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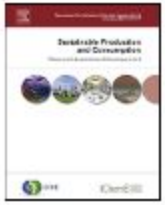

Energy transition pathways for the Nigerian Road Transport: Implication for energy carrier, Powertrain technology, and CO_2 emission

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ABSTRACT

Climate change necessitates an energy transition; however, this transition is not a rapid process and may differ in pace and pathway for different countries, especially petroleum-dependent developing countries like Nigeria. Hence, this study aims to analyse the energy, economic and environmental implications of adopting alternative transition fuels and powertrains for transport in the Nigerian context in a subsidy and subsidy-exempt regime. The fuel options include compressed natural gas and electricity from renewable sources, natural gas, and coal, while the powertrains include internal combustion engines, hybrid electric, and battery electric vehicles. The results indicate that switching to natural gas resulted in resource conservation (33 %) and emission reduction (52 %), and the proposed dedicated CNG and CNG hybrid electric Powertrain options offered the lowest levelised costs of driving (US$0.27/km & US$0.25/km, respectively). Electrified transport presented the most significant emissions savings (up to 98 %) except for using coal. However, the unit-levelised costs were higher than using CNG; hence, they are proposed as long-term solutions. The study also suggested subsidy removal and other initiatives to promote the adoption of low-carbon fuels and Powertrain alternatives in Nigeria.