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An Integrated Entropy-TOPSIS Methodology for Evaluating Green Energy Sources

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ABSTRACT

This research aims to select the optimum green energy sources for sustainable planning from a given set of alternatives. The study presents an integrated multi-criteria decision-making analysis—the entropy-technique for order of preference by similarity to ideal solution (TOPSIS)—to evaluate the energy sources: coal, oil, gas, carbon capture; and storage: nuclear fission/power, large hydro, small hydro, wind, solar photovoltaic, concentrating solar, geothermal, and biomass. Information related to energy parameters are always imprecise; thus, to address the impreciseness of eliciting judgments in the preferences of criteria, the entropy method is used. TOPSIS method is then utilized to select the optimum sources. Results show that solar-photovoltaic is the optimum green energy source having the highest score value, and annual generation is the most prioritized criterion. Sensitivity analysis also demonstrates the robustness of the selection methodology.

KEYWORDS

Decision Making, Energy Management, Entropy Method, Green Energy Sources, TOPSIS Method

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