International Research Journal of Engineering Science, Technology and Innovation (ISSN: 2315-5663) Vol.11 (1) pp. 01-2, Mar, 2025
DOI: http:/dx.doi.org/10.14303/2315-5663.2025.62
Available online @ https://www.interesjournals.org/biotechnology.html

Perspective Article

Green Building Technologies: Engineering Sustainable Architecture for the Future

Meera Iyer*

Department of Environmental and Architectural Engineering, Zenith School of Engineering, Pune, India

***Corresponding author E-mail: bhatt.soundrya@gmail.com**

Received: 01-Mar-2025, Manuscript No. irjesti-25-169527; **Editor assigned:** 03-Mar-2025, PreQC No. irjesti-25-169526 (PQ); **Reviewed:** 17-Mar-2025, QC No. irjesti-25-169527; **Revised:** 21-Mar-2025, Manuscript No. irjesti-25-169527 (R); **Published:** 28-Mar-2025, DOI: 10.14303/2141-5153.2025.62

INTRODUCTION

Green building technologies focus on minimizing environmental impact while enhancing occupant health, comfort, and energy efficiency **(BeLue R et al., 2016)**. As urbanization accelerates, buildings account for a significant portion of global energy consumption and carbon emissions. Engineers and architects are adopting innovative materials, design strategies, and renewable energy systems to create sustainable built environments **(Salama MS et al., 2021)**. From passive solar design to advanced energy management systems, green building practices address both construction and operational phases. This article explores key technologies, their engineering principles, applications, and the challenges in scaling green building adoption globally **(Li J et al., 2018)**.

DESCRIPTION

Green buildings incorporate features such as high-performance insulation, low-emissivity windows, and energy-efficient HVAC systems **(Cannata F et al., 2020)**. Renewable energy sources, like Photovoltaic (PV) panels and solar water heaters, reduce dependence on fossil fuels. Rainwater harvesting systems and greywater recycling minimize freshwater use **(Al-Rasheedi AAS 2014)**. Smart Building Management Systems (BMS) monitor and optimize lighting, temperature, and energy consumption in real time. Materials such as Cross-Laminated Timber (CLT) and recycled steel lower embodied carbon **(Dong Q et al., 2019)**. Certifications like LEED (Leadership in Energy and Environmental Design) and BREEAM (Building Research Establishment Environmental Assessment Method) set standards and benchmarks for sustainable construction.

DISCUSSION

Engineering green buildings requires integrating sustainability principles from the design stage through construction and operation **(American Diabetes A 2019)**. Passive design strategies—such as building orientation, shading devices, and natural ventilation—reduce reliance on mechanical systems. Renewable energy integration can achieve net-zero energy performance, but high upfront costs remain a barrier **(Saeedi P et al., 2019)**. Life Cycle Assessment (LCA) tools help evaluates the environmental impact of materials and systems. Advances in IoT and AI allow predictive maintenance and energy optimization, further improving building performance **(Barkai L et al., 2019)**. However, challenges include limited awareness among stakeholders, lack of skilled professionals, and regional variations in building codes. Retrofitting existing buildings poses additional engineering challenges, often requiring creative solutions to integrate sustainable systems without major structural modifications **(Omar SM et al., 2018)**. Governments can accelerate adoption through incentives, subsidies, and stricter environmental regulations. As climate change impacts intensify, green building technologies will become essential rather than optional.

CONCLUSION

Green building technologies represent a critical pathway toward reducing environmental impact and promoting sustainable urban development. Through innovative engineering, these systems enhance efficiency, comfort, and resilience. While cost and regulatory challenges exist, growing environmental awareness and technological advancements are driving adoption. The continued evolution of materials, renewable integration, and smart management systems will define the next generation of sustainable architecture.**REFERENCES**

1. BeLue R, Ndiaye K, NDao F, Ba FNN, Diaw M (2016). Glycemic control in a clinic-based sample of diabetics in M'Bour Senegal. Health Educ Behav. 43(1_suppl): 112S-116S.
2. Salama MS, Isunju JB, David SK, Muneza F, Ssemanda S, et al. (2021). Prevalence and factors associated with alcohol consumption among persons with diabetes in Kampala, Uganda: a cross sectional study. BMC Public Health. 21: 719.
3. Li J, Chattopadhyay K, Xu M, Chen Y, Hu F, et al. (2018). Glycaemic control in type 2 diabetes patients and its predictors: a retrospective database study at a tertiary care diabetes centre in Ningbo, China. BMJ Open. 8: e019697.
4. Cannata F, Vadalà G, Russo F, Papalia R, Napoli N, et al. (2020). Beneficial effects of physical activity in diabetic patients. J Funct Morphol Kinesiol. 5: 70.
5. Omar SM, Musa IR, Osman OE, Adam I (2018). Assessment of glycemic control in type 2 diabetes in the Eastern Sudan. BMC Res Notes. 11: 373.
6. Al-Rasheedi AAS (2014). The role of educational level in glycemic control among patients with type II diabetes mellitus. Int J Health Sci (Qassim). 8: 177.
7. Dong Q, Huang J, Liu S, Yang L, Li J, et al. (2019). A survey on glycemic control rate of type 2 diabetes mellitus with different therapies and patients' satisfaction in China. Patient Prefer Adherence. 13: 1303.
8. American Diabetes A (2019). 2. Classification and Diagnosis of Diabetes: Standards of Medical Care in Diabetes-2019. Diabetes care. 42(Suppl 1): S13-S28.
9. Saeedi P, Petersohn I, Salpea P, Malanda B, Karuranga S, et al. (2019). Global and regional diabetes prevalence estimates for 2019 and projections for 2030 and 2045: Results from the International Diabetes Federation Diabetes Atlas, 9(th) edition. Diabetes research and clinical practice. 157: 107843.
10. Barkai L, Kiss Z, Rokszin G, Abonyi-Tóth Z, Jermendy G, Wittmann I, et al. (2020). Changes in the incidence and prevalence of type 1 and type 2 diabetes among 2 million children and adolescents in Hungary between 2001 and 2016–a nationwide population-based study. Arch Med Sci. 16: 34.