IER Instituto de Energías Renovables

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Invitation to review for Energy & Buildings

1 message

Energy & Buildings <em@editorialmanager.com> Wed, Feb 2, 2022 at 1:17 PM
Reply-To: Energy & Buildings <support@elsevier.com>
To: Guillermo Barrios del Valle <gbv@ier.unam.mx>

Manuscript Number: ENB-D-21-02772

Developing Analytical Model for Nighttime Cooling of Internal Thermal Mass

Wentao Wu; Jingru Benner; Qingwen Xue; Zhiwen Luo; Nari Yoon

Dear Dr Barrios del Valle,

I would like to invite you to review the above referenced manuscript submitted by Dr Wentao Wu , 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:

Nighttime mechanical ventilation of internal building thermal mass has the potential to save energy and create energy flexibility by shifting peak cooling demand. The free cooling potential needs to be further quantified for different climate zones. This study develops an analytical model for nighttime cooling of internal thermal mass with a constant air change rate and hourly varied air temperatures. Results show that a low (1.5 h -1) and high (8 h -1) ventilation rate can decrease the surface temperature of the thermal mass by 0.9°C and 3°C, respectively. The analytical model is applied to quantify the free cooling energy storage in 48 selected U.S. cities in different climate zones and in the 16 climate zones of California. Among the 48 cities, the maximum free cooling energy storage is reported in Santa Fe, NM with a total free cooling energy storage of 19.1 kWh m -2 a -1 and a net free cooling energy storage of 3.88 kWh m -2 a -1 . Coastal regions in
California are not suitable for nighttime ventilation of internal thermal mass. The maximum total free cooling energy storage in California achieves 27.5 kWh m -2 a -1 , while the maximum net free cooling energy storage is 6.11 kWh m -2 a -1 . The analytical model has a potential to be integrated into whole building energy simulation software to improve the calculation of the effect of internal thermal mass.

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