Evaluation of renewable energy development in Taiwan

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Abstract

In recent years, many countries are keen on developing renewable energy sources, such as wind, solar, biomass, ocean, tides, temperature, geothermal and hydro, etc. There are basically two reasons: energy security and climate change. Facing the scarcity and high prices on non-renewable fossil fuels and aiming to improve energy supply security, many countries are developing renewable energy alternatives to reduce their reliance on fossil energy. Because the land is limited, Taiwan imports over 99% of its energy supply from foreign countries. Nevertheless, located in subtropics and surrounded by sea, Taiwan has a great potential in developing various kinds of renewable energy. Due to the fact that conventional fossil energy can still generate relatively cheap electricity, renewable energy is currently lacking market competitiveness and thus has not yet been fully developed in Taiwan. Therefore, the government in Taiwan has promoted a number of grant subsidy programs to develop different kinds of possible renewable energy. This study explores geographical environment, economy, government policies and other considerations and develops an integrated model to study which renewable energy is the most suitable in Taiwan. By incorporating the experience and knowledge of experts and considering the impreciseness and vagueness in human judgments and information, the model first applies fuzzy Delphi method (FDM) to select a number of requirements that have higher importance and that should be included in the model. Next, the fuzzy analytic hierarchy process (FAHP) is adopted to find the key indicators for the development of renewable energy and to prioritize the types of renewable energy in Taiwan. The results will provide the government and businesses a direction of renewable energy development in the future.

Keyword：renewable energy; fuzzy Delphi method (FDM); fuzzy analytic hierarchy process (FAHP)