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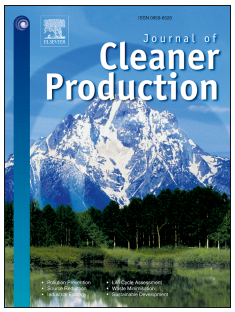

The potential of energy savings and the prospects of cleaner energy production by solar energy integration in the residential buildings of Saudi Arabia

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The Potential of Energy Savings and the Prospects of Cleaner Energy production by Solar Energy Integration in the Residential Buildings of Saudi Arabia

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Abstract: - In this study, various energy conservation techniques and clean energy utilization prospects are investigated for the residential buildings of Saudi Arabia. A base case study of a distinctive residential building in Saudi Arabia is performed using simulation packages and its energy performance is optimized by incorporating the design standards of International Energy Conservation Code (IECC). The optimized results show that the energy consumed by the IECC standardized building is less by 56% for space cooling, 37% for space heating, 46% for lighting, and 27% for appliances. The IECC standardized building is integrated with a passive solar water heating system and a grid-connected solar PV system to meet the water heating load and lighting load, respectively. The use of solar water heating system shows 76% reduction in energy consumption as compared to the electric water heater. The feasibility of integrating a grid-connected solar PV system in the residential buildings is justified in terms of subsidy provided by the government and eco-environmental benefits. Finally, the prospects of utilizing solar energy in buildings are discussed with their economic and environmental benefits.

Keywords: - Energy conservation; Residential buildings; Solar energy utilization; GHG emissions reduction