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The Viability of Generating Electricity by Harnessing Household Garbage Solid Waste using Life Cycle Assessment

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Abstract

Solid waste is predominantly domestic garbage and can be either solid or semisolid. It does not include industrial or hazardous wastes. Energy recovery from garbage is not a new idea globally but the method of determining the energy content of the waste stream has developed over the period. Life cycle assessment (LCA) is a tool used to determine the environmental impact, of any product from its raw material (cradle) stage to finally being discarded (grave) as a waste deposit. For a complete LCA, scenarios have to be created which will aid the study by comparing results of activities with the base case scenario. The aim of this study are to conduct a study for waste to energy (WTE) technology, harnessing household garbage for educational purpose and to create an LCA models to show the environmental impact on various scenarios. In this study, two scenarios were created, namely the base case scenario and energy recovery scenario, respectively. In the base case scenario, all the waste generated is taken to landfill, while in the energy recovery scenario, energy and material recovery is involved. All scenarios are based on a *Universiti Teknologi Malaysia* (UTM) case study. From the result of the LCA, about 12 MW of electricity can be recovered by harnessing the garbage in UTM, with associated high decrease in environmental emissions from 5 tons of CO₂ and 390 kg of deposited goods at the landfills to -0.97 tons of CO₂ and no deposited goods. This is because materials can be recovered from the waste that can be recycled. GabiTM software was used for the LCA assessment.

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Keywords: Life cycle assessment; landfill; gabi software; Universiti Teknologi Malaysia; base case scenario, energy recovery scenario; municipal solid waste

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