HOUSEHOLD LEVEL BIOGAS PLANT

The term 'biogas' is commonly used to refer to a gas which has been produced by the biological breakdown of organic matter in the absence of oxygen. The gases methane, hydrogen and carbon monoxide can be combusted or oxidized with oxygen and the resultant energy release allows biogas to be used as a fuel. Biogas is a commonly used bio fuel around the world and is generated through the process of anaerobic digestion or the fermentation of biodegradable materials such as biomass, manure, sewage, municipal waste, rubbish dumps, septic tanks, green waste and energy crops. This type of biogas comprises primarily methane and carbon dioxide. The actual composition of biogas will vary depending upon the origin of the anaerobic digestion process – i.e. the feedstock.

An air-tight tank transforms the biomass waste into methane producing renewable energy which can then be used for heating, electricity, and many other operations that use any variation of an internal combustion engine. One particular type

of biogas is known as 'landfill gas' (LFG) or 'digester gas'. LFG is produced by wet organic waste under decomposing anaerobic conditions in a landfill. In the same way that a compost heap works, the waste is covered and then compressed by the weight of the new material that is deposited on top. This material prevents the oxygen from escaping and encourages the



anaerobic microbes to thrive. The gas slowly builds up and is released into the atmosphere if the landfill site has not been engineered to capture the gas. **Use of biogas.**

Biogas has a wide variety of uses and can be used as a relatively low-cost fuel for the generation of energy and heating purposes, such as cooking. For example, basically any facilities which need power are able to use biogas to run engines, or to generate either mechanical or electrical power. Biogas can be compressed, similar to natural gas, and is able to be used to power motor vehicles. Biogas is a renewable fuel, so it qualifies for renewable energy subsidies in some parts of the world. It is possible to concentrate the methane within biogas to the same quality standards as fossil fuel derived natural gas to produce bio methane. If concentrated and compressed this biogas can then be used in vehicle transportation.

Benefits

When biogas is used, many advantages arise.

- Generate enough electricity
- Reduce global climate change.

Advantages of biogas

- Use as a renewable fuel
- No additional greenhouse gas emissions (it removes and then releases the same amount of carbon dioxide)
- Waste is disposed of at the same time and in the same operation
- Consumes methane that might otherwise leak into the atmosphere and increase the greenhouse effect

It is proposed to install a bio gas plant with the technical assistance of Clean Kerala Mission, Government of Kerala and Agency for Non-Conventional Energy and Rural Technology (ANERT), Government of Kerala.

A. Household level (Prefabricated – Low Cost Type) Biogas Plant

Infrastructure & Specifications

- 1. Treatment capacity 2.5 kg of solid waste per day
- 2. Volume of digester including gas holder 0.50 m^3
- 3. PVC tank with circular shape as digester and gas holder
- 4. Inlet device with PVC pipe of diameter 110 mm
- 5. Inlet chamber with a plastic mug having circular shape and with a lid.
- 6. Outlet devise with PVC pipe of 63 mm
- 7. A plastic can of 10 liter capacity to be used for collecting slurry/effluent for safe disposal. It toilet waste is also treated in biogas plant, slurry from biogas plant to be treated in septic tank soak arrangement.
- 8. Rubber hose of 25 mm (3/4 inch) diameter for conveyance of biogas for use with maximum length of 10 m.
- 9. Stove with single burner.
- 10. Control valve for regulating gas.

Standards

- 1. Minimum waste retention time of 40 days
- 2. All PVC pipe of class 4 kg/cm²
- 3. Rubber hose, stove and control valve with ISI mark.
- 4. Particle size of waste not to exceed 20 mm

Unit Cost

Rs. 6,500/-

O & M Protocols

- 1. Start up by adding 25 kg of cow dung with equal quantity of water
- 2. Waste feeding after chopping and mixed with water in the ration 1:1
- 3. Daily feeding of easily degradable waste in slurry form or solid waste mixed with equal quantity of water (rice water of other kitchen waste water used for washing of rice, vegetables, meat etc. is preferable) Clean the inlet chamber after each feed and keep.
- 4. Limit the maximum quantity of daily feeding of waste.

- 5. Daily removal of slurry in plastic cans and disposal as manure/disposal in to septic tank and soak pit arrangement.
- 6. Prohibited to feed the wastes of slow degrading nature like straw, soil egg shells, fibrous materials like banana leaves, coconut shells, coconut coir, pseudo stem etc. disinfectants like phenyl, Dettol etc. are also prohibited.
- 7. Mix the substrate or rotate the drum at least weekly for preventing scum formation.