

A wind turbine evaluation model under a multi-criteria decision making
environment

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Abstract

Due to the impacts of fossil and nuclear energy on the security, economics, and environment in the world, the demand of alternative energy resources is expanding consistently and tremendously in recent years. Wind energy production, with its safe and environmental characteristics, has become the fastest growing renewable energy source in the world. The construction of new wind farms and the installation of new wind turbines are important processes in order to provide a long-term energy production. In this research, a comprehensive evaluation model, which incorporates interpretive structural modeling (ISM) and fuzzy analytic network process (FANP), is constructed to select suitable turbines when developing a wind farm. A case study is carried out in Taiwan in evaluating the expected performance of several potential types of wind turbines, and experts in a wind farm are invited to contribute their expertise in determining the importance of the factors of the wind turbine evaluation and in rating the performance of the turbines with respect to each factor. The most suitable turbines for installation can finally be generated after the calculations. The results can be references for decision makers in selecting the most appropriate wind turbines.

Keyword : wind turbine; evaluation; fuzzy analytic network process (FANP); interpretive structural modeling (ISM)