SY GREEN ENERGY

NEW FUTURE FOR WORLD

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SY GREEN ENERGY

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BASIC DETAILS OF THE PROJECT

INTRODUCTION

The main objective of the project is to set up a compressed biogas plant to sell the Bio CNG to the local user at around Rs. 55 per kg. The plant also produces organic manure in large quantities which can be sold at about Rs. 1.5 per kg in an open market. Bio CNG is in good demand. Similarly, organic manure is always in short supply. It is needed for fruits and vegetables and horticulture farming. The plant can be set up in a place where cow dung and Poultry droppings is available in large quantity or some other source of waste biomaterial is available.

PRODUCT

ENRICHED BIOGAS COMPOSITION (As per BIS # IS 16087):
CH4 > 90% H2S < 30.6 mg / Cubic Meter H2O (Moisture) < 0.016 gm/m3 CO2 + N2 + O2 + other gases < 10%
COMPRESSED BIOGAS (CBG) USE:
Industries Canteens Restaurant Hotels Hostels Sweet shop Dhabas, etc.
BIOGAS FERTILIZER (LIQUID SLURRY) - ANOTHER-OPTION:
Liquid slurry is rich in micro & macro nutrients along with NPK and can be directly applied in fields.

CAPACITY	A standard biogas plant of capacity 1000, 3000, 6000 or 12000 Cubic Meters per day can be used. We also know that 1 CU M raw biogas gives 400 Gram compressed biogas.			
BASIC CAPACITY OF THE PLANT (Cubic Meter Raw Biogas Production)	**1000**	**3000**	**6000**	**12000**

GAS STORAGE CAPACITY (Cubic Meter)	500	1500	3000	6000
DUNG MIXING TANK WITH STIRRER (Cubic Meter)	80	240	480	960
SLURRY FEEDING TANK (Cubic Meter)	80	240	480	960
DIGESTER SLURRY EVACUATION TANK (Cubic Meter)	80	480	960	1920

PRODUCTS/ BY-PRODUCTS AND CAPACITY	**The total power units and bio manure produced per day as per the capacity are the following:**			
BIOGAS PLANT CAPACITY (CUBIC METER PER DAY)	1000	3000	6000	12000
ENRICHED BIOGAS CAPACITY (Nm3 per day)	550	1650	3300	6600
ENRICHED BIOGAS CAPACITY (Kg per day)	400	1200	2400	4800
ORGANIC FERTILIZER (30% moisture) (MT/day)	5	15	30	60
ORGANIC FERTILIZER (30% moisture) (MT/Yr.)	1750	5250	10500	21000

ANNUAL RAW MATERIAL INPUT REQUIREMENT

The main raw material required for the plant is cow dung or poultry droppings Biomass or Food waste. This will be procured from dairies and farms in nearby areas. Water is required for the process. A tube well will be installed for meeting water requirements.

The supply of cow dung is available at Rs. 350 per ton delivered at the site and ready to use (for financial modeling, the same rate of Rs. 350 per ton has been taken). Poultry Litter will be available at Rs. 450 per ton. If Biomass waste and food waste are available, they can also be used. Biomass waste will be available at Rs.1000 per ton. We can always mix these wastes as per availability.

Below we are giving approximate quantities of the requirements:

PLANT CAPACITY (NCUM)	1000	3000	6000	12000
DUNG REQUIRED DAILY (TON)	20	60	120	240
OR				
POULTRY DROPPINGS (TON)	7	21	42	84
OR				
BIOMASS WASTE (TON)	7	21	42	84
OR				
FOOD WASTE (TON)	10	30	60	120
A combination of any of these can also work in proportionate quality.				

Note: Production of Biogas is subject to the type of raw material used and its quantity.

Food waste can include the following:

- Kitchen waste
- Vegetable & fruit market waste
- Food processing waste & other biodegradable waste

NAME OF CONSULTANT

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PLANT AND MACHINERY

The entire plant and machinery are easily available from many different suppliers. The know-how is also available from very reliable sources.

The plant will run for 350 days per year, using sophisticated and proven Anaerobic Digestion CSTR technology. Anaerobic digestion is a renewable energy generation process in which microorganisms break down biodegradable material in the absence of oxygen. Anaerobic digestion technology was developed long back and commercialized in Europe and is technically considered a low-risk, high-output technology.

REQUIRED AREA

The buildings for the project will consist of a cylinder filling room, administrative office, security room, etc. The provision for tube well, foundations for equipment, internal roads, etc. have also to be made.

To ensure a continuous supply of waste, the location of the plant has to be in the rural background away from city limits. The land is needed for the planned biogas capacity, storage of cow dung & poultry droppings or other waste, and organic manure produced.

PLANT CAPACITY (NCUM)	1000	3000	6000	12000
AREA REQUIRED (Sq. feet)	4000	8000	12000	24000
Normal Water (Liters/day)	5000	15000	30000	60000
Recycled Water (Liters/day)	15000	45000	90000	180000
Electric Load (Maximum) kW	20	50	120	240

OPERATION

The unit will give employment to at least 8 to 16 persons. The maximum capacity utilization taken is 90%. For marketing the product, we have to take care of the requirements of the different bulk consumers in horticulture in north India.

Daily operating hours: 18 hours.

GOVERNMENT SUPPORT

Central Financial Assistance (CFA) for different categories of projects is given below:

S.No.	Output	Capital Subsidy	Description
1	**Biogas**	Rs. 1.0 crore per 12000m3 Biogas /day. (Max. Rs.10 crore/project)	Biogas generation from Urban waste/ Agricultural Waste/ Industrial wastes/ Effluents or a mix of these wastes. (Distillery effluent is excluded)

2	**Power**	Rs 3.0 crore. Per MW. (Max. Rs.10 crore/project)	Power generation based on Biogas generated from Urban waste/ Agricultural Waste/ Industrial wastes/Effluents or a mix of these wastes. In case, the developer wants to set up a power generating unit at an already existing Biogas generation unit, in that case, the applicable CFA will be only Rs 2.0 crore per MW.
3	**BIO-CNG / Enriched Biogas**	Rs 4.0 crore. Per 4800 kgs of BIO-CNG/day generated from 12000m3 Biogas /day. (Max. Rs.10 crore/project)	BIO-CNG generation is based on Biogas Generated from Urban waste/Agricultural Waste/ Industrial wastes/Effluents or a mix of these wastes. In case the developer wants to set up BIO-CNG generating unit at an already existing Biogas generation unit, the applicable CFA will be Rs 3.0 crore.
4	**Gasifier Thermal /Electrical in Industries/Villages**	Electrical Rs. 2,500 per kW with dual fuel engines Rs. 15,000 per kW with 100% gas engines Thermal Rs. 2 lakh per 300 kW for thermal applications	Biomass gasifier-based Captive Power & thermal applications in industries Distributed / off-grid power for villages using biomass gasifier systems.

SALES

Once operational, the Project will generate revenues through the sale of CBG, and fertilizer.

The CBG can be profitably sold to the local market at a comparative quality and a price of Rs. 55/- per Kg, a price less expensive than the current commercial LPG. The dry Bio-fertilizer is to be sold at Rs. 1.5/kg.

COMPARISON WITH OTHER FUELS

Fuel	Calorific Value	Tariff/Rate/Cost
CNG	52000 kJ/kg	Rs. 50.0/kg

Purified Biogas	52000 kJ/kg	Rs. 55/kg
LPG (Commercial)	46000 kJ/kg	Rs. 72.07/kg
Auto LPG	46000 kJ/kg	Rs. 74.0/kg
LPG (Domestic)	46000 kJ/kg	Rs. 40/kg
Petrol	48000 kJ/kg	Rs. 77.98/ltr
Diesel	44800 kJ/kg	Rs. 68.90/ltr

IMPLEMENTATION SCHEDULE

PHASE	ACTIVITIES	TIME REQUIRED IN MONTHS FOR THE ACTIVITY	FUNDS REQUIRED IN % OF THE PROJECT COST
1	**COMPANY FORMATION**	**1**	**0.25%**
	• Company name approval		
	• Company incorporation		
	• Issue of Certificate		
	• Commencement of Business certificate		
	TOTAL TIME AND COST FOR THE PHASE		
2	**PROJECT DEVELOPMENT**		
	• Site selection	1	5.00%
	• Detailed Project Report	1	1.00%
	• PESO license application	1	0.50%
	• Documentation for Loans	1	2.00%
	TOTAL TIME AND COST FOR THE PHASE	**2**	**8.50%**
3	**DESIGN AND ENGINEERING**	**1**	**3.00%**
	• Detailed design and engineering		

	TOTAL TIME AND COST FOR THE PHASE		
4	**CONSTRUCTION AND COMMISSIONING**		
	• Order for the Plant and Machinery	1	10.00%
	• Start of civil work	1	10.00%
	• Completion of the civil work of the digester	3	20.00%
	• Completion of the entire mechanical work of the digester and biogas holder	1	
	• Fabrication and commissioning of the purification unit	3	20.00%
	• Commissioning of the compressor system	1	15.00%
	• Completion of the slurry system	1	5.00%
	• Commissioning of the complete system	3	8.25%
	TOTAL TIME AND COST FOR THE PHASE	**9**	**88.25%**

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TECHNOLOGY

BIOGAS TECHNOLOGY

BIOMETHANATION

The bio-methanation process is one of the most essential processes for treating the Biodegradable portion of Solid Waste. In this process, the organic matter is converted into biogas which is a very useful form of energy. For the bio-methanation process, the bio-methanation process reactor, called a Bio-digester is used in which the temperature and atmosphere are controlled for the process to occur. Anaerobic processing of organic material is a two-stage process, where large organic polymers are fermented into short-chain volatile fatty acids. These acids are then converted into methane and carbon dioxide. Both the organic polymer's fermentation process and acid conversion occur at the same time, in a single-phase system. The separation of the acid-producing (acid-organic) bacteria from the methane-producing (methanogenic bacteria) results in a two-phase system.

The main feature of the anaerobic treatment is the concurrent waste stabilization and production of methane gas, which is an energy source. The retention time for solid material in an anaerobic process can range from a few days to several weeks, depending upon the chemical characteristics of solid material and the design of the bio-gasification system (e.g., single-stage, two-stage, multi-stage, wet or dry, temperature and pH control). In the absence of oxygen, anaerobic bacteria decompose organic matter as follows:

The conditions for bio-gasification need to be anaerobic, for which a totally enclosed process vessel is required. Although this necessitates a higher level of technology than compared to composting, it allows greater control over the process itself and the emission of noxious odors. Greater process control, especially of temperature, allows a reduction in treatment time when compared to composting. Since a biogas plant is usually vertical, it also required less area than a composting plant.

Bio-methane, after installation of the requisite equipment, is essentially free, as opposed to buying natural gas. Bio-methane has similar qualities to methane and both are used interchangeably, and each may be a substitute for the other.

Organic matter + anaerobic bacteria -CH_4 + CO_2 + H_2S+ NH_3 + other end products + energy Biogas is a mixture of gases composed of the following:

- Methane (CH_4) 40 - 70 % by volume,
- Carbon dioxide (CO_2) 30 – 60 % by volume,
- Other gases 1 – 5 % by volume including hydrogen (H_2) 0-1 % by volume Hydrogen Sulphide (H_2S)
- 0 – 3 % by volume.

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BIO-METHANE FROM ANAEROBIC DIGESTERS

Anaerobic processes could either occur naturally or in a controlled environment such as a biogas plant. Organic waste such as livestock manure and various types of bacteria are put in an airtight container called a digester so the process could occur. Depending on the waste feedstock and the system design, biogas is typically 55 to 75 percent pure methane. State-of-the-art systems report producing biogas that is more than 95 percent pure methane.

The primary component of an AD system is the anaerobic digester, a waste vessel containing bacteria that digest the organic matter in waste streams under controlled conditions to produce Bio-methane. As an affluent, AD yields nearly all of the liquid that is fed to the digester. This remaining fluid consists of mostly water and is recycled to flush manure from the swine building to the digester.

KG WASTE REQUIRED PER CUBIC METER OF BIOGAS GENERATION (APPOX.)

S.NO.	FEED MATERIAL	Quantity
1	Cattle Dung	20
2	Poultry Waste	8
3	Horse dung/ mule dung/ elephant dung	10 to 15
4	Food waste: Pre and post-cooked leftover food from households, hotels, and canteens.	10 to 12
5	Green waste (vegetable market waste): Vegetable refuses from Vegetable Markets or kitchens.	10 to 12
6	Paddy straw/ wheat straw/ mushroom spent waste: Lawn cuttings, leafy biomass, dried flowers, finely chopped and ground straw or bagasse.	5 to 8
7	De-oiled rice bran	3 to 4
8	De-oiled seed cake (Pongamia / Jatropha)	3 to 4
9	Segregated municipal solid waste (biodegradable)	10 to 15
10	Slaughterhouse waste (blood, flesh, and leftover food in the gut of an animal)	5 to 10
11	Algae or plants material recovered from water bodies	
12	ETP and STP grease and sludge.	
13	Used vegetable oil	

EQUIVALENT QUANTITY OF FUEL FOR 1 CUM OF BIOGAS

Biogas	1.00 CUM	**Butane**	0.433 Kg
Kerosene	0.620 Ltr.	**LPG**	0.456 Kg
Fire wood	3.474 Kg	**Electricity**	1.5 – 2.5 kWh
Charcoal	1.458 Kg		

ELECTRICITY GENERATION

Commercial electricity generation systems that use biogas typically consist of an internal combustion (IC) engine, a generator, and a control system. IC engines designed to burn propane or natural gas are easily converted to burn Bio-methane by adjusting carburetion and ignition systems.

Such engines are available in nearly any capacity, but the most successful varieties are industrial engines that are designed to work with wellhead natural gas. A biogas-fueled engine will normally convert 35 to 40 percent of the biogas Btu value to electricity. Biomethane-based engines reject approximately 60 percent of the energy input as waste heat.

PLANT ORGANIC FERTILIZER

USING THE EFFLUENT

The material drawn from the digester is called sludge, or effluent. It is rich in nutrients (ammonia, phosphorus, potassium, and more than a dozen trace elements) and is an excellent soil conditioner. It is being used widely as organic fertilizer. Any toxic compounds (pesticides, etc.) that are in the digester feedstock material may become concentrated in the effluent. Therefore, it is important to test the effluent before using it on a large scale.

Waste coming out of the digester can be separated (solid/liquid) to use the solid part as fertilizer and use the liquid part as fertilizing irrigation or to be treated further for rejection in nature.

The digested slurry can also be fed directly to the crop through the irrigation channels or it can be stored and used later whenever required. To derive maximum benefits from the stored digested slurry, it is essential to prevent its exposure to the sun as any such exposure would result in the loss of ammoniacal nitrogen content of the slurry. It is advisable to dig, two or three manure pits near the biogas plant. The slurry is then carried and stored in these pits which are covered with solid waste from the farm.

The fresh biogas slurry when used by mixing with irrigation water to grow crops gives better yields as compared to other modes of its applications.

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QUALITY OF MANURE

The C: N ratio of organic manure is between 12:1 to 16:1. It is a good source of Nitrogen, Phosphorous, Potassium, and Iron. The typical elemental composition of the organic manure and biogas obtained at two of the operating plants based on BARC technology is given below:

ELEMENTAL COMPOSITION OF ORGANIC MANURE

Sr. No.	Parameter	Concentration %
1	**Calcium**	0.39-0.65
2	**Iron**	0.18-0.32
3	**Magnesium**	0.032-0.01
4	**Manganese**	0.0059-0.008
5	**Nitrogen**	2.6-3.5
6	**Phosphorous**	0.8-0.9
7	**Zinc**	0.007-0.009
8	**Potassium**	0.8-0.95

In other words, one ton of slurry provides 44 kg of nutrients as compared to 19 kg through farmyard manure and 27 kg by compost. Micronutrients such as zinc (Zn), copper (Cu), and manganese (Mn) present in the original material are also recovered in biogas slurry and can prove useful to crops when used as organic manure.

The nutrient composition of slurry manure is shown in Table:

S. NO.	PARAMETER	AMOUNT
1	Total Nitrogen (%)	1.40 – 1.84
2	Total Phosphorous (%)	1.10 – 1.72
3	Total Potash (%)	0.84 – 1.34
4	Organic Carbon (%)	35.0 – 38.4
5	Zinc (mg/kg)	103 – 116
6	Copper (mg/kg)	51 – 68

7	Manganese (mg/kg)	231 – 295
8	Iron (mg/kg)	3200 – 3600
9	Carbon / Nitrogen ratio	10 – 15
10	Organic matter	65%

The organic manure produced is recommended for the following crops:

- **Short-term crops:** Vegetables and Fodder
- **Mid-term crops:** Wheat, cotton, Rice, Potato, Sugarcane, and Maize
- **Long-term crops:** Kinnow, Guava, Grapes, Mango, Lemon, and Apple

CROPS	DOSES	TIME OF APPLICATION
Wheat, Rice, Maize, and Cotton	200-400 Kg/Acre	During the preparation of Land for Sowing
Sugarcane, Potato	400-800 Kg/Acre	Half Dose of Manure during the preparation of Land and the remaining half after two-three months of sowing
Vegetable	200-400 Kg/Acre	20-30 Days after the plantation
Kinnow, Guava, Grapes, Mango, Lemon and Apple.	5-10 Kg/tree	Two times a year

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POTENTIAL APPLICATIONS

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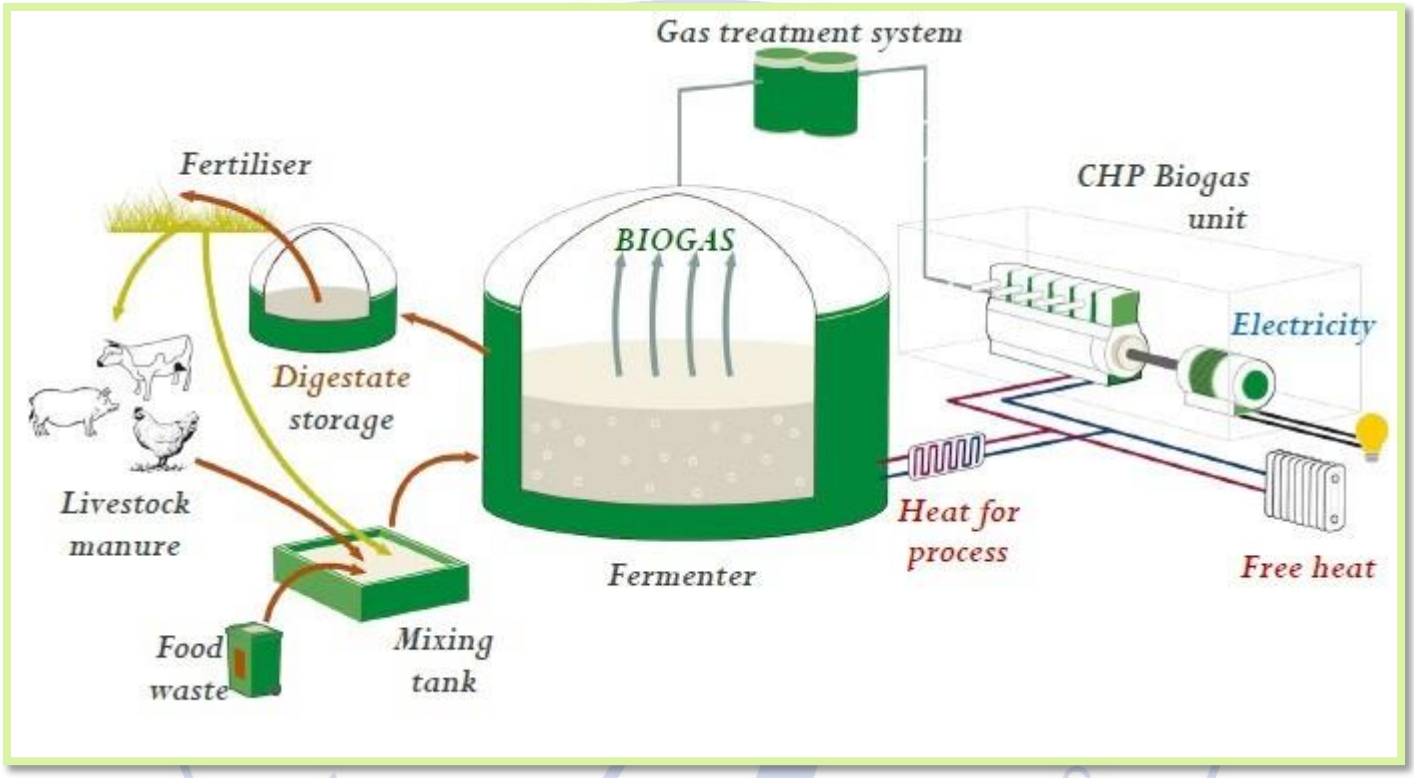
POWER GENERATION

Biogas plant-engine system combined with a generator provides electrical energy for lighting and other household/industrial purposes.



THERMAL APPLICATION

Biogas Plants could be used for any heating, melting, burning, or drying process where an operating temperature is up to 1250 degree centigrade is required. Some of the potential applications of Biogas plants are as under:

- Institutional Cooking/Hotels / Restaurants/Food Processing/Bakeries/Tea / Coffee processing
- Steel re-rolling mills and forgings/Charcoal production/Textile Dyeing
- Heat treatment furnaces/Limekiln and other industrial kilns Ceramic Kiln
- Melting & Heating of Non-ferrous metals/Annealing & heat treatment/Lube oil refineries
- Namkeen and sweat industries
- Boilers/Thermal Fluid heaters/Galvanizing furnaces
- Plywood Industries/Candy Manufacturers/Rubber & Footwear industries/Silk dyeing and carpet units.

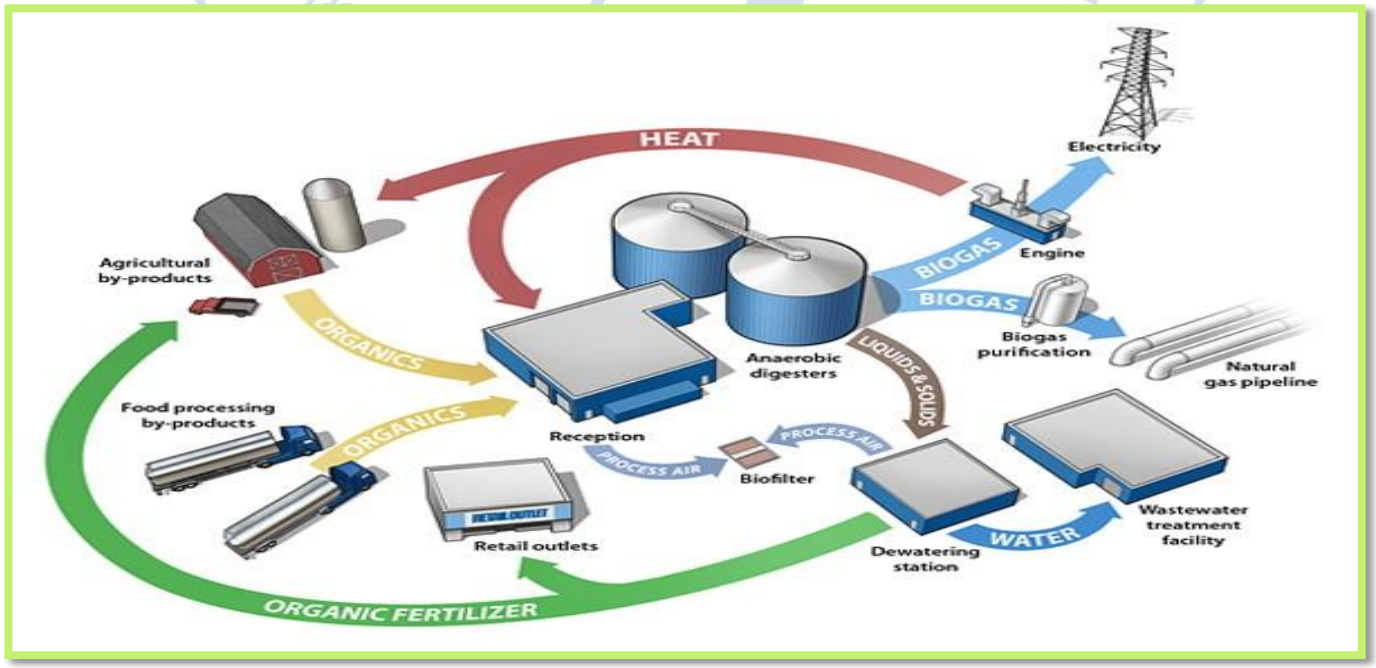
COMMERCIAL APPLICATIONS OF THE BIOGAS PLANTS

Biogas can be either used for thermal applications or we can generate electrical power using it as a fuel.

COMPRESSED BIOGAS SYSTEM: Thermal application is done either by filling the compressed biogas in cylinders and then taking those cylinders to the application site or by direct burning of the biogas at the generation site.

BIOGAS POWER GENERATION SYSTEM:

Electrical power is generated at the biogas generation site only. The plant size can be from a few kW to a few MW.



BENEFITS OF BIOGAS PLANTS

A non-polluting and renewable source of energy is created in biogas plants. During the process, organic waste is converted to useful fuel. It is an excellent way of energy conversion. Compressed biogas or electrical power can be used in Industries, Canteens, Restaurants, Hotels, Hostels, Sweet shops, Dhaba, etc.

- It leads to energy security via the conservation of natural resources (LPG, wood, kerosene, coal, etc.).
Many types of raw material (other than dung) can be used in the plant: Kitchen Waste, Vegetable & Fruit Market Waste, Agro & Farm Waste, Food Processing Waste, and other Bio Degradable Waste.
- It destroys Methane, which is a potent greenhouse gas with a heat-trapping capacity of approximately 21 times that of carbon-di-oxide. It thus leads to the reduction of global warming.
- Biogas plants also produce enriched organic manure. This can be used as fertilizers. The liquid slurry is rich in micro & macronutrients along with NPK and can be directly applied in fields. It leads to soil improvement due to high nitrogen content.
- Biogas as a gas provides an improvement in the environment, sanitation, and hygiene through proper management of waste.
    - It improves groundwater quality as anaerobic digestion provides several water quality benefits.
    - Biogas digesters can destroy more than 90% of disease-causing bacteria that can otherwise enter surface water. Thus, it reduces the risk to human and animal health.

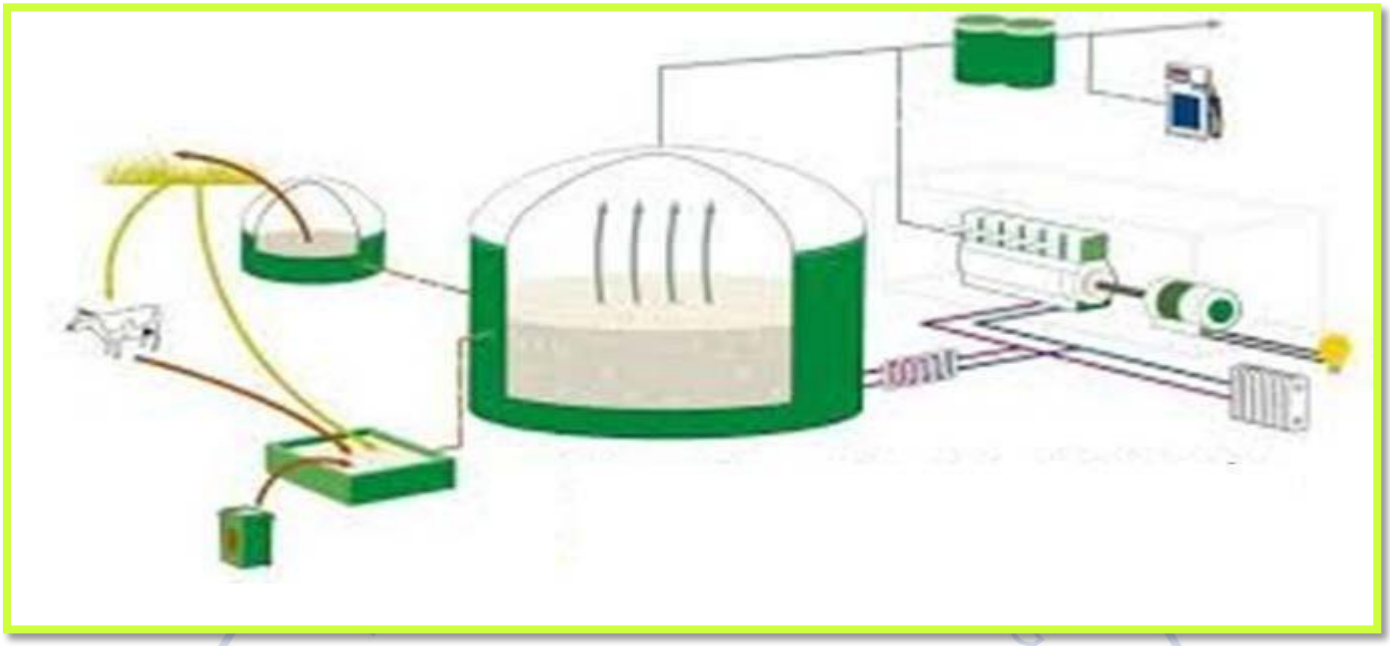
PLANT AND MACHINERY

COMPRESSED BIOGAS SYSTEM

DESCRIPTION & OPERATION OF THE SECTIONS OF THE COMPRESSED BIOGAS PLANT

BIOGAS PRODUCTION PLANT

It deals in the generation of biogas from Cow Dung or Poultry droppings. Biogas is produced in an anaerobic digester i.e., a Biogas plant. Biogas in its natural self consists of Methane gas, Carbon dioxide, Hydrogen Sulphide, Moisture, and traces of other gases. These are the components of the section:



RECEIVING TANK

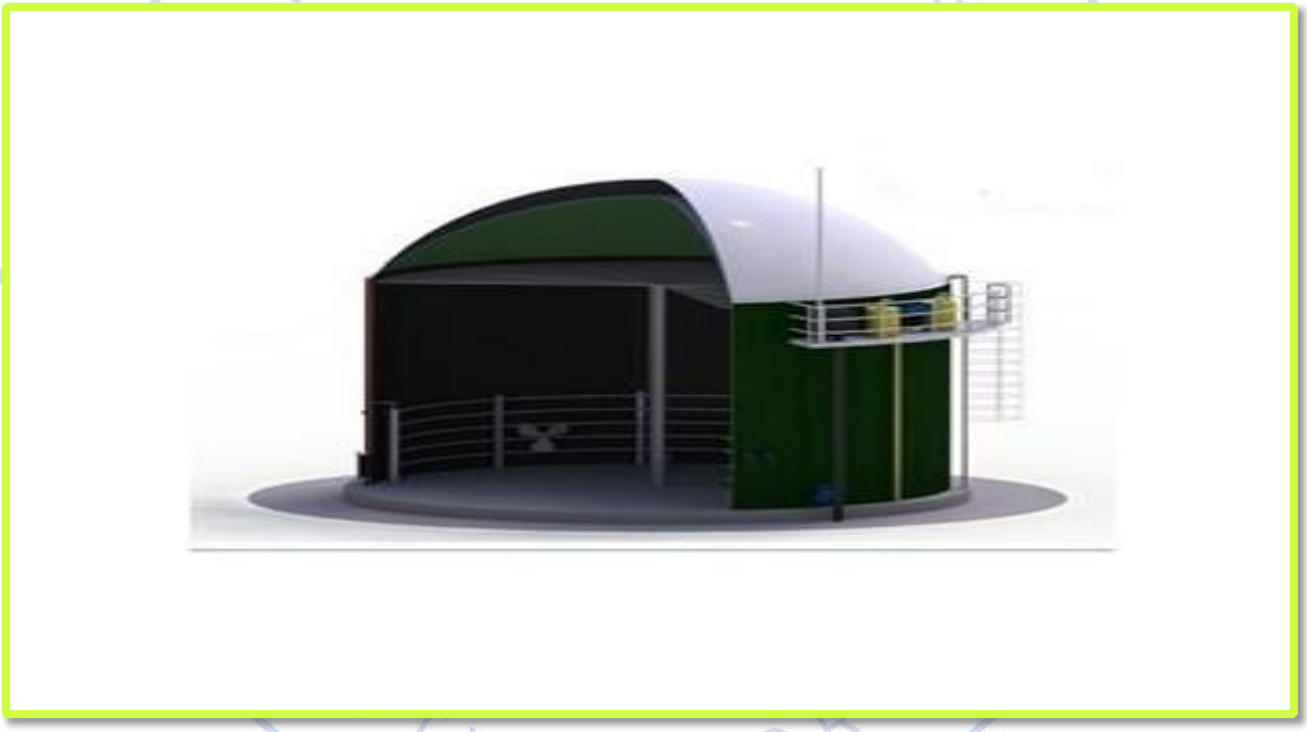
The Dung is mixed with water in the receiving tank with the help of a mechanical stirrer. The ratio of the mixing of water and waste depends upon the quality of the material. The material is thoroughly mixed till a homogeneous slurry is formed.

INLET PIPE

The slurry is moved into the digester through the inlet pipe.

DIGESTER

The mixed slurry is then fed to the anaerobic digester for the production of biogas. It is equipped with a stirrer and heating system. Inside the digester, the slurry is fermented. Biogas is produced through bacterial action. Temperature is maintained around 35°C.



DOUBLE MEMBRANE TOP BALLOON

The biogas thus formed gets collected in the gas holder. It holds the gas till the time it is transported for purification. A separate biogas balloon can work as gas holder.

A Outer membrane **B** Inner membrane **C** Air Flow System **D** Brace system
E Anchor ring **F** Air regulation valve **G** Support air blower **H** Safety valve
I Inspection window

EFFLUENT BUFFER TANK

The slurry is discharged into the outlet tank. This is done through the outlet pipe or the opening in the digester.

EXCESS GAS FLARING SYSTEM

The excess gas flaring system is provided to flare the biogas when the engine generator set is under maintenance & storage is full. As methane is a greenhouse gas and highly flammable, it cannot be allowed to evacuate freely into the atmosphere.

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PURIFICATION PLANT

Biogas is an economical, renewable, and eco-friendly fuel. Biogas produced in an anaerobic digester consists of Moisture, Carbon dioxide, Hydrogen sulfide, and Methane gas. Methane

has a high calorific value in its pure stage. Due to the presence of impurities, Biogas becomes a very low calorific value fuel and hence finds a very limited application even though it is cheap and easily available.

Head Office: 401, 4th Floor, Kahan Commercial Complex, Ring Road, Odhav, Ahmedabad-382415.
Work Shop: Plot No. 1805, Phase-3, GIDC Estate Vatva, Ahmedabad-382445.

We have to extract pure and high calorific value fuel methane from low calorific fuel Biogas to make it suitable for compression. Once pure Methane is available in suitable quality and quantity it finds a wide range of applications from Motor car Engines, as cooking fuel, and to operating a Gas Turbine for rural power generation. Main components of the section:

WET SCRUBBER

Biogas generated from the digester is allowed to flow through moisture traps. This process drains out the water droplets present in the gas. Raw Biogas is compressed by the Low-Pressure Compressor and fed to the bottom of the Packed Tower and from the top water is sprayed through the water Rota pump. Gas and water interact inside the tower in counter-current; as a result, carbon dioxide and hydrogen Sulphide dissolve in water. Water with dissolved gases exits from the bottom of the tower and releases dissolved gases in the cooling tower at atmospheric pressure. The Physical Absorption Device is a specially designed modern high-pressure combined directional flow device for cleaning Biogas of its high impurities.

REFRIGERATED DRYER

Enriched gas exiting from the top of the tower contains moisture which is removed by condensing it at scrubber pressure and low temperature through Refrigerated Drier.

BIOGAS ONLINE MONITORING

A monitoring device is fitted after the filters to gauge the quantum of different gases H2S, CO2, CH4 and Moisture present in the gas.

BOTTLING AND DISTRIBUTION SYSTEM

It deals in compressing and filling Methane in a Gas Bottle:

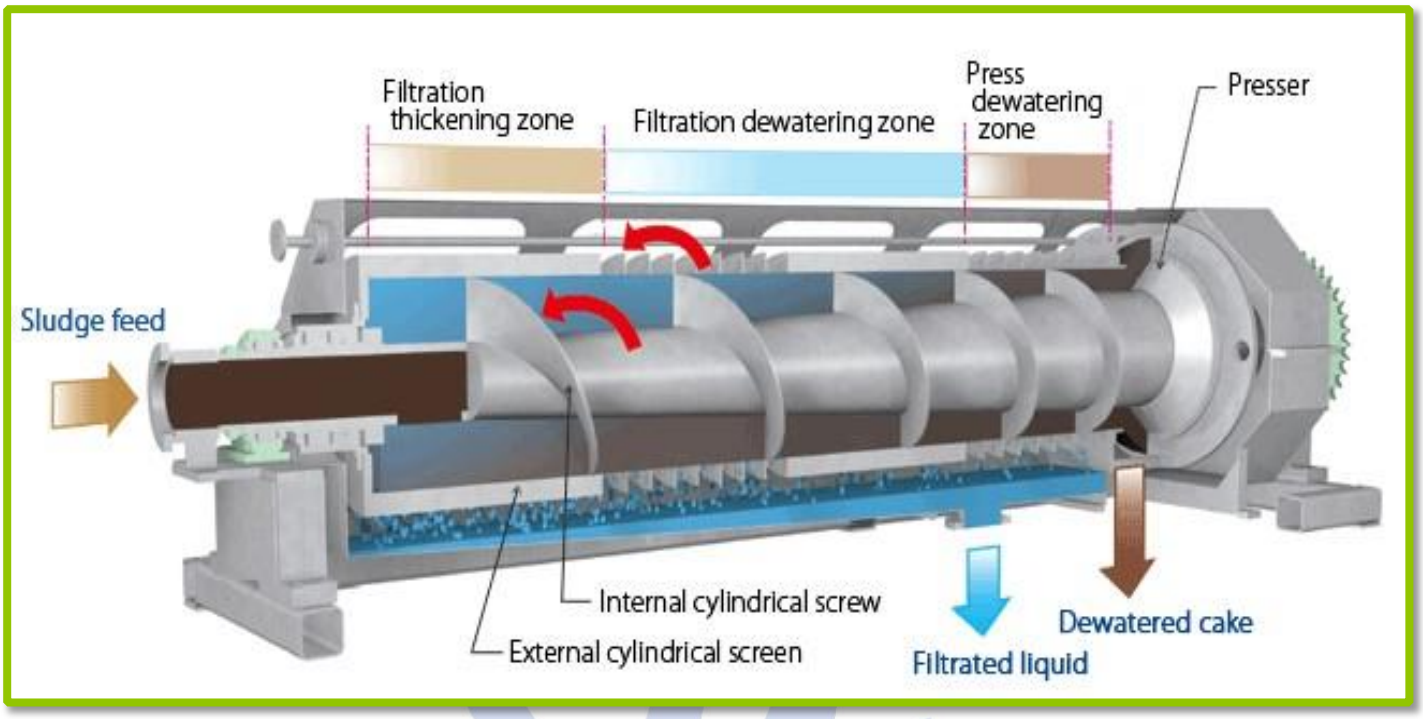
HIGH-PRESSURE COMPRESSOR

The gas is compressed at 200 bar pressure and distributed through Biogas cylinders to users. This pressure is considered suitable to fill up a Cascade of Biogas cylinders. This Bottle Rack can then be connected to a standard CNG Dispenser unit. Now this purified Biogas is ready to be used as Fuel, it is renamed as CBG - COMPRESSED BIOGAS.

SLURRY DEWATER AND BAGGING SYSTEM

SCREW PRESS

Slurry from the effluent buffer tank is passed through a screw press for the Separation of coarse solids from fine & liquid matter.



SETTLING AND AERATION TANK

Residual Slurry is made to pass through a settling tank, aeration tank & secondary clarifier for recycling to process again.

BAGGING MACHINE

Solid waste created in the decanter centrifuge and Clarifier is passed through the drying yard and bagged.

MEMBRANE-TYPE GAS HOLDERS

Membrane gas holders are the most flexible, economical, reliable and efficient biogas storage solution available in the market. The membrane gas holder is fundamental to the process of anaerobic digestion by ensuring a regular supply of biogas availability for the rest of the plant to operate consistently and efficiently.

The constant-pressure gas holders are designed to store the biogas made from the anaerobic digestion of the organic waste and sludge. They are made with biogas-resistant PVC or Polyurethane two-sided coated polyester fiber-reinforced fabric membranes, welded with high-frequency electronic machines. An electronic

sensor gives the continuous filling level of the gas holder, sending the level information to the biogas users (Engines, Boilers).

STATUTORY REQUIREMENTS AND GOVT SUPPORT

APPROVAL FROM STATE NODAL AGENCY

We need to submit a Detailed Project Report to the state Govt. for approval. It helps in getting subsidies and other benefits offered by the Govt.

POLLUTION CONTROL APPROVALS

We have to apply for obtain the following permissions from respective state pollution control boards:

'Consent to establish' (NOC) under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, and Air (Prevention & Control of Pollution) Act, 1981.

'Consent to operate' u/s 25/26 of the Water (Prevention & Control of Pollution) Act, 1974, and/or u/s 21 of the Air (Prevention & Control of Pollution) Act, 1981.

Authorization under Rule 5 of the Hazardous Wastes (Management, Handling, and Transboundary Movement) Rules, 2008.

CHANGE OF LAND USE PERMISSION

We also have to get clearances under the change of land use from the state housing and urban development department.

GAS CYLINDERS RULES, 2004

There are regulatory requirements for the filling of Compressed Biogas. We have to obtain a

license to fill compressed biogas cylinders from the Petroleum and Explosive Safety Organization, (PESO) (Govt. of India) under

Gas Cylinders Rules, 2004. For this, an online application has to be filled up. The license requires payment of a fee.

CANAL WATER/GROUNDWATER USAGE APPROVAL

We have to submit an application to the Central Groundwater authority to get approval.

NOC FROM FOREST DEPTTEMENT

We have to submit an application to the Forest authority to get approval.

NOC FROM VILLAGE PANCHAYAT

We have to get NOC from the village Panchayat.

CLEARANCE FROM CHIEF ELECTRICAL INSPECTOR

We have to submit an application and get approval.

NOC FROM DISTRICT FIRE OFFICER

We have to submit an application to the Fire department and get approval.

GOVERNMENT SUPPORT

PROGRAMME ON ENERGY FROM URBAN, INDUSTRIAL, AND AGRICULTURAL WASTES/RESIDUES DURING THE 12TH PLAN PERIOD

The **Ministry of New and Renewable Energy**, **Government of India** supports Biogas Power Plants under the above program. Following projects for the Production of Power from biogas produced from sewage and industrial wastes or from Urban and Agricultural wastes through Bio methanation gets subsidy under this program.

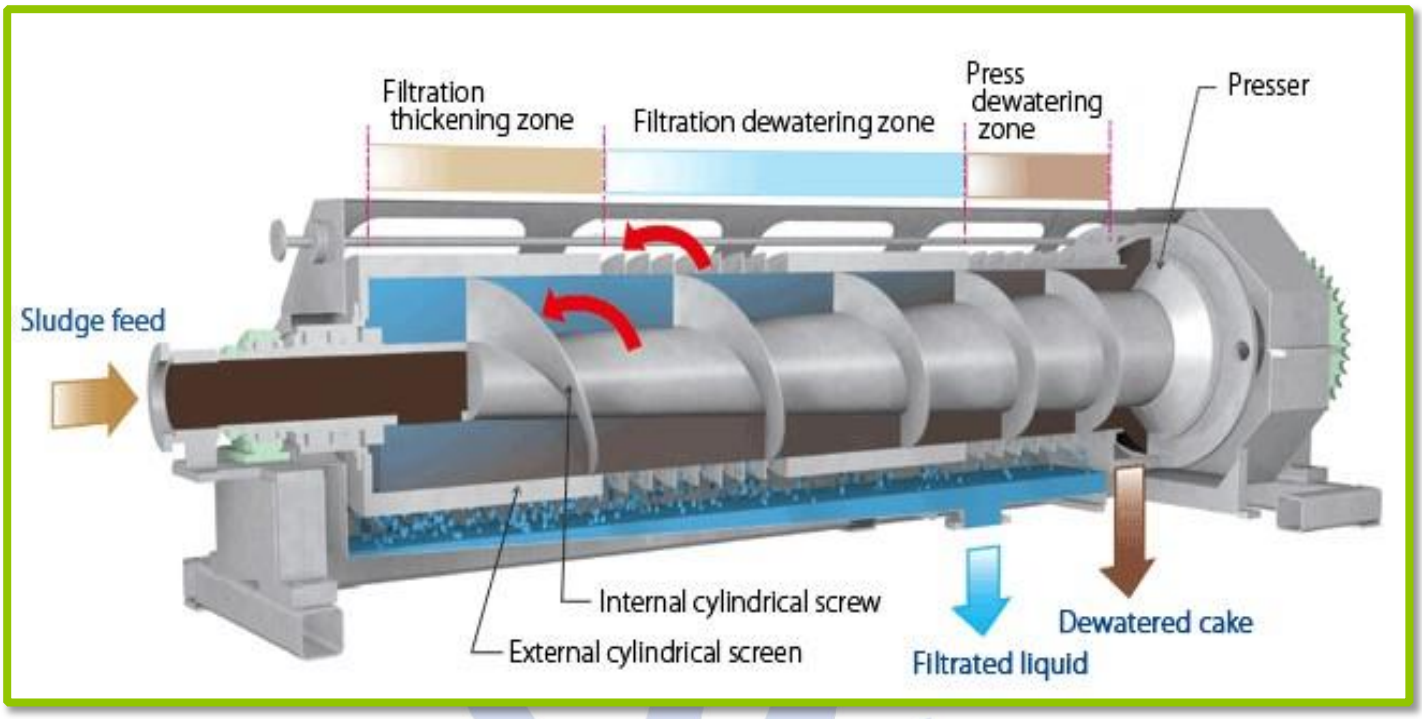
- Projects based on any bio-waste from urban, agricultural, industrial/agro-industrial sectors (excluding bagasse).
- Projects for co-generation /power generation and production of bio-CNG from biogas.
- Mixing of other wastes of renewable nature, including rice husk, bagasse, sewage, cow dung, other biomass, and industrial effluents (excluding distillery effluents) will be permissible.

There will be no minimum / maximum limit on the capacity of projects supported under this program;

SLURRY DEWATER AND BAGGING SYSTEM

SCREW PRESS

Slurry from the effluent buffer tank is passed through a screw press for the Separation of coarse solids from fine & liquid matter.



SETTLING AND AERATION TANK

Residual Slurry is made to pass through a settling tank, aeration tank & secondary clarifier for recycling to process again.

BAGGING MACHINE

Solid waste created in the decanter centrifuge and Clarifier is passed through the drying yard and bagged.

MEMBRANE-TYPE GAS-HOLDERS

Membrane gas holders are the most flexible, economical, reliable, and efficient biogas storage solutions available in the market. The membrane gas holder is fundamental to the process of anaerobic digestion by ensuring a regular supply of biogas availability for the rest of the plant to operate consistently and efficiently.

The constant-pressure gas holders are designed to store the biogas made from the anaerobic digestion of the organic waste and sludge. They are made with biogas-resistant PVC or Polyurethane two-sided coated polyester fiber-reinforced fabric membranes, welded with high-frequency electronic machines. An electronic

the sensor gives the continuous filling level of the gas holder, sending the level information to the biogas users (Engines, Boilers).

STATUTORY REQUIREMENTS AND GOVT SUPPORT

APPROVAL FROM STATE NODAL AGENCY

We need to submit a Detailed Project Report to the state Govt. for approval. It helps in getting subsidies and other benefits offered by the Govt.

POLLUTION CONTROL APPROVALS

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'Consent to establish' (NOC) under the provisions of the Water (Prevention & Control of Pollution) Act, 1974, and Air (Prevention & Control of Pollution) Act, 1981.

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SY GREEN ENERGY

Website: - www.sygreenenergy.com, E-mail: - info@sygreenenergy.com,
GSTIN/UIN - 24OSKPS3484N1ZL, Contact - +91-9724665591, 7405302078

S.No.	Output	Capital Subsidy	Description
1	**Biogas**	Rs. 1.0 crore per 12000m3 Biogas /day. (Max. Rs.10 crore/project)	Biogas generation from Urban waste/ Agricultural Waste/ Industrial wastes/ Effluents or mix of these wastes. (Distillery effluent is excluded)
2	**Power**	Rs 3.0 crore. Per MW. (Max. Rs.10 crore/project)	Power generation based on Biogas generated from Urban waste/ Agricultural Waste/ Industrial wastes/Effluents or mix of these wastes. In case, developer wants to set up power generating unit at already
			existing Biogas generation unit, in that case, the applicable CFA will be only Rs 2.0 crore per MW.
3	**Bio-CNG / Enriched Biogas**	Rs 4.0 crore. Per 4800 kgs of Bio-CNG/day generated from 12000m3 Biogas /day. (Max. Rs.10 crore/project)	Bio-CNG generation based on Biogas Generated from Urban waste/Agricultural Waste/ Industrial wastes/Effluents or mix of these wastes. In case developer wants to set up Bio- CNG generating unit at already existing Biogas generation unit, applicable CFA will be Rs 3.0 crore.
4	**Gasifier Thermal /Electrical in Industries/Villages**	Electrical ■ Rs. 2,500 per kW with dual fuel engines ■ Rs. 15,000 per kW with 100% gas engines Thermal ■ Rs. 2 lakh per 300 kW for thermal applications	Biomass gasifier-based Captive Power & thermal applications in industries Distributed / off-grid power for villages using biomass gasifier systems.

Head Office: 401, 4th Floor, Kahan Commercial Complex, Ring Road, Odhav, Ahmedabad-382415.
Work Shop: Plot No. 1805, Phase-3, GIDC Estate Vatva, Ahmedabad-382445.

NO FEES CHARGED FOR CHANGE OF LAND USE PERMISSION - NO CONVERSION CHARGES FOR SETTING UP OF RENEWABLE ENERGY PROJECTS IN AGRICULTURE ZONE.

We do not have to pay fees for applications under change of land use from the state housing and urban development department.

LONG-TERM PURCHASE AGREEMENT SIGNED BY INDIAN OIL CORPORATION LIMITED AT THE CNG RATES

IOCL will sign a long-term agreement at the present rates declared of CNG.

CUSTOM DUTY CONCESSIONS

Equipment for the project can be imported WITH custom duty concessions.

INDUSTRY STATUS

So, loan is available from institute and banks.

LOCAL AREA DEVELOPMENT TAX EXEMPTED

OTHER FINANCIAL SUPPORT

GOLD STANDARD CARBON CREDITS

As per the prevailing practices any effort by an organization to reduce Green House Gas emissions will be awarded carbon credits. These credits are sold in advanced countries. This system is called the gold voluntary carbon market.

The Gold Standard (GS) seeks to provide a credible but simple set of criteria that will provide integrity to the voluntary carbon market. In particular, the GS will ensure that all project-based voluntary emission reductions that are independently verified to meet its criteria – defined as Carbon credits - represent real, quantifiable, additional and permanent project-based emission reductions.

The Gold Standard was established in 2003 by WWF and other NGO to provide assurance of integrity, effective regulation and strong governance in carbon markets and, more broadly, to define, demonstrate and drive best practice in international compliance carbon markets. It is the only 'compliance grade' standard also operating in the voluntary market and is structured to operate as a genuine regulator on behalf of civil society in these markets.

A project of 2500 CU M capacity will receive about 12500 carbon credits per year for next 20 years. It will mean a gain of Rs 25 Lakh per year at the present market rates of carbon credits.