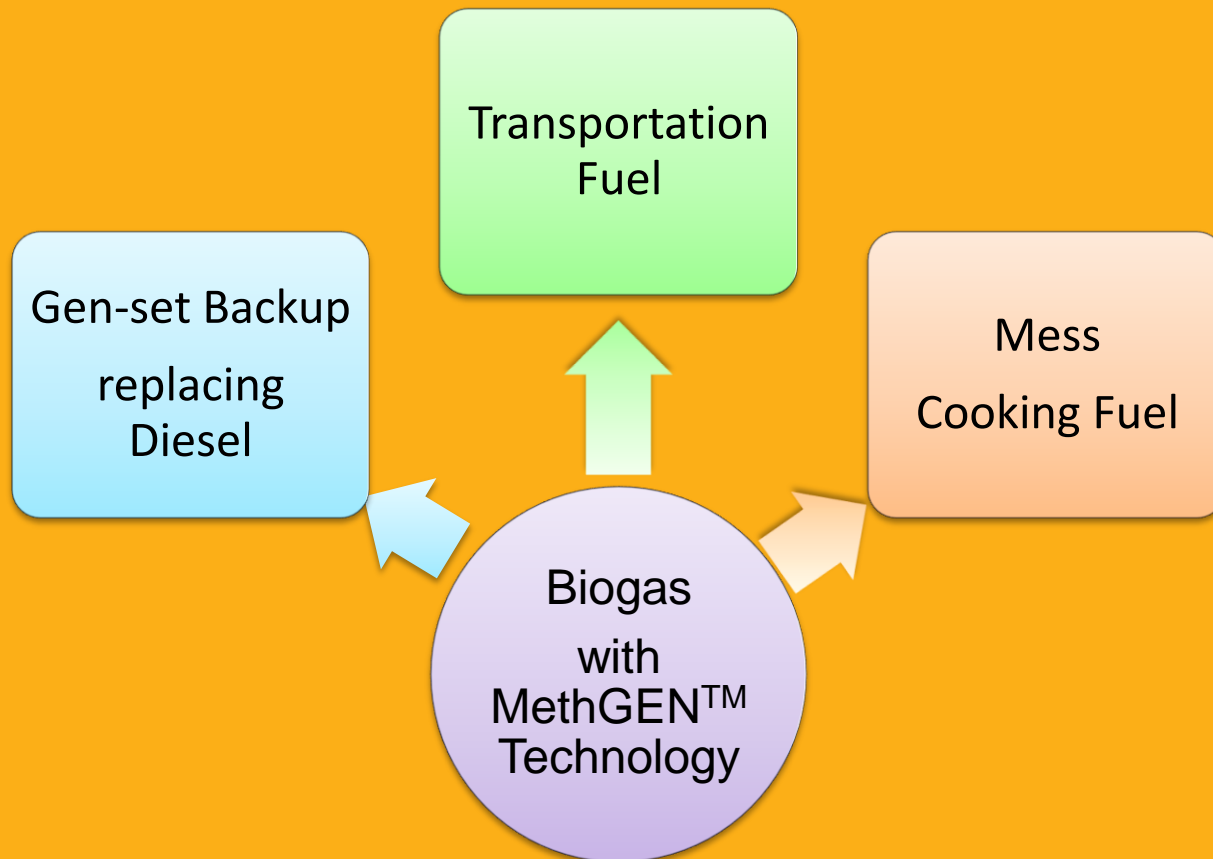


Renewable Natural Gas - Bio CNG



Biogas Sources (Substrates)



Waste water streams from the following Industries:

- **Distilleries**
- **Pressmud/Bagasse**
- **STP (Municipal solid, liquid and landfills)**
- **Food-Agro Processing units (starch-palm- food etc)**
- **Animal droppings-(pig-poultry-cattle etc)**
- **Dairy**
- **Farm Waste (Rice husk, straw etc.)**

What is Bio-CNG?

Purified Biogas is called Bio CNG

- Bio CNG is ***renewable Natural Gas***
- Bio CNG is exactly similar to Natural Gas in composition and properties
- It is a direct replacement of NG and for applications of LPG

Parameters	Biogas	Bio-CNG
Methane (v/v)	55-65%	92-98%
CO ₂ (v/v)	35-45%	2-8%
H ₂ S (ppm)	500 – 30,000	<20 ppm
Moisture (deg C dew point)	Saturated	< -40 deg
Other Impurities (e.g. Siloxanes)	Present	Not present
Calorific Value (LCV)	~ 19500 kJ/kg	~ 52000 kJ/kg

Potential of Bio CNG in India

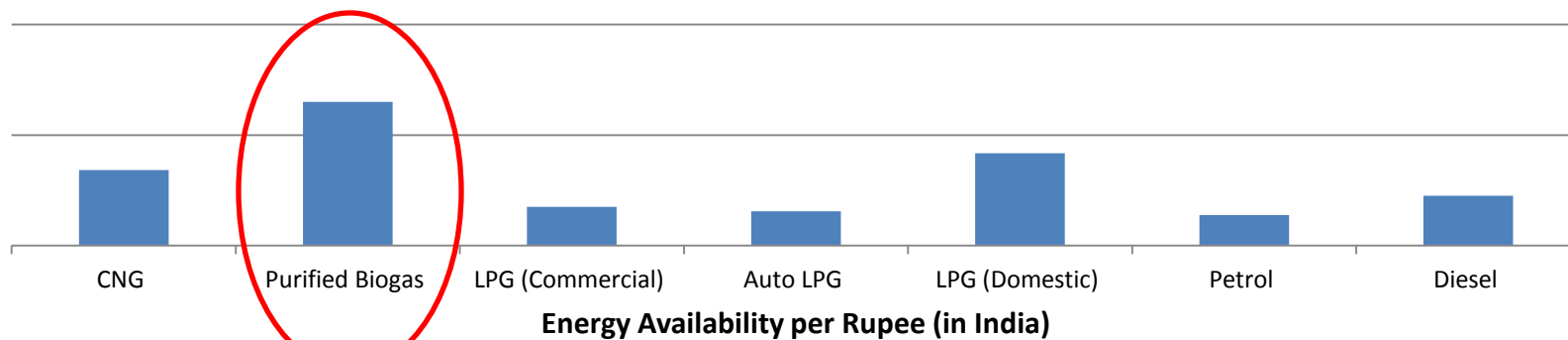
- High potential industries for Biogas:
 - Primary: Distillery, Sugar, and Starch (75% Biogas)
 - Secondary: Pulp and paper, Milk processing, Slaughter house, and Poultry

Biogas India Potential		
1281 MWe	70 lac kg of CNG/LPG per day	7 lac full-tank cars daily

Fuel: Value per Rupee

Fuel	Calorific Value	Tariff/Rate/Cost	Cost of Energy
CNG	52000 kJ/kg	Rs. 38.0/kg	1368 KJ/Rs.
Purified Biogas	52000 kJ/kg	Rs. 20/kg *	2600 KJ/Rs.
LPG (Commercial)	46000 kJ/kg	Rs. 65.7/kg	700 kJ/Rs.
Auto LPG	46000 kJ/kg	Rs. 74.0/kg	621 kJ/Rs.
LPG (Domestic)	46000 kJ/kg	Rs. 27.5/kg	1673 kJ/Rs.
Petrol	48000 kJ/kg	Rs. 65.5/ltr	550 kJ/Rs.
Diesel	44800 kJ/kg	Rs. 41.3/ltr	900 kJ/Rs.

* Based on industrial ETP biogas



Sweden: An example

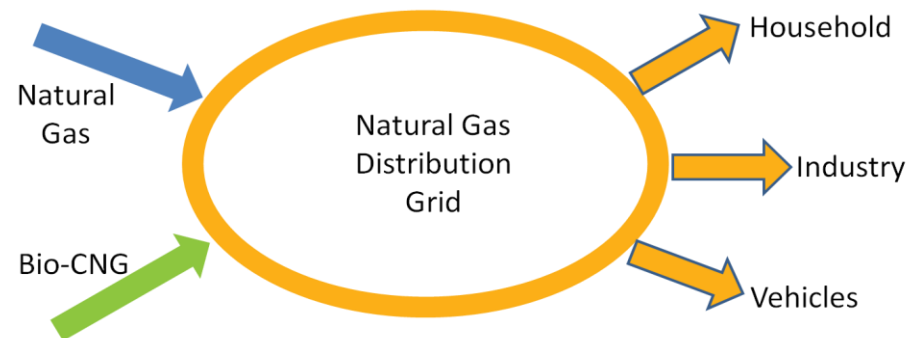
Sweden plans to be World's **first oil-free** economy by **2020**



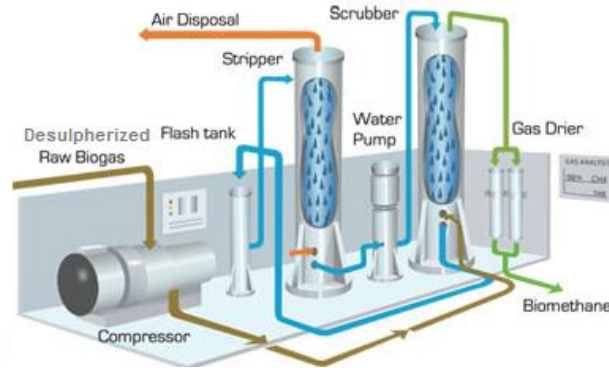
Train trial run on Bio-CNG in Sweden

Most of the heating requirement of this cold country is met through Bio-CNG.

Bio-CNG is pushed in to NG pipeline



Biogas to Bio CNG (Renewable Natural Gas)



3 Upgrade biogas to CNG composition

4 Compress & bottle greenCNG™

2 If $H_2S > 1500$ pm, Desulferize

1 Identify & establish biogas sourcing & plant lease agreement



5 Sale agreement w/ Industrial Kitchens

6 Provide CNG-LPG conversion kit & supply ready-to-use Cylinder Cascade

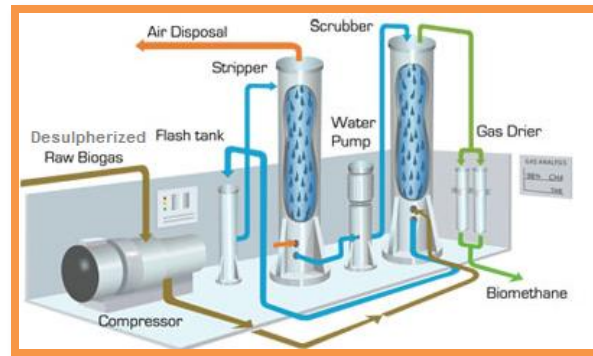
Closed Loop Recycling System

Biogas Source

Biogas to Bio CNG Conversion

Bio CNG Sale

**Distilleries
Breweries
Paper and Pulp
Tanneries
Slaughterhouses
STPs
Palm Oil
Starch
Food Processing**



Bio gas to Bio CNG plant

**Vehicular Fuel
Food Processing
Bakeries
Plastic Molding
Ceramics/Tiles
Glass
Steel
Rubber
Large Kitchens
Hotels/Restaurants
Others using fuel gas**

Govt. Policy, Role & Support



- MNRE subsidy scheme: 'Biogas Generation and Fertilizer Program (BGFP).
 - Under BGFP, 50% capital subsidy was given for biogas purification systems till 11th 5 year Plan.
- Biogas purification is a CDM based CER eligible project.
- BIS standards for purified biogas as approved fuel are developed & due notification.
- 100% depreciation in first year for scrubbing units, if classified as air pollution control equipments
- Better loan terms
- REC based certificates for fuel RTFC will be the next step. (US/UK/Australia)

India: Getting Started



- First few projects taken off:
 - Warana Sugar, WaranaNagar
 - Kisan Veer Satara SSK, Satara
- BIS standards to be notified
- ARAI (Automotive Research Association of India) to permit vehicular use of Bio-CNG
- Pipeline model to be implemented



About us

- We are a company of IIT and Harvard Alumnus based at Delhi.
- GBES is a company engaged in the design and manufacture of specialized purification equipments for industrial scale biogas. We also deal in water treatment by providing solutions to industry and real estate projects.
- GBES has been founded by five IIT alumnus and has a MOU with IIT and BARC (Bhabha Atomic Research Centre) for further R&D and technology transfer.
- In this short period bagged orders and signed MOU for application and installation of methGEN™ in India and Malaysia.

www.gb.es.in



Thank you.

