

Optimal onshore wind farm siting using Spatial Analytic Hierarchy Process: A case study of Fukushima prefecture, Japan

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Fukushima was the most damaged prefecture by the nuclear crisis as a result of the powerful earthquake of March 2011. Its government adopted a strategy to focus on renewable energy to drive its energy structure into a safer and more self-sufficient status. Wind energy stands firm as one of the important renewable energy sources in Japan and plays an important role regarding energy vision goals of Fukushima prefectural government. However, various obstacles are on the way of such approach, mainly because the dispersal of onshore wind farms implies many negative impacts on the environment as well as the communities neighboring such facilities. The aim of this study is to develop a GIS model to identify and evaluate the optimal locations for the siting of onshore wind facilities that combines multi-criteria analysis with geographical information systems. The model incorporates a set of environmental, economic and social criteria. Using a newly designed and developed web application, we apply the Analytic Hierarchy Process (AHP), where a group of wind energy experts and stakeholders was asked the pairwise comparison of the criteria in order to judge their relative importance in site evaluation.

Keywords: Onshore wind farms siting , Multi-criteria decision making, Analytic hierarchy process, GIS, Fukushima prefecture