and apparent temperature (heat index), which integrated with humidity information, through a time series of consecutive hot days while discussed them by diurnal perspective respectively for precluding interference from the difference of human activities. Geographic information system (GIS) was applied for figuring out the spatial pattern and multilinear regression and geographically weighted regression (GWR) was conducted to quantify the result. Relationship was established through different location within the city area. It was found that both temperature and electricity varied significantly in the daytime and the influence from temperature dominant even though humidity influence apparent temperature which showed different spatial pattern from that of temperature. Outcome could be presented on Web-GIS for the access to the public for reference on the energy saving issue and the (apparent) temperature sensitive area could be improved by better heat insulation refurbishment or other electricity saving application.

Keywords: urban heat island, electricity consumption, microclimate, subtropical climate, air condition
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