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Flexi Biogas Technology: An Alternate Low Cost Biogas Technology to Rural India

The article highlights technology of flexi biogas plant, its comparison with Deenbandhu and KVIC biogas plant, economic analysis and its advantages to peoples living in rural and remote areas of India.

India installed 4.75 million biogas plants by Dec 2014 and has potential to install 12.5 million plants. To achieve this target and to provide alter-

nate cooking and lighting fuel to rural peoples, it is necessary to speed up this biogas installations. Deenbandhu and KVIC plant involved civil constructional

work and required skilled labour for its successful installation. The availability of skilled labour and construction material in the rural and remote areas is big problem of concern which inhibit the installation and use of biogas technology for cooking purpose. The cost involved in the development of Deenbandhu and KVIC biogas plant is not affordable to rural poor people which is also one reason for its defame. Low cost advance flexi biogas plant is the alternate solution to rural and remote areas of India which required no civil work and can be installed within day. This article highlighted technology of flexi biogas plant, its comparison with Deenbandhu and KVIC biogas plant, economic analysis and its advantages to peoples living in rural and remote areas of India.



Flexi Biogas Model.

Comparison of Flexi Biogas plant with KVIC & Deenbandhu Biogas plant

KVIC (Floating Drum) & Deenbandhu (Fixed Dome) Biogas Plant	Flexi Biogas Plant
<ul style="list-style-type: none"> • Required high initial capital investment for both KVIC and Deenbandhu biogas plant • Required to replace drum of KVIC plant after 5 years, which cost around 40% of initial investment. • Civil construction work is needed • Required Skilled Labor for construction • 30 to 45 days HRT (Hydraulic retention time) is required • Maintenance is required to operate KVIC and Deenbandhu plant 	<ul style="list-style-type: none"> • Less Initial Investment • No civil construction work • Installation can be done within 1 day • No skilled labor is required • HRT= 7-10 days • Temperature is easily maintained in winter season by providing straw insulation • Material is easily available in nearby market. • Can be installed easily in hilly and remote areas. • No additional maintenance is required • Easy Operation

Economics of Flexi Biogas Plant

Sr. No	Name of Item	Price (approx), INR
1	1 m ³ Flexi Biogas plant	12,500
2	2 m ³ Flexi Biogas plant	15,000
3	3 m ³ Flexi Biogas plant	17,500
4	5 m ³ Flexi Biogas Plant	37,500

Technology of Flexi Biogas Plant

It is an air pillow type (flexi) prefabricated domestic biogas digester with gas holder made of high density polyethylene. PVC coated fabric material is used for the fabrication of flexi biogas digester and gas holder. The flexi digester has been placed in earthen pit with the gas holder above the ground. Biogas Digester is easy to install with no requirement for civil construction, and requires very little attention. There is no civil work involved in the installation of 1m³, 2m³, and 3m³ biogas plant whereas little civil work is needed for the installation of 5m³ and larger size flexi biogas plant. For 2m³ sized flexi biogas plant, the biogas digester consists of 3 inch inlet PVC pipe, 3 inch outlet PVC pipe with 3 inch elbow, 6 inch feeding funnel and 0.5 inch gas opening and closing valve. A mixing tank (plastic drum) along with hand operated agitator has been provided to mix cattle dung and water before feeding. A 20 watt (200 V, 50 Hz) biogas booster pump has been provided in kitchen to supply pressurized biogas to cooking stove (Fig 1). The biogas outlet valve is closed at the time of feeding of the plant. The digested slurry flows out of the outlet pipe into the slurry drying pit due to pressure of the biogas that accumulates in the gas holder. Flexi biogas models are the most advanced technology and cheapest in the market.

Substrates for 2 m³ Biogas Production

- Farm manure up to 50 kg/day– poultry, cattle, pig, horse, poultry(when mixed with other) manure.
- Plant waste up to 55 kg/day – leaves, twigs, little branches(shredded) waste.

Low cost advance flexi biogas plant is the alternate solution to rural and remote areas of India which required no civil work and can be installed within day

- Food waste up to 18 kg/day raw and 40kg/ day cooked; from Restaurants, Cafeterias, Groceries – food wastes like leftover food, fruit and vegetable peelings, over-ripped or spoiled fruits and vegetables, date expired food (shredded)waste.

Utilization of Biogas:

Cooking: Biogas can be used in a specially designed burner for cooking purpose. A

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biogas plant of 2 cubic metres capacity is sufficient for providing cooking fuel needs of a family of about five persons.

Lighting: Biogas is used in silk mantle lamps for lighting purpose. The requirement of gas for powering a 100 candle lamp (60 W) is 0.13 cubic metre per hour.

Power Generation: Biogas can be used to operate a dual fuel engine to replace up to 80 % of diesel-oil. Diesel engines have been modified to run 100 per cent on biogas. Petrol and CNG engines can also be modified easily to use biogas.

Flexi biogas plants are better low cost alternate option to peoples living in rural and remote areas. The Flexi biogas plant is easy to install and operate. The generated biogas meets the cooking as well as lighting need of rural family. Due to less construction work, the plant can be easily installed and repaired locally. Adaption and utilization of flexi biogas plants not only convert available organic waste in to useful gaseous fuel but it also contributes to reduce the global warming effect & harmful environmental emission. The use of Flexi biogas technology would help not only strengthen the energy security, create employment opportunities and have environmental benefits but also it helps to solve the waste management problem and create a clean and hygienic surrounding in rural and remote areas of India ◀◀