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## Investigation of self-sustainability of a composting machine

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Solid waste is a growing problem in urban areas of Sri Lanka and this problem is aggravated due to the absence of a proper solid waste management systems in the country. At present in many instances, solid waste is collected in a mixed state and dumped in environmentally very sensitive places, which causes numerous negative environmental impacts such as ground and surface water pollution, air pollution, etc. There are many countries that use fully automated composting machines as a solution to reduce organic waste. In that process, composting machines discharge the bio gas as a by-product. Hence, the proposed project investigates the possibility to use this by-product to cater to the energy requirement of the compost machine. The proposed project is focusing on designing a prototype of an automated composting machine to operate via generated electricity using bio gas to self-sustain the operation of the machine. In the design, anaerobic fermentation is selected as a suitable method to produce methane gas. A survey was carried out to estimate an appropriate size of the chamber for household composting machines. Forty families in a four different areas were considered for this survey to obtain the average weight of the organic waste that was collected from the kitchens within a period of one week. Forty families participated in the survey. Results showed the maximum possible organic waste output was 5 kg. Therefore a chamber was designed to suit that capacity for domestic usage. Organic waste was mixed in different ratios with straw and cow-dung to facilitate the anaerobic composting process. It was planned to control the temperature of the chamber to accelerate the composting process, although it was not successful. Finally organic waste was mixed with different ratios of straw and cow-dung, and the maximum volume of gas emitted from the process was 1.5 L for 5 kg organic waste. Methane volume generated from the prototype household composting machine will not be adequate to generate electricity for its operation. Therefore, this can be recommended for industry level application.

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