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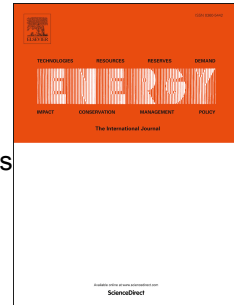
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Modeling hourly consumption of electricity and district heat in non-residential buildings

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Abstract

Models for hourly consumption of heat and electricity in different consumer groups on a regional level can yield important data for energy system planning and management. In this study hourly meter data, combined with cross-sectional data derived from the Norwegian energy label database, is used to model hourly consumption of both district heat and electrical energy in office buildings and schools which either use direct electric heating (DEH) or non-electric hydronic heating (OHH). The results of the study show that modeled hourly total energy consumption in buildings with DEH and OHH (supplied by district heat) exhibits differences, e.g. regarding the operating hours of the heating system. In a normal year, in office buildings with OHH the main part of total modeled energy consumption is used for electric appliances, while in schools with OHH the main part is used for heating. In buildings with OHH the share of modeled annual heating energy is higher than in buildings with DEH. Although based on small samples our regression results indicate that the presented method can be used for modeling hourly energy consumption in non-residential buildings, but also that larger samples and additional cross-sectional information could yield improved models and more reliable results.

Keywords: energy systems, smart meter data, hourly electricity consumption, district heat, panel data

1. Introduction

1.1. Background

In the light of ambitious goals for reducing climate gas emissions, energy consumption and the integration of variable renewable energy carriers (VRE) into the energy system have become a major focus in energy research. Norway is not a member of the European Union (EU), but plays an important role in the European energy system and joins the EU-goals regarding greenhouse gas emissions [1]. While the EU wants to cover 20 % of total energy consumption by renewable energy sources in 2020 [2], Norway aims at a share of 67.5 % [3], which was met for the first time in 2014 [4]. The use of heating oil and paraffin for heating purposes in Norway is planned to be phased out by 2020 [5].

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