IER Instituto de Energías Renovables

Guillermo Barrios del Valle <gbv@ier.unam.mx>

Invitation to review for Energy & Buildings

1 message

Energy & Buildings <em@editorialmanager.com> Sat, Oct 22, 2022 at 4:04 PM
Reply-To: Energy & Buildings <support@elsevier.com>
To: Guillermo Barrios del Valle <gbv@ier.unam.mx>

Manuscript Number: ENB-D-22-02830

In quantifying the thermal resilience of office buildings: energy simulations, linear regression model, and experimental validation

Nagham Bilal Ismail; Djamel Ouahrani; Albert Touma

Dear Dr Barrios del Valle,

I would like to invite you to review the above referenced manuscript submitted by Dr Djamel Ouahrani , as I believe it falls within your expertise and interest. The abstract for this manuscript is included below.

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Kind regards,

John Zhai

Associate Editor

Energy & Buildings

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Abstract:

A growing interest has been recently demonstrated in studying the thermal resilience of buildings that goes beyond minimum standard requirements to meet performance targets under extreme climate changes. However, until now, there has not been a universally agreed-upon method or metric for measuring thermal resilience. Therefore, this study focuses on quantifying the thermal resilience of office buildings during a disruption due to power outage. This is achieved by developing a simplified model that is (i) based on an effective and rational definition (ii) straightforward to understand (iii) effortless to compute. The metric is evaluated based on the number of safe and comfortable hours before the loss of productivity for a typical hot office day, as defined by two criteria: thermal habitability and passive survivability. When one of these conditions is jeopardized, the number of hours is recorded by performing energy simulations that account for different ranges of office
building parameters. Afterwards, the simulation results are expressed in the form of a multi-variate linear regression equation.
The results show that the minimum office thermal resilience (OTR) occurs at relatively large window to wall ratio (WWR), large solar heat gain coefficient (SHGC), low external wall thermal (kappaw). To ensure the validity of the developed simplified model, actual experiment is conducted in the Energy Efficiency and Building Design Laboratory located at Qatar University. Fair agreement is revealed between the energy simulations and the experiment, with a maximum relative error of 12%. On the other hand, the linear regression model developed for the purpose of this study is found to be accurate in predicting the thermal resilience metric (OTR), with a mean relative error of 10% when compared to both the simulations and the experiments.