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Determination of the viability of landfill gas to energy in Africa: The case of Ghana

Solomon Ofori
University of Stuttgart, Germany

Landfilling is a common practice in Ghana. Almost all the existing landfills have no or non-functioning landfill gas collection or flaring systems, resulting in the emission of tonnes of landfill gas (greenhouse gases) into the atmosphere annually. This study uses Ghana as a case study for Africa to determine the viability of landfill gas to energy technology, an approach that holds great promise to reducing methane emissions and ensuring energy recovery from waste. Through reviewing of existing literatures the needed data were obtained and also the Intergovernmental Panel on Climate Change spreadsheet model was used in the estimation of methane generation from fills. The study showed a continuous increase in methane generation since 1950 with the least being 4G g and the highest being 55G g. The lowest amount of methane produced corresponds to 6.1 million m3, having the capacity of producing over 8000 MWh electricity annually. Internal combustion engines (IC) are the most suitable landfill gas to energy technology option for Ghana. Their suitability stems from the fact that the cost of price per installed kilowatt is relatively cheaper, have relatively higher efficiency, and lower cost of operation and maintenance. A total of US $3.4 million was estimated as the installation cost for a 2 MW IC engine with an annual operation and maintenance cost of $360,000 and annual cost recovery of $780,778. The study also revealed that the country is endowed with experts capable of providing the needed technical support in designing, construction and operation of the system but further training may be needed to improve their efficiency. Considering the methane generation rate, cost of the technology and other parameters, the study concludes that landfill gas to energy generation in Ghana is viable and recommends a pilot project to be set up before a nationwide implementation.

Biography

Solomon Ofori is final year student of MSc in Air Quality Control, Solid Waste and Wastewater Process Engineering (WASTE) program of the University of Stuttgart, Germany. His research interest areas include, but not limited to, landfill gas utilization and management, emission measurement and management from waste treatment facilities, climate change and mitigation, municipal and industrial wastewater treatment and sustainable solid waste management.

sofori32@yahoo.co.uk

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