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A Multi-Criteria Optimization Analysis for Jordan's Energy Mix

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Abstract

In this study Jordan's energy options were evaluated and ranked with respect to several criteria clusters including financial, technical, environmental, ecological, social, and risk assessment. The Analytical Hierarchy Process; a multi-criteria decision-making analysis, was selected to evaluate the electricity generation options for Jordan. Energy options covered in the analysis include both conventional and renewable sources. Conventional sources evaluated include Oil and Natural Gas. Renewable sources covered wind, biomass, Photovoltaic and concentrated solar systems. The study also investigated generation from nuclear energy and direct combustion of oil shale as well as demand side savings from energy efficiency measures as a resource. Results indicate that to date; conventional fuels remain Jordan's most feasible options from a technical and financial perspective. Nonetheless diversification is essential to promoting energy security as well as environmental welfare. Results indicate that Jordan's best diversification options are nuclear, oil shale, biomass, and wind energy.

Highlights:

- The Multi-Criteria Optimization Analysis techniques were used to compare nine electricity generation options, including energy efficiency.
- Thirteen evaluation criteria were selected that cover financial, technical, environmental, ecological, social, and risk assessment aspects.
- Results outline potential policy implications for diversifying Jordan's energy mix.
- Conventional fuels remain integral and Oil shale, Nuclear, Biomass and Wind energy offer the best diversification potential.

Key words:

Multi-criteria Decision Analysis; Energy Planning; Renewable Energy; Nuclear Energy, Oil Shale; Conventional resources.

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