Understanding energy consumption in high-performance social housing buildings: A case study from Canada

Jean Rouleau, Louis Gosselin, Pierre Blanchet

PII: S0360-5442(17)32150-3
DOI: 10.1016/j.energy.2017.12.107
Reference: EGY 12056

To appear in: Energy

Received Date: 30 September 2017
Revised Date: 14 December 2017
Accepted Date: 20 December 2017


This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.
UNDERSTANDING ENERGY CONSUMPTION IN HIGH-PERFORMANCE SOCIAL HOUSING BUILDINGS: A CASE STUDY FROM CANADA

Jean Rouleau\textsuperscript{a}, Louis Gosselin\textsuperscript{a,}\textsuperscript{*}, Pierre Blanchet\textsuperscript{b}

\textsuperscript{a}Department of Mechanical Engineering, Université Laval, Quebec City, QC, Canada
\textsuperscript{b}Department of Wood and Forestry Sciences, Université Laval, Quebec City, QC, Canada

Abstract

This paper presents a case study of a recently built high-performance Canadian social housing building with the aim of comparing the expected and measured energy consumptions and to identify the parameters affecting the most the energy need. A monitoring system compiles at a 10-minute frequency information related to the energy use and the thermal conditions observed in the building and its HVAC system. The building has the particularity of comprising two symmetric sections made of different timber structure systems. No significant differences of energy consumption were detected between the two parts of the buildings. However, a large variance was observed when comparing each dwelling individually regardless of their structures. The orientation of the dwelling also exhibited a minimal influence compared to these variations, suggesting that occupant behavior is the dominant factor explaining dwelling-to-dwelling variability and is thus critical for understanding energy use in residential buildings. Regression analysis showed that specific occupant actions, such as opening windows in winter or using electrical appliances, have a great impact on the energy balance of the apartments. In 2016, the performance gap between measured and expected total energy demand of the building was 74\%. With the use of the large dataset coming from the building, it was possible to determine the causes behind this large gap for the reference building.

Keywords: Building energy consumption; Energy performance gap; Monitoring measurements; Regression analysis; Occupant behavior; Cold Climate

Nomenclature

\textsuperscript{*} Corresponding author: Louis.Gosselin@gmc.ulaval.ca; Tel.:+1-418-656-7829; Fax: +1-418-656-5343.
دریافت فوری
متن کامل مقاله
امکان دانلود نسخه تمام متن مقالات انگلیسی
امکان دانلود نسخه ترجمه شده مقالات
پذیرش سفارش ترجمه تخصصی
امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
امکان دانلود رایگان ۲ صفحه اول هر مقاله
امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
دانلود فوری مقاله پس از پرداخت آنلاین
پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات