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The Effectiveness of Taiwan Building Energy Regulation under the influence of Future Climate

Yu-Teng Weng (1) and Kuo-Tsang Huang (2)

(1) Dept. of Bioenvironmental Systems Engineering, National Taiwan University, Taipei, Taiwan (r04622034@ntu.edu.tw),
(2) Dept. of Bioenvironmental Systems Engineering, National Taiwan University, Taipei, Taiwan (huangkt@ntu.edu.tw)

Building energy consumption comprises circa 40% of the national annual energy usage in Taiwan, and the majority proportion is attributed to the cooling apparatus usage. As cooling energy is closely related to the outdoor climate, it is expected that the future global climate change would amplify its demand. Considering the building energy regulation criteria are the minimum requirements that the building has to be complied with, this study tried to investigate whether the current building energy regulation in Taiwan, initiated in 2013, would still be capable of maintaining the energy use in the future as today's level. The research adopted EnergyPlus to simulate the annual cooling energy use of several virtual office building cases with the constructed hourly future weather data under future climate change scenarios of RCP45 and RCP85 defined by IPCC. The virtual building cases are generated by a structured orthogonal array with each case is constituted by 10 building design parameters. The results revealed that the building energy consumption based on the current regulation criteria failed to maintain at the same level in the future as oppose to nowadays. By comparing to the current cooling energy usage, it would rise by 13% and 22% in RCP45 and RCP85, respectively, at the end of this century. This research further parametrically studied the potential cooling energy mitigation strategies and proposed effective building envelope design schemes in order to neutralize the future building energy increase.