frontiers | Frontiers in Energy Research

TYPE Editorial
PUBLISHED 26 October 2023
DOI 10.3389/fenrg.2023.1322805

OPEN ACCESS

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RECEIVED 16 October 2023
ACCEPTED 19 October 2023
PUBLISHED 26 October 2023

CITATION
Perea-Moreno A-J, Nadaleti WC and Manzano-Agugliaro F (2023), Editorial: Energy saving for sustainable cities. *Front. Energy Res.* 11:1322805. doi: 10.3389/fenrg.2023.1322805

Editorial: Energy saving for sustainable cities

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KEYWORDS

energy saving, renewable energy, Zero-energy buildings, energy efficiency, energy policy, energy tariff, sustainability, bioclimatic architecture

Editorial on the Research Topic
Energy saving for sustainable cities

Sustainable cities refer to urban areas that are designed, developed, and managed in ways that prioritize environmental, social, and energy sustainability (Perea-Moreno and Hernandez-Escobedo, 2021). These cities aim to balance the needs of their current residents with those of future generations, striving to create a high quality of life while minimizing negative impacts on the environment and conserving resources. These cities incorporate thoughtful urban planning and design principles that encourage compact, mixed-use developments, green spaces, and pedestrian-friendly neighbourhoods (Juaidi et al., 2019).

Sustainable cities typically promote the use of renewable energy resources like solar, wind, and hydropower to reduce reliance on fossil fuels and lower greenhouse gas emissions among other characteristics. Energy conservation and efficiency play pivotal roles in the pursuit of sustainable urban development (Viciana et al., 2018). As cities continue to grow and expand, the demand for energy escalates, leading to increased greenhouse gas emissions and environmental degradation (Manzano-Agugliaro et al., 2023). Addressing the challenges of energy demand in urban areas is paramount to achieving sustainable cities that are both environmentally responsible and economically viable (Manzano-Agugliaro et al., 2015). This Research Topic, "*Energy Saving for Sustainable Cities*", delves into various strategies and technologies aimed at reducing energy consumption, optimizing resource utilization, and promoting a more resilient and sustainable urban environment.

In their study of Shuyi et al. seeks to understand how various factors influence the active participation of residents in the value co-creation of smart electricity consumption, emphasizing the importance of social networks, individual roles, and interrelationships among stakeholders in achieving sustainable energy-saving goals for cities. In the same trend of research, Muqeet et al. discuss the critical importance of electrical energy in the modern era and highlight the challenges posed by rising energy prices, fossil fuel depletion, grid instability, environmental concerns, and limitations on new transmission lines. The research focuses on distributed generation technologies in the context of a university campus to promote sustainable energy saving practices.

In the context of the "dual carbon" framework, carbon emission trading policies are vital tools for environmental regulation, energy conservation, emission reduction, and green development, the study of Li and Huang focuses on China's pilot carbon trading policy initiated in 2013 and its impact on industrial energy efficiency from 2008 to 2019.

Specifically, it examines both single-factor industrial energy efficiency (ISE) and green total factor industrial energy efficiency (IGTE) in China within the framework of carbon emission trading. Heterogeneity analysis demonstrates that the impact of carbon trading policies is more pronounced in the eastern region of China but less so in the central and western regions. In conclusion, this study offers differentiated policy insights for the future development of China's national carbon market, providing valuable guidance for advancing energy-saving initiatives in sustainable cities. Furthermore, the study of Zhou et al. highlights the intertwined relationship between the digital economy and rural revitalization in China and underscores the significance of tailored development strategies for reducing regional disparities and promoting sustainable energy-saving practices in rural areas.

In a different geographical context, i.e., in Greece, Poland, Portugal, Sweden and the United Kingdom, Baran et al. explore the concept of pro-environmental innovative behaviour (PEIB) as a crucial factor in the development of sustainable cities, particularly with regard to energy efficiency. The premise is that truly sustainable cities are those in which individuals exhibit sustainable behaviours. Therefore, understanding the determinants of human behaviour is vital for comprehending the evolution of cities towards sustainability.

On a more global scale, Li et al. assess the green energy efficiency of 58 countries situated along the "Belt and Road" Initiative zone from 2012 to 2021 using the super-efficiency DEA model and Malmquist index analysis. It also examines the external factors influencing their green energy efficiency through Tobit regression analysis. The study recommends that countries should leverage their unique resource advantages to enhance overall green energy efficiency within the "Belt and Road" Initiative zone, tailoring strategies to local characteristics. It also suggests strengthening cooperation and exchange among countries in the region and implementing outbound strategies to create a conducive environment for advancing green energy efficiency within the "Belt and Road" Initiative region. Also in a broad geographical research framework, Cheng et al. focus on assessing the efficiency of sustainable development and identifying its influencing factors in both BRICS (Brazil, Russia, India, China, and South Africa) and G7 (Canada, France, Germany, Italy, Japan, the United Kingdom, and United States) countries. They aim to compare these countries in terms of total factor productivity, efficiency change, and technological change while addressing environmental concerns. The study provides practical recommendations for enhancing sustainable productivity and environmental efficiency. Additionally, it suggests an inverse relationship between GDP and CO_2 emissions in G7 countries, possibly indicating that they have passed the turning point on an environmental Kuznets curve (EKC). However, this pattern does not align with the EKC hypothesis in BRICS nations.

The latest study focuses on developing countries. Belachew and Melka investigate the adoption and preferences of improved Tikikil stoves in areas where results-based financing (RBF) was used for their distribution. The context is in Ethiopia, where eco-friendly energy practices are crucial for sustainable development. While RBF was implemented to promote these stoves, the study aimed to evaluate its effectiveness, considering households' preferences. The study suggests that households require Tikikil stove options that better align with their preferences. Additionally, socio-economic characteristics and stove attributes play significant roles in promoting the adoption of improved cookstoves to reduce emissions from traditional stoves and meet the growing demand for carbon credits.

In short, the collective body of research presented here underscores the multifaceted and interconnected nature of sustainable cities and energy-saving initiatives. From the meticulous urban planning of compact, green, and pedestrian-friendly environments to the transformative power of renewable energy sources and carbon trading policies, each study offers valuable insights into the quest for a more environmentally responsible and economically viable urban future. The importance of understanding and influencing human behaviour, as highlighted by studies in various geographical contexts, serves as a reminder that true sustainability requires the active participation of individuals in pro-environmental behaviours. Whether in the bustling metropolises of China or the rural landscapes of Europe, the pursuit of sustainable energy-saving practices remains a global imperative. By addressing the diverse challenges and opportunities within their unique contexts, these studies contribute to the collective endeavour of creating cities and societies that prioritize both human wellbeing and the health of our planet. In the face of increasing energy demand and environmental concerns, these research efforts offer guidance and hope for a more sustainable, energy-efficient future.

Author contributions

A-JP-M: Conceptualization, Methodology, Validation, Writing–original draft. WN: Conceptualization, Methodology, Validation, Writing–original draft. FM-A: Conceptualization, Methodology, Validation, Writing–original draft.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

References

Juaidi, A., AlFaris, F., Saeed, F., Salmeron-Manzano, E., and Manzano-Agugliaro, F. (2019). Urban design to achieving the sustainable energy of residential neighbourhoods in arid climate. *J. Clean. Prod.*, 228, 135–152. doi:10.1016/j.jclepro.2019.04.269

Manzano-Agugliaro, F., Chihib, M., Chourak, M., Martínez, J. A., Zapata-Sierra, A. J., and Alcayde, A. (2023). Monitoring energy consumption of vending machines in university buildings. *Energy Rep.*, 10, 3252–3262. doi:10.1016/j.egyr.2023.09.177

Manzano-Agugliaro, F., Montoya, F. G., Sabio-Ortega, A., and García-Cruz, A. (2015). Review of bioclimatic architecture strategies for achieving thermal comfort. *Renew. Sustain. Energy Rev.*, 49, 736–755. doi:10.1016/j.rser.2015.04.095

Perea-Moreno, A. J., and Hernandez-Escobedo, Q. (2021). The sustainable city: advances in renewable energy and energy saving Systems. *Energies*, 14(24), 8382, doi:10.3390/en14248382

Viciana, E., Alcayde, A., Montoya, F. G., Baños, R., Arrabal-Campos, F. M., Zapata-Sierra, A., et al. (2018). OpenZmeter: an efficient low-cost energy smart meter and power quality analyzer. *Sustainability*, 10(11), 4038, doi:10.3390/su10114038