Review Of Wast Handling of Pirana Land Fill

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***Abstract*—The methane emissions from landfills in India are ranked second next only to coal mining. The estimation of methane emissions from landfills is important in order to evaluate measures for reduction these greenhouse gases. The main objective of this research was to evaluate the energy potential of methane from selected urban landfill sites in India. The evaluation of energy potential was done using the first order decay model. This paper examined the current status, future prospects and various barriers for landfill gas (LFG) recovery and utilization in India. Although it seems that technological and economic constraints might be a major factor in the implementation, but the main hurdle is a lack of national policy framework and an integrated action plan for LFG recovery and utilization. Methane, a key component of natural gas, is important for electricity generation because it's a readily available, efficient fuel source that, when burned, produces energy to power turbines and generate electricity, offering a cleaner alternative to coal and oil.**

***Index Terms*—Introduction, Comparison, Current status in India, Electrical Energy Conversion from Landfill**.

I. INTRODUCTION

With rapid economic development and increased urbanization levels and material consumption, the amount of Municipal Solid Waste (MSW) disposed in landfills in India is increasing significantly. India is one of the world's largest emitters of methane from landfills, currently producing around 16 Mt CO2 eq per year, and predicted to increase to almost 20 Mt CO2 eq per year by 2020. Ahmedabad, the seventh largest metropolis in India, produces approximately 4000 metric tons of solid waste daily. Methane makes up around 29% of the total Indian GHG emissions, while the global average is 15%. However, emissions from waste (6%) are also proportionally higher than the global average (3%) [1]. The Municipal Solid Waste (MSW) is disposed using the technology of traditional landfill, without consideration of recovery and utilization of methane. Electricity is generated from methane gas using waste to steam (WTS) technology.

Gas Landfill (LFG) is one of the renewable energy sources that can be used as a power plant. The methane gas contained in landfill gas can be used as a turbine player through the combustion process. The use of landfill gas generated from the Waste Disposal Site (TPA) as an electric energy generator is called a Waste Power Plant (PLTSa).

All of the waste disposal sites in the country are open dumps. These sites emit several gases including methane. Hence open disposal of waste is a prevalent practice in India [2]. In a move aimed at improving solid waste management, the Ahmedabad Municipal Corporation (AMC) has announced the establishment of a 300-tonne-per-day solid waste to steam plant in Ahmedabad, operating under the Public-Private Partnership (PPP) model. The plant, to be constructed by Surat-based Steam house India on a 5-acre plot at the Pirana Waste dumping site, is set to significantly reduce environmental pollution by decreasing reliance on fossil fuels.

So far, most people still view garbage as useless waste, not as a resource that needs to be utilized. The community in managing waste still relies on the end-of pipe approach, i.e. waste is collected, transported, and disposed of to the final waste processing site. In fact, large volumes of landfill at the location of the final waste processing site have the potential to release methane

The project aims to establish a circular economy by utilizing Refuse Derived Fuel (RDF). This German technology, making its debut in India, offers numerous benefits, including reduced environmental impact, low operational costs, and efficient resource utilization. Additionally, the project is anticipated to provide a more cost-effective solution for steam generation, with capital expenditure projected to be 70 percent lower compared to conventional waste to energy plants, according to the AMC.

II. COMPARISON

Feature	Solar Power	Waste-to-Energy (WTE)
Cost	Becoming cost-competitive	Higher cost of electricity generation
Environmental Impact	Minimal operational emissions	Potential for air pollution and waste residue management issues
Reliability	Intermittent (dependent on sunlight)	More consistent power generation
Waste Management	Solar panel waste management and recycling are important considerations	Requires proper waste segregation and management for high-quality fuel
Efficiency	High energy conversion efficiency	Lower efficiency due to waste
Source	Renewable	Fossil Fuel
Environmental Impact	Low	High
Operational Costs	Low	High
Intermittency	High	Low
Infrastructure	New	Existing
Scalability	High	High
Lifecycle Emissions	Low	High

III. CURRENT STATUS IN INDIA

•According to a report by the Centre for Public Policy Research (CPPR), the total energy generated from 186 waste-to-energy plants in India in 2019 was 317.03 MW.

•The Ministry of New and Renewable Energy (MNRE) estimates that the total energy generation potential from urban and industrial organic waste in India is approximately 5690 MW.

•However, the Indian waste-to-energy sector is far from reaching its potential, currently producing only 168.64 MW of electricity.

IV. ELECTRICAL ENERGY CONVERSION FROM LANDFILL GAS

A. Separation and construction of waste

Garbage trucks take our trash to a municipal solid waste landfill, a site designed to contain household trash. It has specialized structures to reduce the contamination of the surrounding soil or water. Modern landfills are completely sealed to reduce contamination of the nearby ground water. Waste that will be produced by landfill gas which will be used for the main fuel of the combustion process to produce electricity. Organic waste is separated to be carried out by landfill which is used as a process for decomposition carried out by bacteria before becoming methane gas .

B. Gas production process (decomposition)

In this process, the waste has been sorted into organic waste and the process of a landfill in the landfill area is ready to be broken down by bacteria. The gas production process begins with the dumping of leftover garbage lying on landfills so that automatically because it is formed mechanically a landfill gas will be produced which is formed due to decomposition activities carried out by bacteria. In principle, the process of forming methane gas through Refuse-derived fuel (RDF).RDF is produced from MSW through a number of processes to meet requirements for particle size, moisture content and noncombustible content dictated by the thermal unit that will receive the RDF. At its simplest, MSW is shredded to a maximum particle size to produce RDF. More often, additional steps are taken to remove noncombustible materials and control the particle size.so that CH4 gas can be produced which will be used as fuel for the combustion process by the engine to produce electricity. Gas is channeled by pipes that are available directly on landfills that are directly directed at the engine to do the combustion process to produce electrical energy.

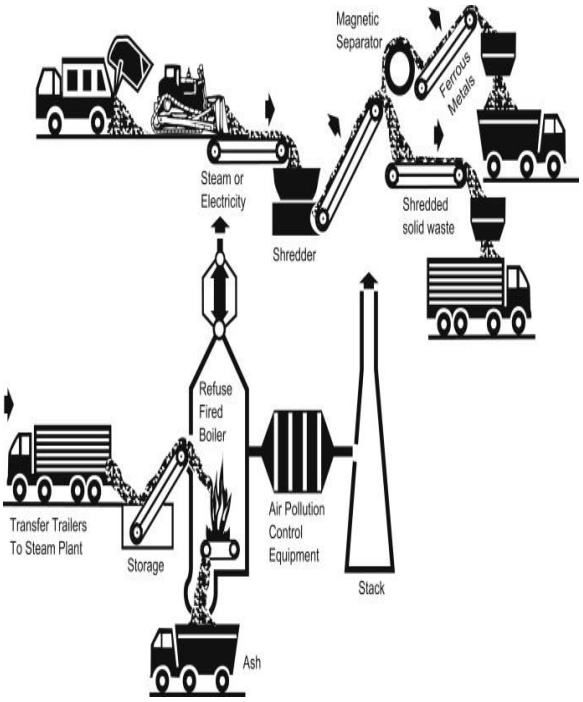

Fig 1. Gas Production Process

C. Process of delivering gas to the engine

The gases produced from this landfill are channeled by media that is directly connected by the engine, namely by using a pipe. This pipe takes methane gas which is trapped in a pile of garbage that has broken down in the landfill area. The methane gas contained in this landfill is about 50% of methane gas and the rest is carbon dioxide (CO2) gas. This pipe extends along a very large waste disposal area so that the gases produced can be channeled to the engine in the form of methane gas ready for the combustion process. The initial stage of the gas distribution process starts from methane gas that enters through the landfill pipe through the aid of a blower so that the methane gas enters through the pipe. Then, the methane gas that rises up through the pipe passes through a filter so that the methane gas is cleaner and the water content contained in the air decreases. The excess methane gas that enters will be burned in flare station so that the incoming methane gas is in accordance with the capacity of the gas pipeline. After that, methane gas enters the compressor, which aims to reduce the volume of methane gas to become smaller particles so that the temperature of methane gas increases to around 190 ° C. with the increase in temperature of the methane gas particles, then enter the cooler (cooler) which serves to reduce the temperature of the gas to be 2-5 ° C so that the water content contained is condensed at this temperature. Then this methane gas enters the second filter which serves to reduce the water content attached to methane gas so that the methane gas is free from the water content that is still contained in methane gas. Then this methane gas undergoes a reheating process that aims to increase the temperature of the methane gas to around 32 ° C and the end result of this air is ready to be burned in an engine that is already connected to the pipe.

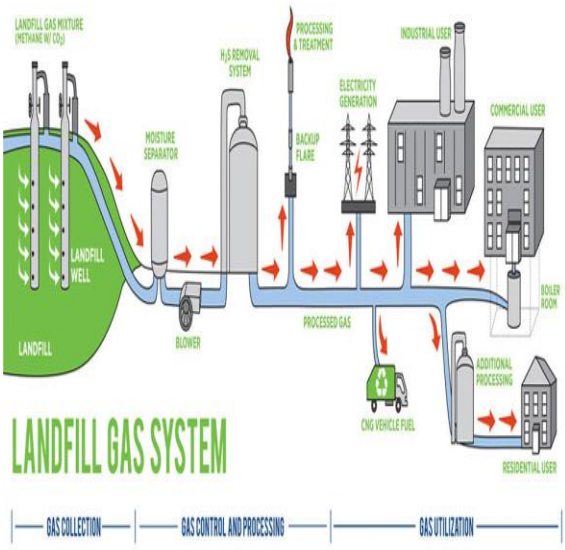

Fig 2. Process of delivering gas to the engine

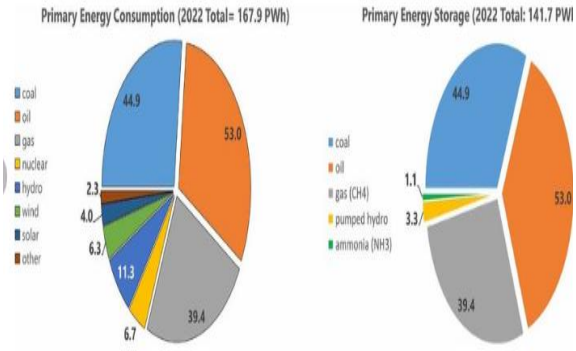

Fig 3. Energy Consumption Bar Chart

V. CONCLUSION

From the above paper we can concluded that use of waste in pirana side can be reduces by using above method and also, we can generate a power using by

product methane gas for house hold use and for electrical power generation

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