

Small scale modular biomass gasification for fuel gas production in rural Thailand

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Abstract

Agricultural wastes are abundant in Thailand. Utilization of these biomass by-products as energy sources is relatively clean and considered neutral on carbon dioxide emission. Gasification is a viable way to make use of these resources. The process is accomplished by heating biomass in oxygen depleted environment in order to partially oxidize carbonaceous substances in biomass to fuel gas. The goal of gasification is to convert as much as possible the carbon content in biomass to combustible, relatively low molecular weight gas such as hydrogen, carbon monoxide and methane while keeping the amount of undesired products such as tar and soot as low as possible. Due to Thailand vast agricultural area, the biomass gasification process will be more feasible when the gasifier can be placed on site. So there is need for practical, small and modular gasifier which will also help promote the small scale electricity production and the independent of national electrical grid in much remote area all over the country. Moreover, in longer term, the production of hydrogen rich gas will enable the use of fuel cell and other advanced energy production processes and realization of the hydrogen economy. Cooperation between the Metal and Materials Technology Center (MTEC) and Chulalongkorn University, this project aims to produce fuel gas from agricultural wastes with minimum amount of tar and other unwanted by-products through gasification process. The gasifier will be a practical modular one, capable of process variety of biomass from agricultural activities while several auxiliary processes such as catalytic reforming, product separation and syn-gas formulation will be incorporated to the gasifier system to clean and utilize fuel gas product in various ways. Target raw materials will be palm shell, rice straw, coconut shell, saw dust, bagasse, and etc.