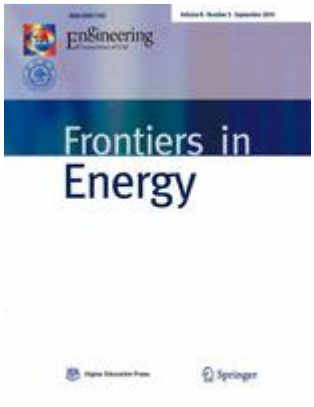

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End-use energy utilization efficiency of Nigerian residential sector

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Abstract

In this paper, the end-use efficiencies of the different energy carriers and the overall energy efficiency in the Nigerian residential sector (NRS) were estimated using energy and exergy analysis. The energy and exergy flows were considered from 2006 to 2011. The overall energy efficiency ranges from 19.15% in 2006 to 20.19% in 2011 with a mean of (19.96±0.23)% while the overall exergy efficiency ranges from 4.34% in 2006 to 4.40% in 2011 with a mean of (4.31±0.059)%. The energy and exergy efficiency margin was 15.58% with a marginal improvement of 0.07% and 0.02%, respectively when compared with previous results. The contribution of the energy carriers to the total energy and exergy inputs were 1.45% and 1.43% for electricity, 1.95% and 3% for fossil fuel and 96.6% and 95.57% for bio-fuel. The result shows that approximately 65% of the residence use wood and biomass for domestic cooking and heating, and only a fraction of the residence have access to electricity. LPG was found to be the most efficient while kerosene, charcoal, wood and other biomass the least in this order. Electricity utilization exergy efficiency is affected by vapor-compression air conditioning application apart from low potential energy applications. In addition, this paper has suggested alternatives in the end-use application and has demonstrated the relevance of exergy analysis in enhancing sustainable energy policies and management and improved integration techniques.

Keywords

end-useenergyexergy efficiencyresidential sectorNigeria

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