

Locating Potential Site for Biomass Power Plant Development in Central Luzon Philippines Using GIS-Based Suitability Analysis

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Abstract : Biomass energy is a traditional source of sustainable energy, which has been widely used in developing countries. The Philippines, specifically Central Luzon, has an abundant source of biomass. Hence, it could supply abundant agricultural residues (rice husks), as feedstock in a biomass power plant. However, locating a potential site for biomass development is a complex process which involves different factors, such as physical, environmental, socio-economic, and risks that are usually diverse and conflicting. Moreover, biomass distribution is highly dispersed geographically. Thus, this study develops an integrated method combining Geographical Information Systems (GIS) and methods for energy planning; Multi-Criteria Decision Analysis (MCDA) and Analytical Hierarchy Process (AHP), for locating suitable site for biomass power plant development in Central Luzon, Philippines by considering different constraints and factors. Using MCDA, a three level hierarchy of factors and constraints was produced, with corresponding weights determined by experts by using AHP. Applying the results, a suitability map for Biomass power plant development in Central Luzon was generated. It showed that the central part of the region has the highest potential for biomass power plant development. It is because of the characteristics of the area such as the abundance of rice fields, with generally flat land surfaces, accessible roads and grid networks, and low risks to flooding and landslide. This study recommends the use of higher accuracy resource maps, and further analysis in selecting the optimum site for biomass power plant development that would account for the cost and transportation of biomass residues.

Keywords : analytic hierarchy process, biomass energy, GIS, multi-criteria decision analysis, site suitability analysis

Conference Title : ICSREE 2015 : International Conference on Sustainable and Renewable Energy Engineering

Conference Location : Rome, Italy

Conference Dates : December 03-04, 2015