Landfills and Methane: A One Year Study Into Actual and Controlled Bioreactor Production of Methane Using G.E.M.

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Searching for alternative energy sources has taken on new meaning in light of concerns regarding climate change. Vast landfills across America do produce a usable alternative fuel in the form of methane. There are 1,250 landfills in America, with 300 of those in California. Out of the 300, only 56 are operating and still accepting waste. Although only 56 of 300 landfills are operational, methane production continues to take place in the other 244. These 244 landfills are known to be non-operational which can still produce methane and can be a large source of renewable energy potentially forever. In contrast to aerobic respiration in landfills, Methanogenesis is anaerobic in nature where hydrogen is oxidized to H+ and CO2 is reduced to CH4. (Lyu et al 2018) Can methane production in landfills be studied in a simulation (self-made bioreactor) over a period of 1 year? This data was compared similarly with actual gas production at the American Avenue landfill, in an effort to validate the performance of our simulation. Data was collected one day per week over the course of an entire year indicating sustained methane production at approximately 45% per cubic foot of measured gas output. Numerous calculations were done to quantify the economic advantage of utilizing methane with some showing savings of up to $138 per month to consumers. This along with preventing unwanted methane from escaping into the atmosphere demonstrate significant and dependable utilization of this alternative energy source.

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