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Special Issue Reprint

Advanced Studies in Nearly Zero-Energy Buildings and Optimal Design

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This Special Issue, "Advanced Studies in Nearly Zero-Energy Buildings and Optimal Design," presents a comprehensive collection of research focused on accelerating the global transition toward a decarbonized and highly efficient built environment. The primary motivation is addressing the complex challenge of achieving Near-Zero-Energy Buildings (nZEBs) and Net-Zero-Energy Buildings (NZEBS) at a large scale. The collected articles provide state-of-the-art studies exploring novel pathways for design optimization and concrete implementation. The research utilizes advanced methodologies, including experimental validation, numerical simulation, and predictive modeling, covering diverse climates and building types. Core contributions center on optimal design strategies:

- Cost-optimal analysis and uncertainty assessment.
- Effective integration of passive systems and renewable energy sources within the building envelope.

Crucially, the Special Issue moves beyond initial energy metrics to analyze the long-term operational performance. It includes essential research on indoor air quality, occupant well-being, and critical challenges such as the risk of fungal growth in highly insulated and airtight buildings. Additionally, it explores the complexities of renovation toward NZEBs and the necessary policy frameworks for widespread diffusion. This valuable Special Issue serves as an indispensable reference for researchers, engineers, architects, policy-makers, and industry professionals seeking the latest evidence and essential roadmaps for sustainable construction.

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