Comparison of Land Fill Sites on The Basis of Methane Emission

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Abstract- *Aim of the study is to support the development & improved practice on calculating of methane emissions from solid waste disposal. At the bio-methanation plant andwaste disposing sites (SWDS) the degradable organic carbon in waste is decomposed by bacteria under anaerobic conditions into methane and other compounds. The SW disposal in many growing countries, especially poor and some concern is expressed also on the suitability of some of the default parameters in their conditions. Improvements in activity data collection and emission factors are needed in many countries. By studying and observing different site we concluded that institutional waste is not used for bio-methanation process. Only degradable Waste of houses and hotel is used for methanation that is 5 tonnes of degradable waste produce 20 m3 of methane. To increase the methanation and to alter the rate of reaction in the capsule we use grains, cattle dung and ruminant under fix and constant temperature similarly landfills gas (LFG) is produced in landfills due to the anaerobic digestion by microbes on any organic matter. Major constituents of LFG are: Methane (45 – 60%), Carbon Dioxide (40 – 50 %), Nitrous oxide (2 – 5%), Oxygen (0.1 1.0%), Ammonia (0.1 - 1.0%), Hydrogen (0 - 0.2%) and Volatile organic compounds. Microorganisms decomposes waste mass into Methane gas.*

FIRST STAGE: AEROBIC ORGANISMS CONVERTS WASTE INTO SIMPLE ORGANIC COMPOUNDS, CO2 & H2O.

SECOND STAGE: ANAEROBIC ORGANISM CONVERTS ORGANIC COMPOUNDS INTO H2,NH3,H2O,CO2 & ORGANIC ACIDS.

THIRD STAGE: METHANE FORMING ORGANISM CONVERTS ORGANIC ACID INTO CH4.

Keywords- Institutional, Ruminant, Grains, gas, methane, reaction.

I. INTRODUCTION

Solid Waste Disposal technology is an urging field and it is also needed for future survival and health-care of human being. The environmental engineers should be updated with the latest trends and technologies with practical applications has become very crucial in order to survive in the co-operate world. Similar to many imminent cities, also faces a major shortfall in the demand and supply gap in its waste management services due to rise in population and small-scale waste management services.

The project includes of study of 1X5 TPD, 3X10 TPD Capacity bio-methanation power generation plant along with the landfill sites in the cities.

The basic philosophy of setting up this plant is to treat the wet organic wastes in an appropriate manner in a most environmental friendly manner. Solid Waste Management Project is one of the most important and significant aspect of this entire exercise, after studying the various landfill site and the emission of methane from the landfill we move towards the various bio-methanation plants. The collection, separation, blending of waste and working and maintenance of the bio-methanation plant is done by different private companies on the terms and conditions as per the government.

Due to insufficient and inadequate collection, treatment and disposal techniques, waste management and treatment has become a critical issue and we are facing stern problems related to the environment. In spite of this crucial problem of solid waste collection, disposal and treatment, the municipal council has provided such efficient and proper facilities in which solid waste that is generated is collected and used as a resource for the generation of electricity. Due to this ultimately the burden or rather the environmental issues are reducing to such an extent that the problems in the vicinity where this plant is located is minimal. The biogas project plays an important role in maintaining the health & sanitation. This paper includes everything right from the way collection of solid waste is done to the generation of electricity using the anaerobic digester.

The term ‘landfill’ is as similar to ‘sanitary landfill’ of Municipal Solid Waste, only if the latter is designed on the

principle of waste containment and is characterized by the presence of a liner and leachate collection system to prevent ground water contamination. The term 'sanitary' landfill has been extensively used in the past to describe MSW disposal units constructed on the basis of 'dump and cover' but with no protection against ground water pollution. Such landfills do not fall under the term 'municipal solid waste landfills.

When waste is landfilled, the organic matter in the waste is converted to landfill gas. Landfill gas is a mixture of methane (45-60%), carbon dioxide (40-55%) and trace components (H2S, organic esters and other volatile hydrocarbons all of them giving landfill gas its characteristic smell).

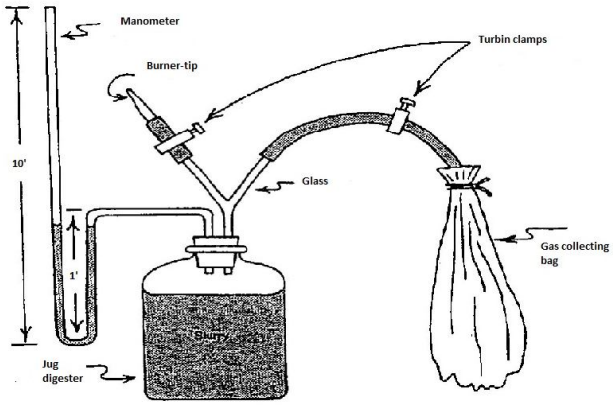
Methane generation only occurs in parts of the landfill that are strictly anaerobic. In reality many landfills will not be completely anaerobic. Due to a.o. wind-activity.changes in ambient pressure parts of a landfill might contain oxygen, especially when a landfill is less well managed no waste compaction ,no daily covers more thin or permeable temporary covers and at older landfills where internal pressure due to gas production is reduced. In these parts methane generation is inhibited anaerobic decay of organic waste (not leading to methane) might take over. One way to deal with aerobic zones in the waste is the introduction of a methane correction factor (MCF), describing the part of the landfill that is not entirely anaerobic and from which no methane is generated. Given the estimated LFG generation, LFG collection efficiency and a methane (CH4) oxidation factor are used to estimate LFG collection and oxidation. Estimated emissions that use these modeling approaches are highly sensitive to a few key parameters: LFG generation depends largely on the types of waste components and climate conditions, and CH4 collection depends on decay speed over time, which varies widely among waste components, LFG collection strategies, landfill cover types, climate conditions, and oxidation factors.

II. MATERIALS, PROCESS AND METHODS

In the bio methanation plant the production process of CH4 is given as follows

A. Collecting the waste and its separation.
B. Adding water to the waste and crushing by mixer of 5 HP.
C. Anaerobic reaction in two steps from 210 m3 waste.
D. Leachate from the tank is separated from in a chamber using pipes.
E. Methane(CH4) is produced than collected in two balloons separately.
F. 20 m3 of methane is produced from 210 m3 of waste.
G. Cleaning of vessel that is scrubber, pressure pump.
H. Electric power is generated.

III. FLOW DIAGRAM



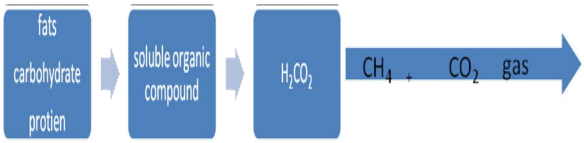
IV. METHODS

To increase the methanationfrom the bio-methanation power-plant we use three methods

1. Adding of grains in the closed tank of bio-degradable waste.
2. Adding cattle dung.
3. By product from brewery.
4. Adding animals cows or buffalos stomach(ruminant).

In the digestive system of animal(rumen) there is presence of numerous microbes. It includes all the plant eating animal cattle, goats etc. The presence of these microbes in the ruminants degrades or divide the complex matter into glucose, starch etc. Microbes further releases C and CH4.

These all are added to increase the number of aerobic micro-organism and to alter the rate of reaction.



V. RESULT

- we analyze various plants of bio methanation plant and landfill sites

1) The greenhouse gas release from the landfilled depends on the rate on the carbon in the waste

a) carbon impound in landfills.
b) carbon is heap and combusted ch4.
c) carbon in co2 from ch4 oxidation.
d) carbon(C) in co2 from decomposed waste.
e) carbon(C) in ch4 released in the open.

2) The waste from food and lawn trimming have similar carbon emission due to their similar doc in dry condition.

3) Emitted GHG from landfill waste very significant by types of waste due to huge various kind of food waste, newly estimated GHG emission are 4% greater than organic waste landfill case, while the other three types of waste lead to 39%-65% reduction in estimated GHG emission due to change in doc and the oxidation factor.

4) As mention earlier, inorganic carbon in plastic does not deteriorate through the digestion process which is anaerobic, results in no emission.

5) The observed parameters have a high impact on gas emission from land fill they are unlikely to modulate however, landfill operators can actively collect and burn more ch4 to lower the greenhouse gas emission.

6) Generate electricity from LFG combustion would lower theGHGemission by displacing electric power that would otherwise be generated.

7) When LFGs sternly gather from the early stage of each cell development, GHG outpouring can be lower by 27% compare to medium LFG collection case.

8) GHG emission credits for power generation result from displacing the us average electricity generation mix reducing GHG emission by 12%.

9) Emission from food waste are more influenced by parameter other than doc in comparison to other food stocksbecause of food waste less collection emission.

10) Climateposture of the landfill influenced affect efficiency prompt in changes in GHGoutpouring however this parameter are based on condition that can be controlled.

11) GHGreleased from landfill, landfill operator can choose to collectively collect and generate electricity using collects LFG reduces the GHG emission with displacing electricity that would otherwise generated with convention power sources.

VI. CONCLUSSION

1. By studying different site we concluded that waste from different institution is not used for methane production.
2. Waste from houses, hotel is used for generation of methane that is 210 m3 of waste produces 20 m3 of methane.
3. To alter the rate of reaction in the capsule we use grains, cow-dung and ruminant.
4. The methane than increased for generation of electricity.
5. The street lights, the power requirement of plant itself is powered from the electricity generated in the process.

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