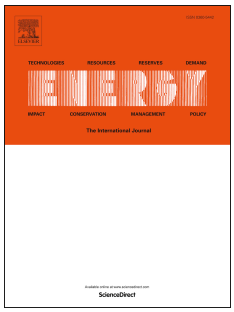
Accepted Manuscript



Urban infrastructure-mobility energy flux

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PII: S0360-5442(17)30985-4

DOI: 10.1016/j.energy.2017.05.189

Reference: EGY 10997

To appear in: *Energy*

Received Date: 16 March 2017

Revised Date: 26 May 2017

Accepted Date: 30 May 2017

Please cite this article as: Mohammadi N, Taylor JE, Urban infrastructure-mobility energy flux, *Energy* (2017), doi: 10.1016/j.energy.2017.05.189.

Urban Infrastructure-Mobility Energy Flux

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Abstract

Intra-city trips are undertaken by urban populations as individuals engage in activities across various locations, thus driving energy consumption. Spatial fluctuations in this energy use are, thus, often associated with the locational distribution of urban building types (i.e., residential and commercial). However, people exhibit heterogeneous patterns in their daily activities and the number of locations they visit, which may directly or indirectly influence the energy use patterns in buildings. Here we investigate the interplay between population mobility networks and building types by comparing a total of 27,764,197 positional records from an online social networking platform with energy consumption (i.e., electricity and gas) in Greater London and the City of Chicago over the course of twelve (12) months. The statistically significant spatial dependency between energy use and *returners'* human mobility networks indicate the dominant role of this population in relation to residential and commercial building energy consumption. This suggests that spatial fluctuations in urban energy consumption are governed by the structure of human mobility networks coupled with building types. Future strategies to improve energy efficiency should thus reflect these spatial dependencies, creating new opportunities for developing more effective energy related practices.

Keywords: Hotspot Analysis, Human Mobility Networks, Spatiotemporal Energy Demand, Urban Energy Flux.

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