The selection of wind power project location in the Southeastern Corridor of Pakistan: A factor analysis, AHP, and Fuzzy-TOPSIS application

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ABSTRACT

Pakistan has sufficient wind energy potential across various locations of the country. However, so far, wind energy development has not attained sufficient momentum matching its potential. Amongst various other challenges, the site selection for wind power development has always been a primary concern of the decision-makers. Principally, wind project site selection decisions are driven by various multifaceted criteria. As such, in this study, a robust research framework comprising of factor analysis (FA) of techno-economic and socio-political factors, and a hybrid analytical hierarchy process (AHP) and fuzzy technique for order of preference by similarity to ideal solution (FTOPSIS) have been used for the prioritization of sites in the southeastern region of Pakistan. The results of this study reveal economic and land acquisition as the most significant criteria and sub-criteria, respectively. From the eight different sites considered, Jamshoro has been prioritized as the most suitable location for wind project development followed by Hyderabad, Nooriabad, Gharo, Keti Bandar, Shahbandar, Sajawal, and Talhar. This study provides a comprehensive decision support framework comprising of FA and a hybrid AHP and Fuzzy TOPSIS for the systematic analysis to prioritize suitable sites for the wind project development in Pakistan.

KEYWORDS:

wind project site selection; factor analysis; AHP; fuzzy TOPSIS; Pakistan