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Xian-Xiang Li

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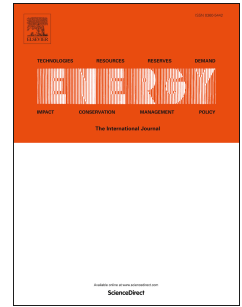
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Linking residential electricity consumption and outdoor climate in a tropical city

Xian-Xiang Li*

Center for Environmental Sensing and Modeling, Singapore-MIT Alliance for Research and Technology, Singapore

Abstract

The link between climate and energy consumption has been widely established in many cities. The residential electricity consumption majorly for space conditioning is especially responsive to the outdoor climate. As a hot and humid tropical city, Singapore is expected to see increasing residential electricity consumption with global climate change. In this study, a multiple regression analysis is performed to relate the residential electricity consumption per capita and per household with outdoor climate during a 12-year period (2005-2016). The per-capita electricity consumption during 2008-2016 sees substantial decrease from that during 2005-2007, possibly due to the various energy saving measures taken by Singapore government. The different responses to outdoor climate variation in different household types are examined. It is found that generally dwellers in public households are more sensitive to outdoor climate variations, while private household occupants are not much affected by climate. Due to increasing ownership of electricity-consuming appliances in 1-2 Room and 3 Room public households, their electricity consumptions show a consistent increasing trend during the period studied. Under the worst scenario of projected future temperature increase, the per-capita and per-household electricity consumptions are projected to increase by 47% and 41%, respectively.

Keywords: Building energy consumption, Climate change, Electricity energy, Regression analysis

1. Introduction

Energy consumed in the building sector consists of residential and commercial end users and accounts for 20.1% of the total delivered energy consumed worldwide [1]. In 2010, 17.84 EJ (1 EJ = 10^{18} Joule) of electricity was spent in the residential sector, which has experi-

*Corresponding author: Dr. Xian-Xiang Li; Singapore-MIT Alliance for Research and Technology (SMART) Centre, 1 CREATE Way, #09-03, Singapore 138602, Singapore; Tel: (65) 6516-2048; Fax: (65) 6684-2118.

Email address: lix@smart.mit.edu (Xian-Xiang Li)

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