

Site Selection of Cassava-Residue Briquetting Plant: A Case Study in Phitsanulok Province, Thailand

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Abstract: Biomass is a kind of renewable energy resources that has drawn attention from worldwide as an alternative solution to alleviate the global warming issue. Due to the photosynthesis process during the plants growth, atmospheric carbon dioxide is extracted and bound in the biomass materials. Therefore, net zero carbon dioxide gain can be achieved when biomass is utilized in a sustainable way. For developing countries, biomass may supply over one-third of their energy consumption, and in some cases up to 90%. One of the highest potential biomass materials is agricultural residue. Nonetheless, the major drawback of biomass utilization, especially agricultural wastes, is that they are dispersed over large areas. Besides, the agricultural residues are not energy dense, in other words, they have low bulk and low energy densities. Using such a source for large scaled and centralized power plant, therefore, may not be the best choice when high transportation, handling and storage costs are taken into account. One of the suitable solution for this problem is biomass briquetting technology which can be defined as a densification process to improve the handling and fuel characteristics of loose organic materials.

Phitsanulok, a province in the lower northern part of Thailand, is located between the latitude 1621' N to 1744' N and longitude 9952' E to 1014' E. It has an area of approximately 10,816 square kilometers which is divided into nine districts. One of the major agricultural products of the province is cassava. Therefore, a considerable amount of cassava residue, such as cassava stalk, is available in this area. This paper presents a case study of briquetting plant site selection including optimization of plant location in Phitsanulok province by utilizing the data from geographical information system. The data was employed to define the supply area of the high potential location based on transportation distance. In addition, cassava-stalk residue-to-product ratio and cassava productivity in each area of the province were also used for computing the amount of cassava stalk available in each candidate location. With regard to the information, the suitable location for setting a cassava stalk briquetting-plant was identified.

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