

Estimating heating energy consumption and CO₂ production – A novel modeling approach

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Abstract

This research focuses on the integration, identification and classification of energy related key indicators of buildings to gain greater insight into the effect of occupants' socioeconomic status, building morphological and typological characteristics and resulting carbon dioxide emissions. The city of Karlsruhe, Germany is used as a study area. To identify regions of common characteristics, a two-step clustering approach using Self-Organizing Maps (SOM) and k-Means clustering has been applied. For spatial cluster contiguity the geographic location of each building was included and weighted in the SOM clustering process. The generated clusters show areas of common socio-demographic, energy usage and emission profiles. Results from this research will be directly used for targeted local renovation initiatives which aim only at users identified by the generated clusters. Instead of using administrative units the generated clusters of user behavior and building characteristics will be beneficial for stakeholders and decision makers.

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