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WIND TURBINE SELECTION METHOD BY USING ANALYTICAL NETWORK PROCESS ASSOCIATED WITH COST BENEFIT ANALYSIS

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Abstract

Wind turbine evaluation is very crucial in the overall effectiveness of a wind project where the stakeholders are challenging for selection among very different wind turbines. Consequently, this study proposes a method which incorporates analytic network process and cost benefit analysis to choose appropriate turbines during development and investment of a wind plant. A case study is implemented for performance evaluation of various wind turbine types, determining the evaluation priority of factors for wind turbine selection and ranking the turbine performance with respect to key cost and natural parameters. Sensitivity analysis is studied to analyse the stability of method outputs to changes in parameter values. Cost benefit analysis of different turbines is carried out in terms of internal rate of return and net present value. Several scenarios of technical and economical input parameters are vital in order to examine turbine performance under different conditions since the importance of each parameter varies considerably depending on chosen turbine technology. It is aimed to highlight that even minor changes in these parameters may have a serious variation on decision making with no uniform criteria but a combination of indices is most preferable.

Keywords: analytic network process, cost benefit analysis, multi-criteria decision-making, sensitivity analysis, wind energy economics

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