

MINIMIZATION OF HAZARDOUS WASTE MATERIALS ON ENVIRONMENT AS A PRODUCTION OF ECO-FRIENDLY BIOGAS FUEL FROM DISCARDED ORGANIC WASTES

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Abstract : The global energy demand is growing rapidly, and majority of the present demand is met by fossil based fuels such as coal, oil, and natural gas. Since the industrial revolution, our increased dependence on fossil based fuels has resulted in various airborne emissions leading to serious climatic, environmental, and health effects. These emissions are at alarming levels and require immediate actions to counter severe future problems. Due to scarcity of petroleum and coal it threatens supply of fuel throughout the world also problem of their combustion led to research in different corners to get access the new sources of energy ,like renewable energy resources , solar energy, wind energy, different thermal and hydro sources of energy. A great variety of organic waste materials such as biological wastes of cattle dung, vegetable wastes, municipal solid waste, and industrial waste water are disposed in landfill or discarded which causes the public health hazards and diseases like malaria, cholera, typhoid. Inadequate management of wastes like uncontrolled dumping bears several adverse consequences on environment. It not leads to polluting surface and groundwater through leachate and further promotes the breeding of flies, mosquitos' rates and other disease bearing vectors. Also, it emits unpleasant odor & methane which is a major greenhouse gas contributing to global warming. The production of biogas from organic waste material should be major issue in India. Biogas is an important source of renewable energy produced by the anaerobic digestion of biomass. The composition of biogas depends on the biomass source and duration of the digestion process. But biogas is distinct from other renewable energies because of its characteristics of using, controlling and collecting organic wastes and at the same time producing fertilizer and water for use in agricultural irrigation. Biogas does not have any geographical limitations nor does it require advanced technology for producing energy, also it is very simple to use and apply. Biogas can be used as energy source and also for numerous purposes. But, any possible applications require knowledge & information about the composition and quantity of constituents in the biogas produced.

Keywords - Renewable energy, biogas, biomass, eco-friendly fuels, organic waste materials, environment pollution, minimization.

INTRODUCTION

In the recent past, biogas systems have received considerable attention as an attractive source of renewable fuel that is clean, environment friendly, and cheap. Biogas is produced by anaerobic digestion of a variety of organic wastes. This technology offers a very attractive route for decentralized applications in rural areas for meeting the energy needs. Biogas energy is typically used for small to medium

scale combined heat and power production, and also receives increasing attention as renewable feed stock for chemical industry. An increased usage of biogas as a fuel reduces the dependence on fossil based fuel, and has important advantages for both environment and long term energy security. The production of biogas is considered to be a carbon neutral process. Plants produce oxygen and carbohydrates from carbon dioxide by

photosynthesis. So even if the organic matter produces carbon dioxide in the source of biogas formation, there is a good balance between the exhaustion of carbon dioxide into the atmosphere and absorption of carbon dioxide from the atmosphere.

Deforestation is a very big problem in developing countries like India, most of the part depends on charcoal and fuel-wood for fuel supply which requires cutting of forest. Also, due to deforestation it leads to decrease the fertility of land by soil erosion. Use of dung, firewood as energy is also harmful for the health of the masses due to the smoke arising from them causing air pollution. We need an eco-friendly substitute for energy. Organic waste material having the high calorific value to microbes. In most of cities and places, waste material is disposed in landfill or discarded which causes the public health hazards and diseases like malaria, Cholera and typhoid. Inadequate management of wastes like uncontrolled dumping bears several adverse consequences. It not only leads to polluting surface and groundwater through leachate and further promotes the breeding of flies, mosquitoes, rats and other disease bearing vectors. Also, it emits unpleasant dour & methane which is a major greenhouse gas contributing to global warming.

Organic solid waste impact on environment component and its create pollution in our environment. It can be minimize by production of biogas which is main source of renewable energy. Due to scarcity petroleum and coal it threatens supply of fuel throughout the world also problem of their combustion led to research in different corners to get access the new sources of energy. Mankind can tackle this problem (threat) with the help of methane or biogas production and minimize hazardous waste material on environment. However till now we have not been benefited, because of

ignorance of basic sciences like output of work is dependent on energy available for doing that work. This fact can be seen in current practices of using low calorific inputs like cattle dung, distillery effluent, industrial waste water, municipal solid waste (MSW) and sewage in biogas plants, making g methane generation highly inefficient. We can make this system extremely efficient by using solid waste material and minimize environmental pollution.

Germany is the biggest biogas producer in Europe and has 5,905 plants in operation with an installed power generation capacity of 2,291 MW. The resultant electricity supply is approximately 12.8 TWh, which is 12.6% of the total electricity from renewable sources. The UK is another country which uses biogas widely for power generation and set the targets to deliver 29 GW from its present biogas plants and is targeting a total production of 32-50 TWh by 2020 from biomass sources. The Ministry of New and Renewable Energy, Government of India, has initiated a scheme on biogas based distributed/ grid power generation programmes in 2006. The main objectives of these programmes are proper utilization of animal wastes, industry wastes and wastes from forestry, rural based industries (agro/food processing), kitchen wastes, etc. India has a total of 348 biogas plants that produce a total capacity of 6,617 KW from 65, 2873 of biogas. Biomass energy and co-generation programmes are also promoted for optimum usage of India biomass resources. The proper disposal of organic waste material should be done in eco-friendly and cost effective way for production of biogas. While calculating the cost effectiveness of waste disposal we have to think more than monitory prospects. The dumping of solid waste in places and making the places unhygienic can be taken good care of. It adds to the value of such biogas plant. Using the natural processes like microorganisms waste material & biodegradable waste viz paper, pulp can be

utilized and minimize the solid waste material on environment.

MINIMIZATION OF HAZARDOUS WASTE ON ENVIRONMENT AS A PRODUCTION OF BIOGAS

The proper management of solid waste on environment is crucial issue all over the world because waste material creates pollution in our surrounding. Solid wastes can be directly or indirectly impact on living and non-living thing. For the production of biogas by anaerobic digestion of different variety of hazardous solid waste (organic materials) such as biological wastes of cattle dung, vegetable wastes, municipal solid waste, industrial solid waste and waste water, landfill, etc. can be used. Because in most of countries solid waste is disposed in landfill or discarded, which causes the environmental pollution and the public health hazards. Inadequate management of

wastes like uncontrolled dumping bears several adverse consequences. It not only leads to polluting surface and groundwater through leachate but also it emits unpleasant odor & methane which is a major greenhouse gas contributing to global warming. Therefore for production of renewable sources of energy (biogas) we can use different organic solid waste, including industrial waste for the minimization of solid waste on environment. Different solid waste feedstock's produced biogas composition according to nature of waste materials. Biogas production and composition from different feedstock's (organic solid wastes) given in table -1. The production of biogas from solid waste not only reduces environmental pollution but also we can benefit as a sources of renewable energy economic, social, and environmental and health.

Table-1 Biogas composition from different feedstock's (organic solid waste) during production.

Components Volume%	Municipal waste	Waste water	Agricultural/Animal waste	Waste from Agro food	Landfill
CH ₄	50-60	61-65	55-58	68	47-57
CO ₂	34-38	36-38	37-38	26	37-41
N ₂	0-5	2	1	3-5	-
H ₂	-	-	-	0-5	-
O ₂	0-1	1	1	1	-
CO	-	-	-	0-5	-
H ₂ S (ppm)	60-750	700-2800	2100-7000	280	36-115

- . Production of renewable sources of energy for cooking, lighting and other purpose.
- . Transformation of organic wastes to very high quality fertilizer.
- . Improvement of hygienic conditions through reduction of pathogens.
- . Environmental advantages through protection of soil, water, air etc.
- . Micro-economical benefits by energy and fertilizer substitutes.

- . Macro-economical benefits through decentralizes energy generation and environmental protection.
- . Treatment of solid waste without long-term follow-up costs usually due to soil and water pollution.
- . Generation of income through compost and energy sales (biogas/electricity/heat) to the public grid.

. Improved soil/agriculture productivity through long-term effects on soil structure and fertility through compost use.

. Reduction of landfill space and consequently land costs.

. Creation of employment in biogas sector.

. Improvement of the general condition of farmers due to the local availability of soil improving fertilizer.

. Decreased smell and scavenger rodents in our environment.

CONCLUSION

The proper management of solid waste on environment is crucial issue all over the world, because solid waste materials create pollution in our surrounding. Solid waste can be directly or indirectly impact on living and non-living thing. Minimization of solid waste on environment by production of biogas, it is a multipurpose importance for being and also our environment. Biogas production from solid waste not only produce renewable source of energy but also in this system organic wastes transfer to very high quality fertilizer, reduce landfill space and consequently land costs, treated solid waste without long-term follow-up costs usually due to soil and water pollution, improve hygienic conditions through reduction of pathogens, creation of employment in production of biogas from solid waste, improve the general condition of farmers due to the local availability of soil improving fertilizer. The dumping of solid waste in places and making the places unhygienic can be taken good care of. It adds to the value of such biogas plant. Using the natural processes like microorganisms waste material & biodegradable waste viz paper, pulp can be utilized and minimize the solid waste material on environment.

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