Urban Data and Building Energy Modeling: A GIS-based Urban Building Energy Modeling System Using the Urban-EPC Engine

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Abstract

There is a lack of building energy modeling in current planning support systems (PSS) while building energy efficiency is getting greater attention. This is due to the current limitations of energy modeling at the urban scale and the inconsistency between the available urban data and that required for modeling. The chapter seeks to fill this gap by developing a GIS-based urban building energy modeling system, using the Urban-EPC simulation engine, a modified Energy Performance Calculator engine. This modeling system is compatible with other planning tools, enhanced by the combination of physical and statistical modeling, and adjustable in its resolution, speed and accuracy. Through processing the Data Preparation, Pre-Simulation, Main Simulation and Visualization & Analysis models in this energy modeling system, the urban data related to the basic building information, mutual shading, microclimate and occupant behavior are collected, modified, and synthesized in the GIS platform and then used as the input of the Urban-EPC engine to get energy use of every building in a city, which could be further visualized and analyzed. The method is applied in Manhattan to show its potential as an important component in PSS to inform urban energy policy making.

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