

**Green Thumb**

&

the  
**synodbioscience**  
..environment solutions for tomorrow, today..

Create savings & manage wet  
waste through Biogas



The Embassy Apartments, Bangalore

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# The Problem

- Fluctuating LPG costs, non-renewable commodity
- The daily per capita solid waste generated in our country ranges from about 300 g to 500 g
- Disposal of biodegradable waste is achieved by means like incineration, landfills, dumping in the sea or other water bodies, composting etc.
- These methods have their own hazards. One of the economic ways would be to raise biogas plants on biodegradable waste.



# The Solution – Domestic Biogas



Reduce LPG needs  
up to 50%



# What is Biogas?

- Biogas is flammable gas obtained from a process called Biomethanation using methanogens or methane producing bacteria.
- In an anaerobic condition organic waste is digested by methanogens that emit primarily, CH<sub>4</sub> (60-70%), CO<sub>2</sub>, small amounts of H<sub>2</sub>S, water vapour and other trace elements. The bacteria multiply in an ideal temperature of 25-35°C which is easily available in the tropics.
- Through biogas we can produce heat for cooking or boiling water and with larger quantities of organic waste, electricity can also be produced.
- The bi-product of producing bio-gas is slurry of concentrated liquid manure ideal for gardens and farming.
- By implementing Biogas, we also do our bit to the environment by capturing Methane which is a harmful Greenhouse gas, otherwise contributing to global warming



# How is Biogas produced?

To produce the gas an enclosed chamber is required so as to not allow air to enter, called a biogas digester.

The digester has 5 components:

- 1. Waste inlet:** *The organic solid waste is mixed organic waste water in a 1:1 ratio to achieve a homogenous mixture and poured in through this inlet. For obtaining the right bacteria to digest this waste, a one-time dumping of cow dung is required and the bacteria within is allowed to multiply after which the organic waste can be put in everyday*
- 2. Digestion chamber:** *Anaerobic decomposition takes place and methane gas rises within the chamber while the solid and liquid settle at the bottom*
- 3. Floating dome:** *The gas rises into a fiber dome or fiber coated metal dome placed above the digestion chamber that constantly floats in a small pool of water. As the gas rises into the dome, the dome also rises and exerts pressure on the internal gas and slurry*
- 4. Gas outlet & tube:** *The pressure from the dome causes the gas to pass through the gas outlet into a tube which is connected to a gas stove placed in the kitchen*
- 5. Slurry outlet:** *The solid and liquid waste that collects in the digestion chamber, will rise into the slurry outlet and can be collected with a bucket.*

# Portable Model – Home solutions

**Biogas Stove**



**Organic waste**



**Slurry**



**Vegetation**



**Gas rises**

**Anaerobic Digestion**

# Myths & Facts

**MYTH: It will stink up my house!**

Fact: Odour free and slurry obtained is an excellent form of rich, concentrated liquid manure

**MYTH: Biogas plants are unhygienic**

Fact: Biogas is one of the safest ways to dispose organic waste. It does not attract any flies, insects and pathogens thereby reducing spread of diseases

**MYTH: It takes a very long time to be produced and requires regular cow dung input.**

Fact: Only once cow dung need to be used and within 10 days, the unit will produced 1.5hrs of cooking gas everyday

**MYTH: They do not cook food like LPG**

Fact: Customers say they feel no difference and extra large holes in the burners ensure more heat

**MYTH: Large quantity of waste is required to make Biogas**

Fact: As little as 1.5kgs per day is sufficient to make gas for daily cooking

# Option 1 – Individual homes

| Quantity of waste/ day | Min to Max pax | Unit Capacity (cubic meter) | Area required (sq.m) | Output of gas (kg/hrs/day) | Output of slurry (lt./day) |
|------------------------|----------------|-----------------------------|----------------------|----------------------------|----------------------------|
| 1.5                    | 2-5            | 0.75                        | 1.1                  | 0.3/1.5                    | 2.5                        |

|  |              |
|--|--------------|
| Spending on LPG for first 6 cylinders          | Rs.2400/yr   |
| Rest 6 cylinders displaced by Biogas - SAVINGS | Rs. 4800/ yr |
| Manure value                                   | Rs. 1000/yr  |
| Cost of 0.75 cum unit to Bangalore *           | Rs.17,621    |
| Investment Return                              | 3.5 yrs      |
| Life Span                                      | 25 yrs       |
| Warranty                                       | 1 yr         |

\* (includes biogas unit, biogas stove, gas tube taxes, transportation & labour)



# Option 2 – Group/apartment complex

| Quantity of waste/ day | Min to Max pax | Unit Capacity (cubic meter) | Area required (sq.m) | Output of gas (kg/hrs/day) | Output of slurry (lt./day) |
|------------------------|----------------|-----------------------------|----------------------|----------------------------|----------------------------|
|------------------------|----------------|-----------------------------|----------------------|----------------------------|----------------------------|



# Handy housewives' tips

- The input should be in the ratio of one part water and one part solid waste.

**Solution: Save up the water used to wash rice, dhals & vegetables, mix with wet waste and pour the mixture into the inlet**

- The optimum temperature within the digester is 25-30° C. When temperatures drop and you find the output of gas low.

**Solution: Add luke warm water.** Make luke warm water from

- Whey of paneer
- Whey of pasta/noodles/rice
- Remaining water from a pressure cooker
- Any hot tawa/dish after cooking to be immersed in waste water

- The upper drum floats in fresh water which attracts mosquitoes.

**Solution: Convert it into an aquarium by adding guppy fish that will eat the mosquito larvae**