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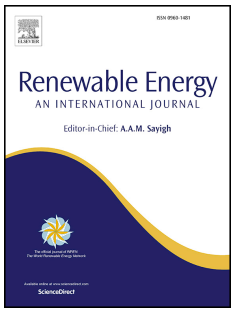

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DECISION MAKING MODEL DEVELOPMENT in INCREASING WIND FARM ENERGY EFFICIENCY

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Abstract

Renewable energy is a significant input for environmental, economic and social development. The wind energy has become the quickest thriving renewable energy resource. It is worth noting that wind power has the least emissions and lowest water consumption, but it has comparatively high costs. Thus, making wind energy station planning decision requires an operation of balancing various technical, economic, ecological, and environmental aspects over time and space. This paper is constructed to choose a convenient turbine from various perspectives for developing a wind energy station. For 2 MW, the best wind turbine brands are listed based on expert interviews and literature review and they are used to establish a decision-making model with four main criteria consisting technical, economic, environmental, and customer attributes with various sub-criteria. Determining the related criteria and grouping them in main categories is the novel approach provided by this research. The constructed model can be solved by various multi-criteria decision making techniques. The selection of the best wind turbine is determined by using AHP technique. The results are significant both from engineering and economic perspective as the applied methodology is practically implementable and commercially viable. Accurate and up-to-date data are obtained from leading companies in the industry.

Keywords: AHP, Wind turbine select, Renewable energy, Energy efficiency, Multi-criteria decision making.

Abraviations used: *AHP, Analytic Hierarchy Process; TOPSIS, Technique for Order Preference by Similarity to Ideal Solution.*

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