

# **SHREE JEE BIO ENERGY**

## **Bio-CNG**

### **DETAILED PROJECT REPORT**



**5,000 Kg Bio-CNG & 30 Ton Organic Fertilizer**

# **PROJECT**

**- :Based On: -**

**SUGARCANE PRESSMUD WASTE**

#### **Project Location:-**

**Khasra No** - 1/16,1/17,1/25,1/27,1/28,1/29  
**Village** - Jaswa Wala  
**Block** - Bahadrabad  
**District** - Haridwar  
**State** - Uttarakhand -249402

#### **Prepared & Submitted By:-**

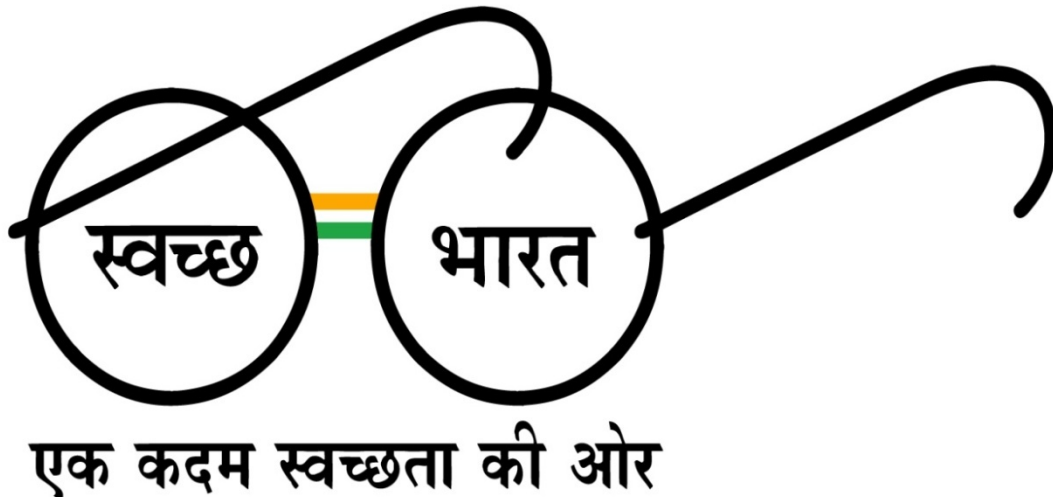
**SHREE JEE BIO ENERGY**  
**Village-Jaswa Wala, Block- Bahadrabad,**  
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## I. EXECUTIVE SUMMARY

### The Great Regional Impact



### “Swachh Bharat Abhiyan”

(Clean Indian Mission)

**Swachh Bharat or Swachh Bharat Abhiyan- स्वच्छभारतअभियान**, English: Clean Indian Mission) is a national level campaign by the Government of India covering 4041 statutory towns to clean the streets, roads and infrastructure of the country. This campaign was officially launched on 2 October 2014 at Rajghat, New Delhi, where Hon'ble Prime Minister Narendra Modi himself wielded broom and cleaned a road. The campaign is India's biggest ever cleanliness drive and 3 million government employees and schools and colleges students of India participated in this event. The mission was started by Shri Narendra Modi, the Prime Minister of India, nominating nine famous personalities for this campaign, and they take up the challenge and nominate nine more people and so on (like the branching of a tree). It has been carried forward since then with famous people from all walks of life joining it.–

**M/S. SHREE JEE BIO ENERGY , the Sole prompter of the Project**, Joins the mission of “**Swachh Bharat Abhiyan**” for the Establishment of Waste to Energy Management based on the waste and residual organic substances from Urban, Industrial and Agricultural activities of Rural INDIA, such as Municipal Waste, Farm Residue, Vegetable Food Waste, Cattle Dung, Sugarcane Press mud, Napier Grass etc. State Pollution Department has also been worried about the dairy & farm wastes management; this project would boost our P.M.'s Dreams project “**Swachh Bharat Abhiyan**” too.

## A.Introduction of Project

### **Bio-CNG/Organic Fertilizer Plant** **(Based on Sugarcane Pressmud & Cattle Dung)**

Today we primarily use fossil fuels to heat and power our homes and fuel our cars. It is convenient to use coal, oil, and natural gas for meeting our energy needs, but we have a limited supply of these fuels on the Earth. We're using them much more rapidly than they are being created. Eventually, they will run out. Today there is a burning need of an alternative for fossil fuels because the fossil fuels are getting extinct. Hence it is necessary to find out alternative source of energy. This topic will make us aware that various biodegradable wastes and plant/crop residue, such as cattle dung Sugarcane press mud & Cattle dung other Agro-Waste and other plant residue can be used to produce biogas. Constructional details, process details, and composition of required input are elaborated later. The Biogas produced from this process can replace fossil fuel in any application, such as biogas engine industrial and domestic usage.

In addition to it the Biogas plant generate high quality Organic fertilizer, (solid as well as liquid) which can be sold at good margin as there is always standing demand of the product in local fertilizer market.

#### **Background Description: -**

We often call renewable energy technologies "clean" and "green" because they produce few of any pollutants. Burning fossil fuels, however, sends greenhouse gases into the atmosphere, trapping the sun's heat and contributing to global warming. Climate scientists generally agree that the Earth's average temperature has risen in the past century. If this trend continues, sea levels will rise, and scientists predict that floods, heat waves, droughts, and other extreme weather conditions could occur more often. We all know that biogas is good alternative for fossil fuels.

Therefore, use of biogas should be done as much as possible. Much work has been carried out in obtaining biogas from various sources like kitchen, human, animal and agricultural wastes. The plants constructed for these purpose are working successfully too. Such plants are now-a-days being used by many people locally for obtaining biogas. As biogas is a non-polluting and renewable energy resource, it is efficiently replacing the LPG.

The work proposed in this paper is to obtain biogas, not from the above mentioned sources but from a completely new source i.e. sugarcane press-mud. Press-mud which is also called as filter-cake is rich in methane which is the major component Bio-CNG. This press-mud is usually dumped as garbage.

Some sugar industries make use of it by converting it into compost. But this compost, along with its advantages, has some **disadvantages** too. It increases the wax content in the soil. The increase in wax reduces the porosity of the soil causing clogging which is not desirable. Therefore, making use of press-mud for the production of biogas is a better option.



## MAIN OBJECTIVE OF THE PROJECT: -

The main objective of the project is to set up a compressed biogas plant to sale the Bio CNG to the local user at around **INR- 70 per Kg**. The plant also produces organic manure/Solid Fertiliser in large quantity which can be sold at about **INR- 2.0 per Kg** in 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 Sugarcane press-mud & Cattle dung is available in large quantity or some other source of waste bio material is available.

## PRODUCT: -

- **Bio-CNG:** -Bio-CNG, a clean and renewable fuel, has vast potential in India. It can be a supplement to petroleum products, if used in compressed form in the cylinders. Biogas originates from bacteria in the process of biodegradation of organic material under anaerobic conditions. Methane is the most valuable component under the aspect of using biogas as a fuel; the other components do not contribute to the calorific ("heating") value and thus are "washed out" in our purification plants in order to obtain a gas with almost 95-96% CH<sub>4</sub>. Methane is the flammable compound in biogas.

### Composition of Purified Bio-CNG

Ingredient	Value	Test Method
CH <sub>4</sub> (Percentage)	95-96 %	IS-5130 (Part3)
CO <sub>2</sub> + N <sub>2</sub> + O <sub>2</sub> (Percentage)	4-5 %	IS-15130 (Part3)
Only CO <sub>2</sub>	< 4 %	IS-15130 (Part3)
H <sub>2</sub> S (Mg/M <sup>3</sup> )	5 (Mg/M <sup>3</sup> )	ISO- 6326-3
Moisture (Mg/M <sup>3</sup> )	5 (Mg/M <sup>3</sup> )	IS-15641 (Part2)

Use of Bio-CNG: - Automobiles Fuel, Industries, Canteens, Restaurant, Hotels, Hostels, Sweet shop, Dhabas etc.

- **ORGANIC FERTILIZER:** -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. 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

- Calcium 0.39-0.65
- Iron 0.18-0.32
- Magnesium 0.032-0.01
- Manganese 0.0059-0.008
- Nitrogen 2.6-3.5
- Phosphorous 0.8-0.9
- Zinc 0.007-0.009
- Potassium 0.8-0.95

## RAW MATERIAL-

- **SUGARCANE PRESS-MUD & CATTLE DUNG: -**

India is the largest consumer and second-largest producer of sugar worldwide with sugarcane grown across India. Uttar Pradesh ,Uttarakhand, Maharashtra, Andhra Pradesh, Karnataka, Gujarat, and Tamil Nadu are the primary sugar-producing regions. Sugar processing facilities tend to be located near major sugarcane-producing areas to minimize transportation costs. As a result, Uttar Pradesh ,Uttarakhand, Maharashtra, Karnataka, and Tamil Nadu have the highest amount of both sugarcane area and sugarcane production. As presented above these states make up nearly 85 percent of sugarcane production in India. Based on expert judgment, an estimated 75 percent of sugarcane is processed in sugar mills, while the remaining 25 percent is used to produce Jaggery, an unrefined sugar product, which produces no wastewater.

Bahadrabad is a Town in Bahadrabad Block in Haridwar District of Uttarakhand State, India. It is located 12 KM towards west from District headquarters Haridwar. It is a Block head quarter. Elevation / Altitude: 271 meters. Above Sea level

Bahadrabad Pin code is 249402 and postal head office is Bahadrabad. It has a bio-energy potential to fulfil the energy demand. Production of biogas using Press-mud & cattle dung is excellent solution in rural development technology to fulfil energy needs.

Since 19th century, sugarcane was primarily grown for production of sugar in different countries in the world. With the increasing energy crises and need for sustainable reforms, scientists and researchers have realized the value of sugarcane and its by-products (bagasse, press mud (filter cake) and Molasses). Sugarcane is usually processed to sugar and biomass where the available biomass mainly comprises of components like lignin, fibre, pith and pentosans, which have enormous potential to be used in biochemical and microbial field. During the processing of sugar, a number of by-products contain biodegradable matter. Such high value by-products could serve as valuable raw materials for various biotechnology processes for producing produce value-added products. One possibility is using anaerobic or other appropriate technology for biogas production from some such waste or by-products. Biogas generation from a wide range of lignocelluloses biomass is increasing globally. Considering economic and environmental issues this is an ideal movement. Biogas generation technique is very precise and complicated since diverse microbial species are engaged. Anaerobic digestion is considered as an innovative process, which offers the opportunity to utilize wastes as an energy source and meet the demand for a feasible alternative to bio fuels production. Biogas production from sugarcane industry solid waste by anaerobic digestion method coupled with pre-treatment process and mixing with other raw materials has huge potential for energy generation.

Press Mud or Filter Cake is a by-product of sugarcane juice filtration process. In general, 100 tons of sugarcane crushed generates 3.0-3.5 tons (3.0-3.5 % of total cane weight) of Press Mud or Filter Cake. The composition of Press Mud depends on agro-climatic zone, cane variety, milling process and methods of clarification etc.

Sugarcane industries from all over the world produce large amounts of Press Mud every year and the disposal of this by-product is a matter of concern. In general, Press Mud is being dumped as garbage in open fields or sold/given to farmers to use as fertilizer, although in some of the cases it is being used for bio-composting with spent wash obtained from the molasses based distilleries. However, this disposal method poses some environmental challenges such as air pollution due to odour, surface and ground water pollution and overall pollution of the environment. Recently, much attention has been focused on better use of Press Mud and the Government of India has launched a SATAT scheme for procurement of bio-CNG/compressed bio-gas produced from press mud from sugar industries at good prices. Indian sugar industry while crushing around 300 million tonnes of sugarcane and producing about 10 million tonnes of press mud annually can offer compressed bio-methane/bio-CNG to the extent of 0.4 million metric tonnes .

## APPROXIMATE COMPOSITION OF SUGARCANE PRESS MUD

### Composition of Press mud

Components	PERCENTAGE
Cellulose	11.4%
Hemi cellulose	10.0%
Lignin	9.3%
Protein	15.5%
Wax	8.4%
Sugar	5.7%
Na	0.22%

- **COW-DUNG: -**

In the state of Uttarakhand, million tons of animal dung is produced every year which can be utilized for better purposes, Hence anaerobic digestion becomes a promising technology. The project was to construct an anaerobic processing facility to generate biogas which will be more cost effective and economically friendly.

Fresh cow dung is collected from nearby villages and Cow Farms. The proximate and microbial parameters of the dung were determined. The proximate analysis showed that the energy yielding nutrient values of the cow dung were significantly higher than the fowl dung.

#### PERCENTAGE PROXIMATE COMPOSITION AND PH VALUES OF THE DUNG

PARAMETERS	COW DUNG
Moisture %	18.55 ± 0.28
Ash %	10.10 ± 0.02
Crude Fiber %	40.20 ± 0.12
Crude Protein %	6.80 ± 0.06
Crude Fat %	4.00 ± 0.42
Carbohydrate %	20.35 ± 0.34
pH	7.10 ± 0.01

Gas produced from cow dung is 55-65% methane, 30-35% carbon dioxide, with some hydrogen, nitrogen and other traces. Its heating value is around 600 B.T.U. per cubic foot. Cow dung slurry is composed of 1.8-2.4% nitrogen (N<sub>2</sub>), 1.0-1.2% phosphorus (P<sub>2</sub>O<sub>5</sub>), 0.6-0.8% potassium (K<sub>2</sub>O) and 50-75% organic humus.

About one cubic foot of gas may be generated from one pound of cow manure at around 28°C. This is enough gas to cook a day's meals for 4-6 people in India. About 1.7 cubic meters of biogas equals one Litre of gasoline. The manure produced by one cow in one year can be converted to methane, which is the equivalent of over 200 Litres of gasoline.

**Note:** Chemical Fertilizer application will be reduced through application of assured Quality Organic manure.



## KEY BENEFITS OF BIO-CNG TECHNOLOGY:-

- Renewable Energy Source
- Reduced Greenhouse gas emissions
- Reduced dependency on imported fuels
- Waste Reduction
- Job Creation
- Reduces Environmental Pollution by proper utilization of wastes

## ADVANTAGES AND BENEFITS OF BIO-CNG:-

- Biogas is eco-friendly fuel. Provides a non-Polluting and renewable source of energy.
- Has a calorific value of around 6kWh/M<sup>3</sup>—this is equivalent to half a liter of diesel.
- Larger biogas plants can generate and feed electricity into mainstream power grids.
- Efficient way of energy conversion.
- Saves women and children from drudgery of collection and carrying of firewood, exposure to smoke in the kitchen, and time consumed for cooking and cleaning of utensils.
- The digested sludge is high quality organic manure, completely natural and free from harmful synthetic chemicals. It can supplement or even replace chemical fertilizers.
- Leads to improvement in the environment, sanitation and hygiene.
- Provides a source for decentralized power generation.
- Leads to employment generation in the rural areas.
- Any biodegradable matter can be used as substrate.
- Anaerobic digestion inactivates pathogens and parasites, and is quite effective in reducing the incidence of water borne diseases.
- Environmental benefits on a global scale: Biogas plant significantly lowers the Greenhouse effects on the earth's atmosphere. The plant lowers methane emissions by entrapping and using it as fuel.
- The project combines and synergizes state of art foreign technical knowhow and equipment with cost effective frugal engineering and balance of plant from INDIA.

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## II. PROJECT PROMOTER

<b>NAME OF PROMOTER</b>	:	<b>Mr. Vivek Agarwal</b>
<b>Age</b>	:	49
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Mr. Vivek Agarwal is Committed and motivated business owner with almost a decade of experience in the textile, hotels, catering and in retail sectors. Proven track of analyzing construction plans and proposals and identifying affordable sources of material and labor. Highly knowledgeable about the fundamental construction principles, customer service, project management and leadership. Started his own business of sarees and suits from year 1989 later, he has also gain experience in gold and silver jeweler ornaments business at 1998. He has experience and a solid academic background in accounting and financial management; excellent analytical and problem-solving skill, able to handle multiple projects while producing high quality work in a fast-paced, deadline-oriented environment. He also has a position in market research or financial analysis where strong technical skills, mathematical/statistical background and problem-solving abilities can be applied towards the successful achievement of business goals and objectives.

Mr. Vivek is also having a largest distributorship of UltraTech cement in Uttarakhand and he sell more than 2,25,000 bag of cements per annum on an average and also runs hospitality management business with own 2 hotels at different locations.

# SHREE JEE BIO ENERGY

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<b>NAME OF PROMOTER</b>	:	<b>Mr. Arpit Agarwal</b>
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Mr. Arpit Agarwal is an enthusiastic, creative and self-motivated personality having strong educational and laboratory-based background of pharmaceutical and formulation, regardless giving the best of knowledge and skillful work to enrich valuable targeted goal of an organization. As a manufacturer he was responsible to monitoring for the batch-wise manufacture of active pharmaceutical ingredients. Utilizing batch logs, (SOP) standard operation procedures, and work instructions under cGMP guidelines he would double check material calculation, check and prep process lines and equipment prior to charging reactors.

He has experienced in streamlining the drug manufacturing process, in accordance with the safety guidelines and corporate standards. Ensures consistent quality and efficacy of prescription medications. Adept at employing multiple techniques and appropriately modifying protocols, as required, to suit the changing needs of research or development sciences. He has also strong research skills including observation, analysis, assessment, and reporting and excellent understanding of the integration of quantitative pharmacology and pharmacometrics into clinical drug development.

### **III. TECHNOLOGY SUPPLIERS (EPC)**

**The EPC of the Project** will be executed by JOG WASTE TO ENERGY PVT. LTD. Registered address- 16/3, Shivbhumi Industrial Estate II, Near Indore Highway, Gatrad Bakrol Road, Bakrol Bujarang 382433. Jog Waste To Energy Private Limited is a Private incorporated on 13 June 2016, Our Corporate Identification Number is (CIN) **U40100GJ2016PTC092443, (GST)-24AADCJ7356G1ZJ** and its registration number is 92443. **JOG Waste to Energy** is a company established by four experienced, energetic enthusiastic and young entrepreneurs, with a prime objective of providing cost effective innovative products and services, to cater ever emerging needs of the domain, of solar energy / Biogas and other waste to energy technologies.

**JOG Waste to Energy** provide everything you need from the most cost-effective equipment to expert consulting and training in order to set up your very own Biogas generation & Up-gradation plant. The term purification is used interchangeably with the term Up-gradation in the Indian market. We at **JOGWTE** understand the importance of all the stages of the upgrading process, which is why we focus on every stage starting from Raw Biogas collection, Biogas to power project, Biogas cleaning, Biogas drying, Biogas purification, Biogas compression, and finally Biogas Bottling.

Today, **JOGWTE** is renowned as one of the pioneer companies for providing Renewable Energy Customize Solution in order to make use of Wastage Energy. We at JOG WASTE TO ENERGY is an established solar venture concentrated on off-framework and on-lattice (with net metering) Solar Power plant applications. Our main goal is to give renewable vitality source at a moderate cost. We will probably be the slightest cost control maker on the plant by Solar Energy.

JOG Waste To Energy Pvt. Ltd. offer On/Off network PV/Thermal Solar Power Plant on long haul settled value contracts to our clients, at costs which much of the times are at or underneath current choices for these clients. Since start, we have accomplished a broad decline in sunlight based Power Plant cost, which incorporates a critical reduction in adjust of frameworks expenses due to some extent to our esteem building, outlining and acquisition works. We are taking a shot at Customize Solutions of Oxygen Plant, Nitrogen plant, Air and gas dryer, Solar Rooftop Project for Industry/Residence as per prerequisite of the Customer. JOG WASTE TO ENERGY should give the Turnkey answer for this rooftop beat sun based Photovoltaic Power Plant.



## **IV. PROJECT AT A GLANCE**

### **5,000 Kg/Day Bio-CNG Generation Plant**

WASTE STUFF including Sugarcane press-mud & Cattle dung and other Agricultural Waste etc. is collected using special vehicles designed for transporting the wastes from nearby Farm, and villages in enclosed containers to prevent air pollution by the SPV which also pays the restaurants. Cattle dung is collected from nearby villages used as inoculants. The conversion of Sugarcane press mud & Cattle dung into Biogas/ Bio-CNG also produces high quality organic-fertilizer, which can be used as a soil enricher and nutrient in agriculture, and manure merchants can be benefited immensely by the continuous and assured supply of organic manure all through the year from this plant.

### **Salient Features of the Plant:**

The present project is a **14,100 M<sup>3</sup>/Day Biogas plant design capacity** and **12,600 M<sup>3</sup>/Day** Biogas generation plant based on anaerobic digestion of Sugarcane Press mud and Cattle manure Waste or any other suitable wastes which may be available. The salient features of the project may be enumerated as under-

- Project envisages setting up of a state of art upgraded bio-fuels production plant to convert cattle Sugarcane Press mud and Cattle Manure into the following products.
- **5,000 Kg (7000 M<sup>3</sup>)/ Day of Bio-CNG**, which will be sold as replacement to commercial LPG/CNG or PETROL AND DIESEL.
- **30 Ton/day** of solid organic fertilizer and **90 KL/ Day** of Liquid Fertilizer, which will be sold as value added by products.
- Plant operation: 80% is mechanical and 20% is manual.
- These are CSTR type reactor and operate at mesophilic temperatures. HRT is 28 to 32 days.
- Feed stock will be stored in open area covered with black colour plastic sheet to protect from direct sunlight and UV Rays. Approx. 200 days of feedstock will be stored in our project premises. It will help us to maintain daily feedstock and smooth process of biogas generation.
- Feed tank is fitted with a mixer for making uniform feed slurry and pumped, into digesters through underground pipe line.
- The digester is also equipped with gas capturing system to hold about 1500 M3 (Balloon Capacity) of Biogas. It is of European make; air inflated double membrane type, to prevent the heat loss from the digester top portion. It is also weather resistant.

## V. DETAILED PROJECT DESCRIPTION

### 1. FEEDSTOCK

- **PRESS-MUD:** - Press mud is a solid residue, obtained from sugarcane juice before crystallization of sugar. Generally press mud is used as manure in India. It is a soft, spongy, lightweight, amorphous, dark brown to black coloured material.

It generally contains 60-85% moisture (w/w); the chemical composition depends on cane variety, soil condition, nutrients applied in the field, process of clarification adopted and other environmental factors. Press mud from sugar factory typically contains 71% moisture, 9% ash and 20% volatile solids, with 74-75% organic matter on solids. Sugar molasses has methane potential (i.e. CH<sub>4</sub> per ton of raw material) of 230 m<sup>3</sup>. Typical composition of press-mud is given below in the table.

**COMPOSITION OF PRESS MUD**

Components	PERCENTAGE
Cellulose	11.4%
Hemi cellulose	10.0%
Lignin	9.3%
Protein	15.5%
Wax	8.4%
Sugar	5.7%
Na	0.22%

The present methods for disposal of press mud are not economically suitable and pollute the environment too. As it contains appreciable proportion of biodegradable organic matter, it has very good potential for the production of biogas.

Material under anaerobic conditions. Methane is the most valuable component under the aspect of using biogas as a fuel; the other components do not contribute to the calorific ("heating") value and thus are "washed out" in our purification plants in order to obtain a gas with almost 97-100 % CH<sub>4</sub>. Methane is the flammable compound in biogas.

- **COW-DUNG:** -

In the state of Uttar Pradesh, million tons of animal dung is produced every year which can be utilized for better purposes. Hence anaerobic digestion becomes a promising technology. The project was to construct an anaerobic processing facility to generate biogas which will be more cost effective and economically friendly.

Fresh cow dung is collected from nearby villages and Cow Farms. The proximate and microbial parameters of the dung were determined. The proximate analysis showed that the energy yielding nutrient values of the cow dung were significantly higher than the fowl dung.

## Percentage Proximate Composition and pH Values of the Dung

PARAMETERS	COW DUNG
Moisture %	21.5 ± 0.28
Ash %	10.10 ± 0.02
Crude Fiber %	40.20 ± 0.12
Crude Protein %	6.80 ± 0.06
Crude Fat %	4.00 ± 0.42
Carbohydrate %	20.35 ± 0.34
pH	7.10 ± 0.01

Gas produced from cow dung is 55-65% methane, 30-35% carbon dioxide, with some hydrogen, nitrogen and other traces. Its heating value is around 600 B.T.U. per cubic foot. Cow dung slurry is composed of 1.8-2.4% nitrogen (N<sub>2</sub>), 1.0-1.2% phosphorus (P<sub>2</sub>O<sub>5</sub>), 0.6-0.8% potassium (K<sub>2</sub>O) and 50-75% organic humus.

About one cubic foot of gas may be generated from one pound of cow manure at around 28°C. This is enough gas to cook a day's meals for 4-6 people in India. About 1.7 cubic meters of biogas equals one Litre of gasoline. The manure produced by one cow in one year can be converted to methane, which is the equivalent of over 200 Litres of gasoline.

### Highlights

- The feedstock is low cost and consists of **10,000 Kg/ day** of cattle dung, **1,20,000 Kg/day** Sugarcane press mud from the said sugar mill and other bio-degradable stuff from nearby villages and municipalities.
- Cattle dung is collected from various dairy farms/ nearby villages @ **INR 750/MT** and used as inoculants.
- The sugarcane press mud is generated in the said sugar mill and made available to the project @ **INR 600/ Ton** and supplied to the bio-gas plant sited at the plot adjacent to the sugar mill.
- Other bio-degradable waste stuff is collected using special vehicles designed for transporting the wastes from nearby municipality and villages in enclosed containers to prevent air pollution by the SPV which also pays the restaurants INR 500/MT for the waste collected.

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Below is given Approximate Required Quantities of the Substances (Alone)

Sr. No.	Item	Daily Required Quantity (Ton)
1	Cow Dung	250
2	Poultry Droppings	98-100
3	Food Waste	175-180
4	Sugarcane Press mud	125

Combination of any of these mentioned above can also work in proportionate quantity. But the present project will be using the following Combination of Raw Materials as per Feed stock analysis Table 1.

Sr. No.	Item	Daily Input Quantity (Ton)
1	Cow Dung Required	10-15
2	Sugarcane Press mud	115-120
Note: Feed stock quantity may vary based on Dry matter and volatile matter available in the above mentioned feed stock		

Table -1



## 2. PRODUCTS AND SERVICES

- The bio-gas plant produces **12,700 M<sup>3</sup>/day** of biogas, using low cost raw material in the form of Sugarcane Press mud and Cattle Manure or other bio degradable waste stuffs, which may be available at low cost to the project. This ensures low cost generation of automobile fuel at the command and control of the facility management.
- The generated Biogas is converted into **5,000 Kg/day of Bio-CNG**.
- The plant also produces **30 Ton/Day** of solid organic fertilizer, and **90,000 Litre/day** of liquid fertilizer.
- We may develop additionally a production facility for bio coal on a commercial scale making bio coal a viable and sustainable alternative to fossil coal, where high-quality bio coal will be produced.

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### 3. MARKET FOR THE PRODUCTS

- **Bio-CNG** is to be supplied to consumers directly as a replacement for CNG as a fuel in Vehicular Fuel, industrial utilization, or as a cooking fuel in the restaurants at the nearby markets. It can also be used as an automobile fuel using gas dispensers and as high grade industrial fuel for cutting and welding applications. The Bio-CNG produced has to be sold to **INDIAN OIL CORPORATION LTD. @ INR 70.00/Kg. We have already secured a purchase agreement/ LOI (Ref No.)IndianOil/SATAT/01/3366.**



कॉर्पोरेट कार्यालय  
Corporate Office

इंडियन ऑयल कॉर्पोरेशन लिमिटेड  
कॉर्पोरेट कार्यालय : स्कोप कॉम्प्लेक्स, कोर-2  
7, इंस्टिट्यूशनल एरिया, लोधी रोड, नई दिल्ली-110 003  
**Indian Oil Corporation Limited**  
Corporate Office : SCOPE Complex, Core-2  
7, Institutional Area, Lodhi Road, New Delhi-110 003  
Website : www.iocl.com



Ref: IndianOil/SATAT/01/3366  
Date: 15.05.2023

To,  
**Shree Jee Bio Energy**  
Front of Jama Masjid Kathera Bazaar,  
Jwalapur, Haridwar, Uttarakhand- 249407

**Sub: Letter of Intent for supply of CBG to IndianOil under SATAT**

Madam/ Sir,

This has reference to the following:

Notice Inviting Expression of Interest (NIEOI) ref. :	<b>CBG56</b>
NIEOI released on:	<b>01.03.2023</b>
NIEOI application dated:	<b>31.03.2023</b>
NIEOI file reference number:	<b>938304</b>
Status of CBG Plant as on date of application:	<b>Proposed</b>
CBG plant location as per NIEOI application:	<b>Front of Jama Masjid Kathera Bazaar, Jwalapur, Haridwar, Uttarakhand</b>
CBG Quantity as per NIEOI application:	<b>5.0 Tonnes Per Day</b>

We also refer to documents submitted in the EOI and/or correspondences exchanged with IndianOil and your willingness to provide Compressed Bio Gas (CBG) to IndianOil from the above mentioned CBG plant for marketing through IndianOil's Retail Outlet(s).

Based on the evaluation of the EOI submitted by you, we hereby issue this Letter of Intent (LOI) for retailing of CBG produced from your above mentioned CBG Plant on following broad terms and conditions:-

1. In accordance with the NIEOI, you shall be responsible for, inter alia, the following obligations:
  - a. You shall be responsible for planning, preparation, engineering and execution of the CBG Plant, including storage of raw material, operation and maintenance of the CBG Plant, maintaining final product output quantity and quality, managing the by-products and wastes from the CBG Plant as per existing central / state government norms and providing performance guarantee for the CBG Plant at your cost.

(contd..)



पंजीकृत कार्यालय : इंडियन ऑयल भवन, जी-9, अली यावर जंग मार्ग, बान्द्रा (ई.), मुम्बई - 400051, महाराष्ट्र (भारत)  
Regd. Office : IndianOil Bhawan, G-9, All Yavar Jung Marg, Bandra (E), Mumbai - 400051, Maharashtra (India)  
CIN : L23201MH1959GOI011388

- **The Solid and Liquid Bio-Fertilizers** are in demand as a premium replacement for chemical fertilizers and are to be directly marketed using appropriate channels to the farming communities and sold @ **INR 2.00/Kg and INR 0.10/L** respectively.

# SHREE JEE BIO ENERGY

GST- 05AEYFS0945L1ZB

## • CBG Pricing Circular – Stakeholders Of SATAT Scheme



कॉर्पोरेट कार्यालय  
Corporate Office

इंडियन ऑयल कॉर्पोरेशन लिमिटेड

कॉर्पोरेट कार्यालय : स्कोप कॉम्प्लेक्स, कोर-2

7, इंस्टिट्यूशनल एरिया, लोधी रोड, नई दिल्ली-110 003

Indian Oil Corporation Limited

Corporate Office : SCOPE Complex, Core-2

7, Institutional Area, Lodhi Road, New Delhi-110 003

Website : www.iocl.com



Ref: CO/AE&SD/01

Date: 20.05.2022

To

Stakeholders of SATAT Scheme

Sub: Purchase price of Compressed Bio-Gas (CBG) under SATAT scheme

You are kindly aware that, 'SATAT' (Sustainable Alternative Towards Affordable Transportation) scheme on CBG was launched on 1.10.2018. As per the scheme, procurement price of CBG purified as per IS 16087: 2016 standards, compressed at 250 bar pressure and delivered to OMC Retail Outlets in cascades (up to 25 km one way distance from CBG Plant) was fixed at Rs. 46/kg + applicable taxes for period from 1.10.2018 to 31.3.2024. It was also informed that minimum procurement price will not be lower than Rs. 46/kg + applicable taxes up to 31.3.2029.

To facilitate entrepreneurs for financial closure of the projects as well as promote setting up of CBG Plants, it has been decided that the CBG prices shall be indexed to the prevalent Retail Selling Price (RSP) of CNG in the market (or CBG RSP for markets where CNG is not available).

Accordingly, the following revised procurement pricing of CBG shall be implemented:-

- 1.0 The minimum procurement price of CBG will not be lower than Rs. 46/kg + applicable taxes for the period up to 31.3.2029.
- 2.0 The Retail Selling Price of CBG in a market shall be at par with RSP of CNG (as provided by the authorized CGD entity).
- 3.0 The following slabs for CBG procurement price have been decided, which will be the procurement price of CBG delivered at IndianOil Retail Outlet situated at any distance (up to 75 km one way) as per IS 16087 2016 specification (or its latest version) and compressed at 250 bar pressure: -

S No	Lower Retail Selling Price of CBG in Slab including tax	Higher Retail Selling Price of CBG in Slab including tax	Procurement price of CBG Without GST	Procurement price of CBG With GST
	Rs./kg	Rs./kg	Rs./kg	Rs./kg
1	Retail Selling Price of CBG up to 70		54.00	56.70
2	70.01	75.00	55.25	58.01
3	75.01	80.00	59.06	62.01
4	80.01	85.00	62.86	66.01
5	85.01	90.00	66.67	70.01
6	90.01	95.00	70.48	74.01
7	95.01	100.00	74.29	78.01

Note: The above table is applicable strictly for supply of CBG at a one-way distance up to 75 km from the CBG Plant. For distance beyond 75 km, the price will be first adjusted as defined in para

Page 1 of 2

पंजीकृत कार्यालय : इंडियन ऑयल भवन, जी-9, अली यावर जंग मार्ग, बान्द्रा (ई.), मुम्बई - 400051, महाराष्ट्र (भारत)  
Regd. Office : IndianOil Bhawan, G-9, Ali Yavar Jung Marg, Bandra (E), Mumbai - 400051, Maharashtra (India)

CIN : L23201MH1959GOI011388

## 4. PROVEN BIO-METHANATION TECHNOLOGY

- **The CSTR Mesophilic bio-methanation** technology along with its purification system as supplied by JOG WASTE TO ENERGY PVT LTD , Ahmadabad based solution provider, having expertise and collaboration with German specialists in biological degradation of organic wastes.
- The manufacturing process uses mesophilic CSTR bio-methanation for ensuring high efficiency in converting substrates to biogas, low environmental footprint and low capital cost of the plant and machinery, and 100% availability of plant independent of local climate and weather conditions.
- The plant has a low physical foot print as the hydraulic residence time of the mesophilic plant is just 28-30 days.
- The plant operates 24 X 7 throughout the year as the temperature is maintained at 36-40°C, and hence has constant output of biogas independent of the external temperature and climatic conditions. This ensures high plant availability throughout the year.
- We do have dedicated team of experts and industry veterans and efficient vendor companies for technology supply and after sale technical support.
- The company has a long experience in developing new biological processes and new components for treatment of solid waste and waste water.
- JOG Waste To Energy Pvt. Ltd. will provide the complete plant on turnkey basis. We here at JOG Waste to Energy Pvt. Ltd. adopt frugal engineering and whole system design as the guiding lights and procure only critical equipments from trusted suppliers, while the balance of plant is procured/ engineered locally, thus saving costs and time for implementation.

## 5. PROVEN BIO-GAS UP-GRADATION TECHNOLOGY

- The biogas so generated is separated into bio methane and CO<sub>2</sub> using PSA system that recover approximately over 96-98% of the methane from biogas at methane purity 95-96%.
- The separated bio methane is compressed to 250 bar g using high efficiency compressor and filled in cascades of standard cylinders of 75 Litre of water capacity. The gas is directly supplied to IOCL CNG Pump Outlets/ consumers as automobile fuel at a retail outlet in the market areas, using state of art gas dispensers.
- The separated CO<sub>2</sub> is released to the atmosphere.
- Most of the water used for the process is recovered and recycled from the biogas slurry, to cut down the requirement of make-up water for process requirement, thus reducing the water footprint of the project.
- All the macro and micro nutrients in the feedstock are recovered in the form of solid and liquid fertilizers, with ultra-filtration and reverse osmosis process plants, thus forming a virtuous closed loop.



## 6. PROJECT INFRASTRUCTURE

- Biogas to CNG plant needs a total of about 21,609M<sup>2</sup> land area for Project implementation, 842 M<sup>2</sup> Covered Shed for Fertilizer Processing and storage in off season. 3056 M<sup>2</sup> of open area for locating the hydrolysis tanks, biogas digester tank, and sludge separator filter, besides connecting roads. About 800 M<sup>2</sup> of built up area is required to house the technical buildings including MPSA separation plant and Bio CNG Compressor. About 11,757 M<sup>2</sup> is reserved for Green Belt and future expansion.
- The biogas plant will need about 36 factory workers, 1 field officer to co-ordinate the food waste supply chain, 1 stores in charge and 1 chemist to operate the plant. General Manager and 2 account manager, assisted by 1 Accountants assistant and one office assistant, provides the administrative management to the facility.
- The plant needs about 1, 00,000 Litre/ day of water and 500 Kwh of power to meet process energy requirement.

## 7. ENVIRONMENTAL ASPECTS

- The project has a low water foot print, as most of the process water is recycled.
- The project is zero discharge and provides valuable solid and liquid fertilizers, which recycle all the macro and micronutrients back to the soil.
- It reduces global warming by preventing fugitive emissions of methane from organic waste streams.
- For all these reasons, the project is entitled to excise and VAT exemption, tax breaks and subsidies.

## BENEFITS OF BIOGAS PLANTS

- A non-polluting and renewable source of energy is created in biogas plants. Under 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 Automobile vehicular fuel, Industries, Canteens, Restaurant, Hotels, Hostels, Sweet shop, Dhaba, etc.
- It leads to energy security via 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 21times that of carbon-di-oxide. It thus leads to reduction of global warming.
- Biogas plants also produce enriched organic manure. This can be used as fertilizers. Liquid slurry is rich in micro & macro nutrients along with NPK and can be directly applied in fields. It leads to soil improvement due to high nitrogen contents.
- Biogas as a gas provides improvement in the environment, sanitation and hygiene by proper management of waste.
- It improves ground water 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 risk to human and animal health.

## GOVERNMENT SUPPORT

Govt. of India will provide a subsidy of Rs. 400 Lakh/12000 M3 or 4800 kg BioCNG equivalent Project capacity installed of the plant. Govt. officials may visit during project life to show it to others, as a model project. The **Ministry of New and Renewable Energy, Government of India** supports Biogas Power Plants under above program. Following projects for 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/rural, agricultural, industrial/ agro-industrial sector.
- Projects for co-generation /power generation and production of bio-CNG from biogas.
- Mixing of other wastes of renewable nature, including paddy straw, rice husk, bagasse, sewage, cow-dung, other biomass and industrial effluents (excluding distillery effluents) will be permissible.

\*\*\*\*\*

## VI. STATUTORY REQUIREMENTS

### STATUTORY REQUIREMENTS

- **APPROVAL FROM STATE NODAL AGENCY:** -We need to submit a Detailed Project Report to the state Govt. for approval. It helps in getting subsidy and other benefits offered by the Govt.
- **POLLUTION CONTROL APPROVALS:** - Reference to Central Pollution Control Board notification no: CPC/IPC-VI/ROW6686-6730, Date:22.09.2021  
Sr. No 86, Clause No b. its mention that CBG Plant based on process waste (Industrial/ process liquid effluent & solid waste like press mud, organic sludge, molasses, etc) comes in Orange Category. (The anaerobic biodegradation of the same may generate waste water containing high BOD and COD. If discharge of wastewater is more than 100KLD, PI will be 60 and will be categorized as RED.
- **CHANGE OF LAND USE PERMISSION:** - We also have to get clearances under change of land use from state housing and urban development department.
- **GAS CYLINDERS RULES, 2004:** -There are regulatory requirements for filling of Compressed Biogas. We have to obtain a license to fill compressed biogas cylinders from Petroleum and Explosive Safety Organization, (PESO) (Govt. of India) under Gas Cylinders Rules, 2004. For this an online application has to be filled up. License requires payment of a fee.
- **NOC FROM VILLAGE PANCHAYAT:** - We have to get NOC from village Panchayat.
- **CLEARANCE FROM CHIEF ELECTRICAL INSPECTOR:** -We have to submit an application and get the approval.
- **NOC FROM DISTRICT FIRE OFFICER:** - We have to submit an application to Fire department and get the approval.

## **VII. FEED STOCK ANALYSIS AND SUPPLY**

### **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 digester so the process could occur. Depending on the waste feedstock and the system design, biogas is typically 55 to 60 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 effluent, 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.

### **Approximate Quantity Required For Generation of One M<sup>3</sup> Biogas**

Sr. No.	Substance	Quantity (Kg)
1	Cattle Dung	20
2	Paddy Straw	4
3	Napier grass	8
4	Poultry Waste	8
5	Horse/ Mule/ Elephant Dung	12-15
6	Food waste: Pre and post cooked leftover food from households, hotels and canteens.	10-12
7	Green waste (vegetable market waste): Vegetable refuses from Vegetable Markets or kitchens.	10-12
8	Paddy straw/ wheat straw/ mushroom spent waste: Lawn cuttings, leafy biomass, dried flowers, finely chopped and ground straw or bagasse.	5-8
9	De-oiled rice bran	3-4
10	De-oiled seed cake (Pongamia/ Jatropha)	3-4
11	Segregated municipal solid waste (biodegradable)	12-15
12	Slaughter house waste (blood, flesh and left over food in the gut of animal)	5-10

- **PRESS-MUD:** - Press mud is a solid residue, obtained from sugarcane juice before crystallization of sugar. Generally press mud is used as manure in India. It is a soft, spongy, lightweight, amorphous, dark brown to black coloured material.

It generally contains 60-85% moisture (w/w); the chemical composition depends on cane variety, soil condition, nutrients applied in the field, process of clarification adopted and other environmental factors. Press mud from sugar factory typically contains 71% moisture, 9% ash and 20% volatile solids, with 74-75% organic matter on solids. Sugar molasses has methane potential (i.e. CH<sub>4</sub> per ton of raw material) of 230 m<sup>3</sup>. Typical composition of press-mud is given below in the table.

**COMPOSITION OF PRESS MUD**

Components	PERCENTAGE
Cellulose	11.4%
Hemi cellulose	10.0%
Lignin	9.3%
Protein	15.5%
Wax	8.4%
Sugar	5.7%
Na	0.22%

The present methods for disposal of press mud are not economically suitable and pollute the environment too. As it contains appreciable proportion of biodegradable organic matter, it has very good potential for the production of biogas.

Material under anaerobic conditions. Methane is the most valuable component under the aspect of using biogas as a fuel; the other components do not contribute to the calorific ("heating") value and thus are "washed out" in our purification plants in order to obtain a gas with almost 97-100% CH<sub>4</sub>. Methane is the flammable compound in biogas.

- **COW-DUNG:** -

In the state of Uttarakhand, million tons of animal dung is produced every year which can be utilized for better purposes. Hence anaerobic digestion becomes a promising technology. The project was to construct an anaerobic processing facility to generate biogas which will be more cost effective and economically friendly.

Fresh cow dung is collected from nearby villages and Cow Farms. The proximate and microbial parameters of the dung were determined. The proximate analysis showed that the energy yielding nutrient values of the cow dung were significantly higher than the fowl dung.

## Percentage Proximate Composition and pH Values of the Dung

PARAMETERS	COW DUNG
Moisture %	18.55 ± 0.28
Ash %	10.10 ± 0.02
Crude Fiber %	40.20 ± 0.12
Crude Protein %	6.80 ± 0.06
Crude Fat %	4.00 ± 0.42
Carbohydrate %	20.35 ± 0.34
pH	7.10 ± 0.01

Gas produced from cow dung is 55-65% methane, 30-35% carbon dioxide, with some hydrogen, nitrogen and other traces. Its heating value is around 600 B.T.U. per cubic foot. Cow dung slurry is composed of 1.8-2.4% nitrogen (N<sub>2</sub>), 1.0-1.2% phosphorus (P<sub>2</sub>O<sub>5</sub>), 0.6-0.8% potassium (K<sub>2</sub>O) and 50-75% organic humus.

About one cubic foot of gas may be generated from one pound of cow manure at around 28°C. This is enough gas to cook a day's meals for 4-6 people in India. About 1.7 cubic meters of biogas equals one Litre of gasoline. The manure produced by one cow in one year can be converted to methane, which is the equivalent of over 200 Litres of gasoline.

### Highlights

The feedstock is low cost and consists of **10,000-15,000 Kg/ day of cattle dung, 120,000 Kg/day Sugarcane press mud** from the said sugar mill and **5,000 Kg/Day** other bio-degradable stuff from nearby villages and municipalities.

Cattle dung is collected from various dairy farms/ nearby villages @ **INR 750/MT** and used as inoculants.

The sugarcane press mud is generated in the said sugar mill and made available to the project @ **600/ Ton** and supplied to the bio-gas plant sited at the plot adjacent to the sugar mill.

Other bio-degradable waste stuff is collected using special vehicles designed for transporting the wastes from nearby municipality and villages in enclosed containers to prevent air pollution by the SPV which also pays the restaurants **INR 500/MT** for the waste collected.



# SHREE JEE BIO ENERGY

GST- 05AEYFS0945L1ZB

Below is given Approximate Required Quantities of the Substances (Alone)

Sr. No.	Item	Daily Required Quantity (Ton)
1	Cow Dung	250
2	Poultry Droppings	98-100
3	Food Waste	175-180
4	Sugarcane Press mud	125

Combination of any of these mentioned above can also work in proportionate quantity. But the present project will be using the following Combination of Raw Materials as per Feed stock analysis Table 1.

Sr. No.	Item	Daily Input Quantity (Ton)
1	Cow Dung Required	10-15
2	Sugarcane Press mud	115-120
Note: Feed stock quantity may vary based on Dry matter and volatile matter available in the above mentioned feed stock		

Table -1

## VIII. PROCESS TECHNOLOGY

### 1. PREFACE

Biomass is one of the main resources employed within renewable energy, making use of waste streams from agriculture, industrial processes and municipal wastes. Besides using waste sources, biomass clearly has advantages due to low cost, zero carbon footprint and high plant utilization factors compared to other renewable and conventional energy technologies. Globally, energy trapped in biomass is more than the combined known reserve of oil, gas and coal. With large quantities of biomass available in INDIA in dispersed and decentralized mode in a wide variety of forms across a range of agro climatic conditions, biomass is expected to become increasingly important over time.

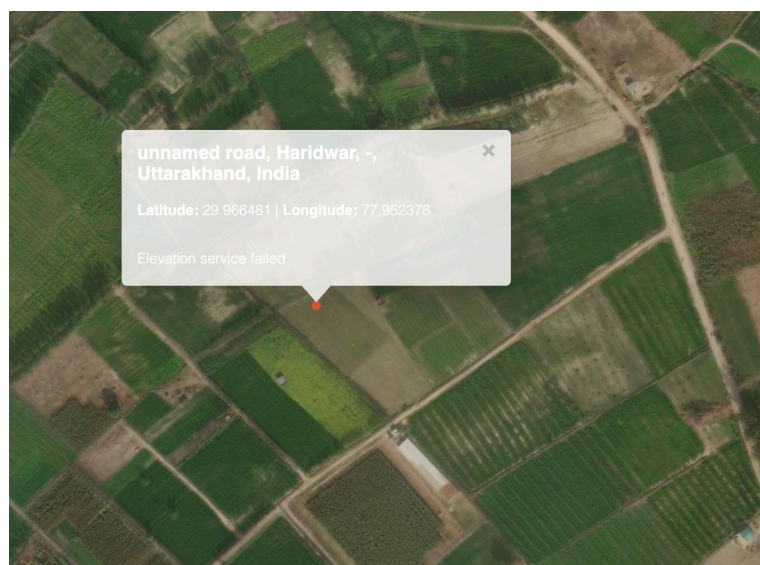
There are three temperature ranges in which bio methanation takes place mesophilic (35-38°C) and thermophilic (40 - 55°C) in this project about 10-15 MT/ day of cattle dung will be co-digested with about 120 MT/ day of Sugarcane Press Mud ,which may be collected from nearby Sugar industries. The pH and C: N ratios will be adjusted and the entire hydrolyser and digester are thermally insulated and heated to 35-38°C with a heat pump to provide the required temperature for thermophilic bacteria to thrive and maximize biogas output.

The present project proposes to employ two stage thermophilic processes using a continuous stirred tank reactor configuration to optimize plant size and conversion efficiency.

## 2. AVAILABILITY OF COW DUNG & Sugarcane Press mud WASTE

This Present Plant is proposed to be set-up on a Non Agricultural Land owned by M/S.SHREE JEE BIO ENERGY, located at Village-Jaswa Wala, Block- Bahadrabad, District-Haridwar, Uttarakhand -249402 Vide below table.

Chak No	254,228
Village	Jaswa Wala
Block	Bahadrabad
District	Haridwar
State	Uttarakhand-249402

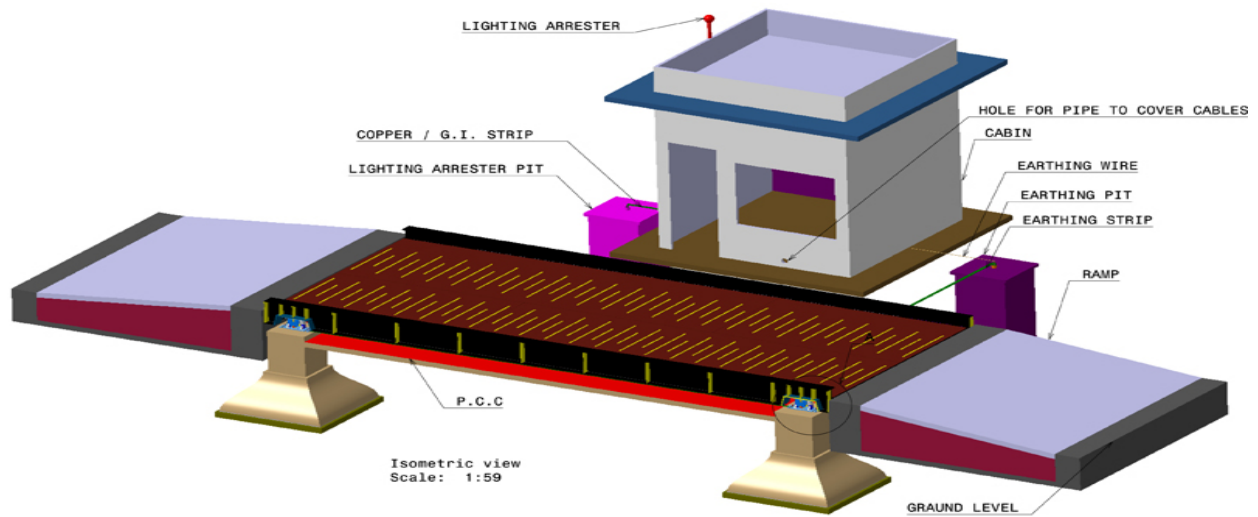


Jasawala, Bahadrabad, in Haridwar district is well known by sugar processing industries from sugarcane. Bahadrabad, Haridwar is surrounded by top 10 -12 biggest sugarcane industries around 35 to 40 km range area. The present methods of for disposal of press mud are not economically suitable and pollute the environment. Around 800-1000 tons per day of sugarcane press mud is being disposed, as it contains appreciable proportion of biodegradable organic matter, it has very good potential for production of biogas. As per the past records of their yield, we are assured of getting the required amount of raw material as required for the plant. Daily 10-15 tons of Cattle dung and 115-120 ton Sugarcane press- will be fed to the Plant. The proposed scheme will ensure a stable microbial reaction and a smooth functioning of the digester performance. Quantity of the addition will be adjusted as per the availability, TS content, and storage requirements of the project.

### DETAILS OF THE AVERAGE FEED-MATERIALS AVAILABLE FOR THE PLANT

S.No.	Feed Materials	Availability
		(Tons per day)
1)	Cattle Dung	10-15
2)	Sugarcane Press mud Waste	115-120
	<b>Total</b>	<b>130</b>

### 3. WEIGH BRIDGE



#### Weighbridges

Weight as a measure of a quantity has several benefits. Unlike volumetric measurement, weight can measure quantity without the use of a correction factor for the material's bulk density, weighing does not require contact with the material and with the correct system weighing is fast, accurate and objective, particularly in long-run situations where errors in individual measurements can be neglected.

One of the most common weighing systems used in the bulk transportation industry is the weighbridge. Weighbridges are used throughout the world as a way of quickly assessing the weight that a truck or train is carrying.

#### Principle

Their basic configuration is almost the same. All needs sensors, junction box, printer, weighing instrument, nowadays weighbridge can match with computer and weighing software. When a weight is applied to the platform, a portion of the load is transmitted to each load cell. Each load cell sends an electrical signal to the weigh controller via the junction box which sums the signals from a number of cells. The weigh controller converts the summed signals to a weight reading.

## PRINCIPLE OF OPERATION

- **Feeding**

Feeding devices are applied in case to feed shredders with light or bulky materials. Apart from the standard feeding devices, also special designs are possible that, adapted to the relevant feeding materials, effect an optimal feeding.

- **Coarse Crushing**

The size reduction can be coarse or medium course, in two or four shaft design, as a single-stage or multi-stage system.

- **Fine-comminution**

Granulating systems for an additional shredding if a fine particle size reduction is to be achieved.

### Feeding Process:

The bio mass will be put into a Feed preparation pit. A top mounted mixer, which will mix different feed stocks and bring it to unpacked, fluffy and consistency. From time to time it releases small quantities of feedstock into an open mouth pump. This screw pump joins an additional quantity of liquid with the biomass and pushes it forward. The liquid itself comes in the beginning of the daily preparation period from a Fertilizer pit or sometimes directly from digester. The mixture of feedstock will be pumped into the digester.

The Fertilizer pit and the Feed prep pit are complete of the same design. Digester is comprised of a standing cylindrical tank of reinforced concrete with a net volume of 7,200 M<sup>3</sup> of digesters. Digesters are also covered with a double membrane gas roof with inbuilt gas storage capacity. This will reduce emission as well as it increases the gas storage capacity of the whole system.



**Substrate Supply Pump**



**Preliminary (Mixing) Tank**

Feed preparation pit are fully mixed by high quality agitators. Whilst its way from the Feed preparation pit to the digester, the biomass passes through an additional chopper to refine the whole mixture for better pumping, piping and mixing consistence. This way of maintaining an acceptable fluid viscosity even of high dry matter containing. Mixtures will also reduce the demand of electrical self-consumption of the plant



## 4. ANAEROBIC DIGESTER DESIGN AND SIZING SUITABLE FOR MULTI-FEEDSTOCK:

The feeding of the anaerobic digester will work as a semi-automatic storage flow-process, by which the biomass is guided into the digester from the feed prep pit per day. Any process of pumping from, and to any containment will be monitored by level switches.



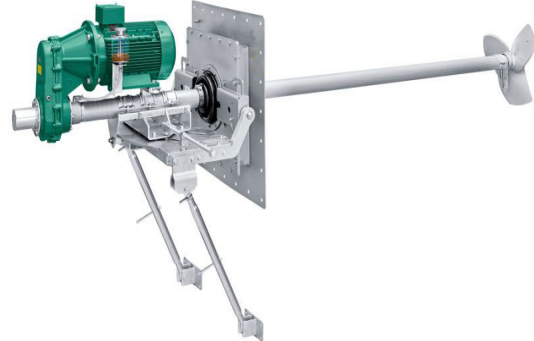
### CSTR Technology based Anaerobic Digester

The Digesters are mounted with quality side entry agitators and will be operated in a mesophilic ( $35^{\circ}\text{C} \pm 2$ ) temperature range. This leads to a stable process and an economical optimized demand for process heat and 30 days of retention time. So, a maximum gas yields.

The digester is comprised of a standing cylindrical tank of reinforced concrete with a net volume of  $12,700 \text{ M}^3$  including a freeboard head space for gas release. The Digester is covered with a double membrane gas roof.

The solids that are fed into the Digestion System for decomposition or degradation of the Volatile Solids (VS) (Organic Dry Matter) present inside the feed substrate (Bio mass). The degradation is done in the digester. Bio mass is guided into digester by the

pumping system several times per day. Additionally, re-circulated slurry will be pumped into the digesters. The treated sludge will be pumped to the liquid fertilizer.



## Side Entry Type Agitator (Mixer)

As described above, the digester is fully mixed by high quality side entry agitators and will be operated in a mesophilic temperature Range. This combination leads to a stable process with good mechanization results and a minimized effort as far as area requirements and digester volume are concerned. On the other hand, it aims at maximum gas yield which results in maximum greenhouse gas reduction.

## 5. BIOGAS STORAGE:

The digester as well as the feed preparation pit is installed with a top dome covering. The digester is covered with Double membrane balloon and an approximate pressure of 4-5 Milli Bar Gas Pressure is maintained.

The technology used in CSTR (continuously stirred reactors.) The Agitators will be installed inside the digester to ensure extremely homogenous mixing of the slurry.



## Gas Storage -Double membrane Balloon

The digested feed material has VS content in it to produce a gas comprising of maximum pure biogas and the rest of containing of  $\text{CO}_2$  and  $\text{H}_2\text{S}$ . This gas is called biogas. After digestion the feed material is taken for further storage. This technology ensures that the maximum biodegradable feedstock is degraded and maximum efficiency is attained out of the biogas generation plant.



## 6. MPSA BASED BIOGAS UP-GRADATION/PURIFICATION TECHNOLOGY:

Biogas is the bio fuel having number of impurities in it, which may create problems for man, machine and environments if consume directly for heating, power generation or cylinder filling. So we need to remove all the impurities as per the gas application norms and standards governed by the controlling agencies or equipment manufacturers.

The system which we are going to design for cylinder filling, so we have to follow the Norms of PESO for all constituents present in the final product which will be filled in cylinders.

**As per given input data of the gas by user, we have to process as per the following steps to get the desired quality of product gas.**

1. Pre cleaning or H<sub>2</sub>S removal.
2. Pressurization and dehydration.
3. Co<sub>2</sub> removal.
4. Methane recovery from exhaust stream.
5. Gas analysis and control system



**H<sub>2</sub>S Removal -Biogas cleaning system**



**Moisture & Co<sub>2</sub> Removal -Biogas**

# SHREE JEE BIO ENERGY

GST- 05AEYFS0945L1ZB

## Design Basis for Biogas Up-Gradation Unit:

The composition of biogas and plant load characteristics is indicated in the tables below:

### INLET GAS FLOW AND COMPOSITION:

INLET GAS SPECIFICATION	
B-GAS inlet flow	700 M <sup>3</sup> /hr
B-GAS inlet pressure	ATM
B-GAS Pressure by After Blower	Up to 0.8 Bar G
B-GAS COMPOSITION	
Methane	55-60 %
Carbon Dioxide	35-40 %
Hydrogen Sulphide	2000 PPM (± 500 PPM)
H <sub>2</sub> O	Saturated (3 to 4 % )
Nitrogen & Oxygen	< 2 %

### OUTLET GAS FLOW AND COMPOSITION:

OUTLET GAS SPECIFICATION	
B-GAS OUTLET flow	350 - 400 M <sup>3</sup> /hr
B-GAS OUTLET pressure	0.2 - 0.4 Bar G
B-GAS COMPOSITION (As Per BIS STD 16087:2016)	
Methane	> 95% (+ -1%)
Carbon Dioxide	< 4%
Hydrogen Sulphide	< 8 PPM (±5 PPM)
H <sub>2</sub> O	Dew Point (–)65°C or 5 PPM
Nitrogen & Oxygen	Balance

## 7. BIO-CNG BOOSTER COMPRESSOR

For transportation and storage, Bio CNG must be compressed up to 250 bars to save space. This application requires compressors and lubricants specifically designed for this use. Air compressors have been used in industry for well over 100 years because air as a resource is safe, flexible, clean and convenient. These machines have evolved into highly reliable pieces of equipment that are almost indispensable in many of the applications they serve.



## 8. ORGANIC FERTILIZER PLANT (SOLID LIQUID SEPARATION SYSTEM)

For each Digester the effluent would be of the order of some amount with 5.5 - 7% TS. The Digester Effluent has wide ranging use as organic fertilizer including for farming. But have preferential applications for, short cycle, forage/energy crops, & horticulture products farming. The effluent from the Biogas Digester is sent to the organic fertilizer unit where the solids & the liquid are separated. The separated solids can be used as organic fertilizer by further processing such as composting.

The Separator separates water from solids. It operates continuously and automatically according to the press screw separator principle and separates thin and viscous compounds. The solid matter / liquid compound are pumped from the inlet chamber by the press screw into the horizontal screen. Some of the water flows due to the force of gravity through the screen.

The press screw conveys the rest of the water with solid particles (also smallest particles) into the press zone in the last section of the screen. Here a permanent regenerative, compact solid matter is generated and is then pressed out through the outlet of the machine, which can be easily filled into containers. The separated fluid slows through the outlet underneath the machine. On the grounds of narrow tolerance the inside of the screen is permanently kept clean.



**Solid liquid Separator Plant**

## 9. AUTOMATICS AND ELECTRIC EQUIPMENT

Process control equipment is used for the supervision and regulation of the operation of the plant and for the limitation of damage. In case of emergency, for example, breakdown of the electrical power supply, the biogas plant is automatically transferred to safe operating conditions by the process instrumentation. Necessary electrically driven devices are supplied with emergency power. Automatic system allows to supervise the plant parameters in real time and to recognize and correct aberrations immediately; to run the plant on its optimum and thereby to save resources and costs; to make recordings for the electronic journal of operation parameters.

Automatic system consists of control cabinet, sensors for parameter control of technological process and execution devices. Control cabinet is designed on the basis of industrial controller with using periphery distributing system and operator panel Touch with touch-sensitive control. Communications is executed physical interface RS-485.



### Electric Equipment

Upper part has power box, central, and front-end processor. Below periphery distributing system is installed with input – output unit. In lower part the interface relay and clips are installed for connecting execution devices. All plant is operated by 1 or 2 operator.



## 10.CNG STORAGE SYSTEM FOR COMPRESSED BIOGAS/BIOCNG

With over 10+ years of experience and expertise behind us, we, Jog waste To Energy Pvt Ltd have emerged as one of the leading names in manufacturing, exporting and supplying of CBG Storage Cascades & related equipment's. Fully equipped with the latest machinery for production with all required safety accessories and necessary approvals as required.

Compressed Biogas Cylinder designs are based on the customer's requirements and specifications prescribed by the Indian or International Standards. Design calculation and drawings are duly verified by BIS and finally approved by the Petroleum and Explosives Safety Organisation (PESO), Nagpur. The industrial cylinders for domestic market are manufactured as per IS-7285 standard whereas the CNG cylinders for on-board usage in automobiles are manufactured as per IS-15490, both the standards are duly certified by Bureau of Indian Standards (ISI) and later approved by Petroleum and Explosives Safety Organisation (PESO), Govt. of India.



**BioCNG Cascade**

## 11.UTILITIES REQUIREMENT:

### a) Land for Project

Land	21,609 M <sup>2</sup>
------	-----------------------

### b) Fresh Water Resource

100 M<sup>3</sup> /Day Required Fresh Water (Ground water)

### c) A C Power

Supply of AC power 415 V, 50 Hz, 3P & N required for Total plant running, for consumption of different components of the unit as bellow :-

Purpose	Power consumption
<b>Raw Material Preparation and Feeding</b>	
Shredder & Grinder	1 x 5 kW
<b>Digester plant and machinery</b>	
Mast for Mixer in pit	2 x 12 kW
Mast for Mixer in digester-1	6 x 12 kW
Mast for Mixer in digester-1	6 x 12 kW
Screw Pump	2 x 12 kW
Solid liquid Separator	2 x 5.5 kW
<b>BIOGAS UPGRADATION SYSTEM (Biogas purification plant )</b>	
Bio-Gas (Roots Blower)	40 KW
Water Jet Vacuum Pump	40 KW
Booster Compressor	120 KW
Other utility	25 KW

Total Running Load Required      630 KVA  
Total Connected Load Required      800 KVA  
Total Power consumption per day      5000 KWH

## PROCESS DISCRIPTION

- **Overview**

Biogas is formed in a natural process when organic material, such as cattle dung, Sugarcane Press mud, agro-wastes, food wastes, MSW etc. is decomposed by micro-organisms in an anaerobic or oxygen-free environment, biogas is produced in natural environment where the availability of oxygen is limited, for example in bogs and marshes, rice fields and in ruminants stomach.

Anaerobic digestion also takes place in landfills and biogas plants. The present organic waste to biogas system operates in a thermophilic process in continuous stirred tank reactor. The process of bio-methanation can be divided into four steps; viz. Hydrolysis, Acidogenesis, Acetogenesis and Methanogenesis. Biomass in the form of cattle dung, Paddy or Wheat Straw, Napier Grass, Other Agro-Waste and other bio-degradable stuffs are properly mixed in a feed mixer and then sent to a pulper, where it is comminuted into fine particles.

- **Hydrolysis**

In the first step (hydrolysis) the pulped material is sent to the **Hydrolysis Tank**, where the organic matter is enzymolyzed externally by extra cellular enzymes (cellulose, amylase, protease and lipase) of microorganisms. Converting solid waste into liquid form, the pulverizer stimulates this step. Bacteria start decomposition of the long chain of the complex carbohydrates, proteins and lipids into shorter parts. Proteins are split into peptides and amino acids and fats into fatty alcohols. Hydrolysis occurs in the two hydrolysis tanks which are maintained at a high temperature and provided with insulation. Various types of bacteria are involved in the remaining three processes which occur in the two digester tanks, which are likewise maintained at high temperature with insulation and continuously stirred.

- **Acidogenesis**

Acid-producing bacteria involved in the second step convert the intermediates of fermenting bacteria into volatile fatty acids along with ammonia ( $\text{NH}_3$ ) hydrogen sulphide ( $\text{H}_2\text{S}$ ) and Carbon-dioxide ( $\text{CO}_2$ ). The pH of the raw slurry falls from 7.5 to about (4.5 to 5.5) in this stage.

- **Acetogenesis**

In Acetogenesis, bacteria which are aerobic and facultatively anaerobic, and can grow under acidic conditions, produce acetic acid, during which they use the oxygen dissolved in the solution or bounded oxygen. These bacteria largely convert the products of Acidogenesis into acetic acid ( $\text{CH}_3\text{COOH}$ ) carbon-di-oxide ( $\text{CO}_2$ ) hydrogen ( $\text{H}_2$ ) and traces of methane.

Various zones are formed in fermentation pond and different bacteria dominate these zones.



- **Methanogenesis**

A consortium of archaeobacteria belonging to methanococcus group is involved in the fourth step and decomposes compounds with a low molecular weight. These bacterial are naturally present in the alimentary canal of ruminants (cattle). They occur to the extent that anaerobic conditions are provided, for instance under water (in marine sediments), in ruminant's stomach and in marshes. They are obligate anaerobic and very sensitive to environmental changes. They have very heterogeneous morphology and a number of common biochemical and molecular-biological properties that distinguish them from all other bacteria. The heat used for maintaining the temperature of the slurry in the hydrolysis tank and the digester tank is recovered in a cooling tank with the help of a heat pump coupled to heat exchangers. The undigested lingo-cellulosic and hemi-cellulosic materials are then passed to the sludge separator which recovers solid organic fertilizer from it. This fertilizer is dried packed and sold to the farming community.

- **Biogas Generation**

The biogas produced is a mixture of methane, carbon dioxide water vapour and small quantities of contaminants such as  $H_2S$   $NH_3$  and  $N_2$ . The average composition of biogas is as follows

Methane ( $CH_4$ )	50-60 %
Carbon dioxide ( $CO_2$ )	36-40 %
Water vapour ( $H_2O$ ) saturated mass	3- 4 %
Hydrogen sulphide ( $H_2S$ )	50-2500 PPM
Ammonia ( $NH_3$ )	0-300 PPM
Non-gaseous particulates and oil	Low concentration

- **Biogas up gradation: -**

Biogas Up gradation is the process of removing impurities like  $H_2S$ , Moisture and  $CO_2$ , We are using the process to remove  $H_2S$  is catalytic removal, moisture removal is in two steps first by chilling process and second by desiccant adsorption process.

Removal of  $CO_2$  is being done by four tower VPSA system, it's a versatile and a proven technology for gas separation, in this system we are using four steps for removing  $CO_2$ , are Adsorption, desorption (evacuation by vacuumed), purging and pressurization. Adsorption the process of  $CO_2$  adsorption on solid surface of porous material called molecular sieve at pressure of 0.7 bra G by Roots type gas Blower, after its saturation this tower will come in desorption in this step the vacuum shall be taken up to minus 0.8 bar by using water ring type vacuum pump, after the completion of the step tower will come in next step call purging during purging the product gas will be purged and final step is depressurization then the tower will be depressurize by equalize with the tower in process and tower purged and then pressurize with product gas.

This process is the cyclic and repeated in cycle of the 5 minutes. System controlled by programmable logical control system through a control panel.

## Plant Components

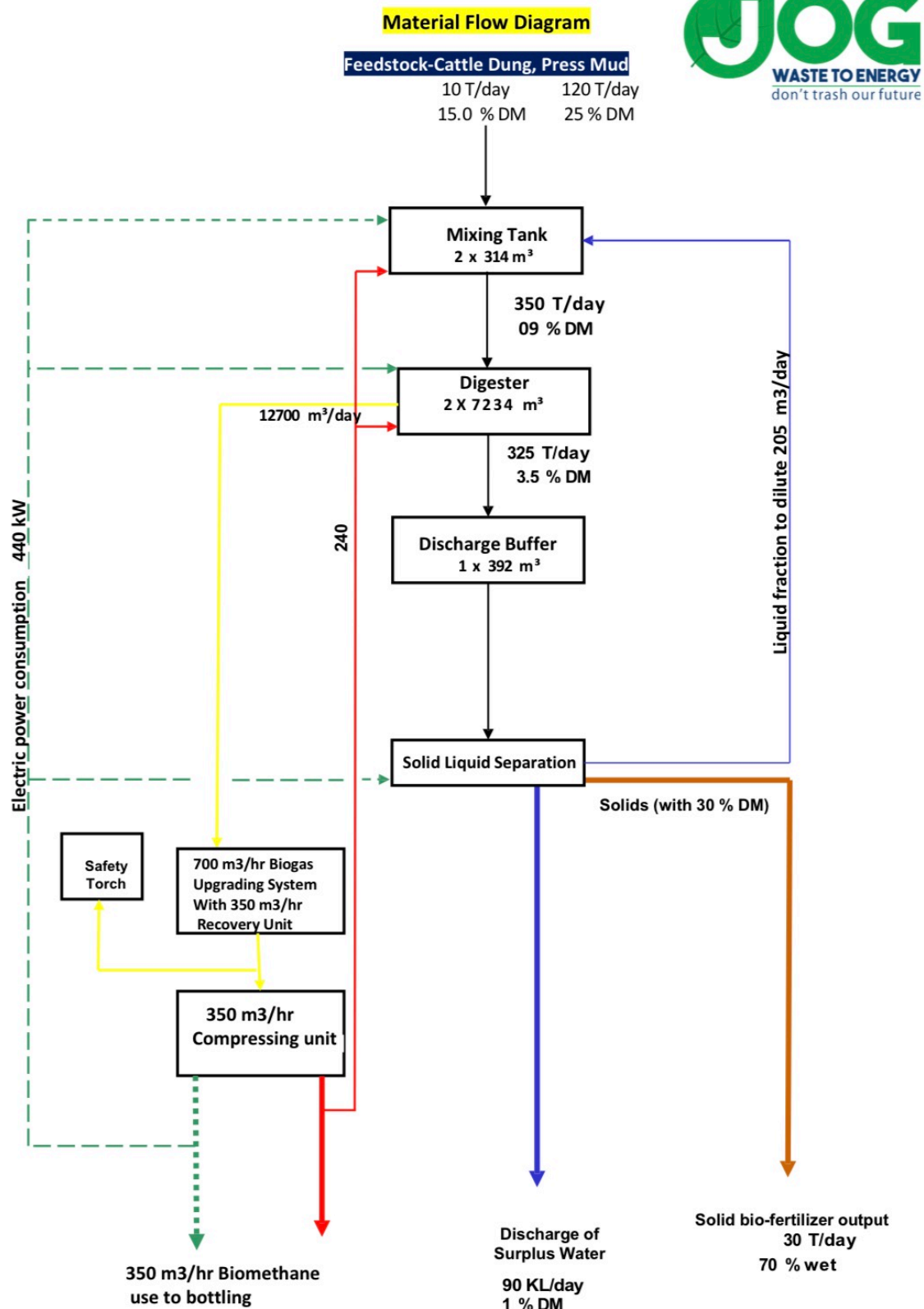
The present Bio-waste to Bio-CNG system operates on a two phase thermophilic process and consists of the following components and equipments;

- Weighbridge
- Shredder with Grinder
- Feed Mixer
- Holding/ Mixing Tanks With Stirring Arrangement
- Digester Tank with Stirring and Heating Arrangement
- Double membrane biogas Balloon
- Heat Pump With Heat Exchanger
- Sludge Separator
- Liquid Fertilizer Tank
- Solid liquid Separator
- Solid Fertilizer Packaging Plant.
- Gas Blower And Gas Flare
- Gas Meter
- Associated Liquid Piping System For Conveying Substrates And Liquids
- Gas Piping System For Conveying Gases To Downstream Equipments
- MPSA System with Auxiliaries for Separation of the Biogas into Component Gases of Methane and Carbon Dioxide.
- Bio-CNG Compressor with Auxiliaries Capacity for Compressing Methane to 200 Bar and Storing In the Cylinders.
- Storage Cylinder Cascades.
- Solid Fertilizer Packaging Plant.
- Liquid Fertilizer Filling Plant.
- Bore well with Motor, Piping and Pump
- Online gas Monitoring system with Analyser
- Electrical Equipment, Instruments and control system & Automation
- Conveyance vehicle

# SHREE JEE BIO ENERGY

GST- 05AEYFS0945L1ZB

## PROCESS FLOW CHART & PROJECT LAYOUT



**GST- 05AEYFS0945L1ZB**

**EQUIPMENTS LIST:-**

SR	DESCRIPTION	SIZE	REMARKS
1	DIGESTER-01 & 02	32M X 5M	
2	WIND PIT-01	10M X 4M	
3	DIGESTED SLURRY TANK	10M X 5M	
4	FED PUMP SUD	6M X 3M	
5	WATER TREATMENT TANK	6M X 3M	
6	WATER STORAGE TANK	5M X 5M X 4M	
7	CONTROL ROOM	10M X 4M	
8	BIO GAS INFORMATION SYSTEM	25M X 15M	
9	BIO CNG COMPRESSOR	16M X 8M	
10	CASCADE FILLING STATION	20M X 8M	
11	ADMIN OFFICE	12M X 10M	
12	LAB AREA	5M X 4M	
13	WEIGHT SCALE	12M X 3M	
14	WEIGHT SCALE OFFICE	4M X 4M	
15	SECURITY OFFICE	4M X 4M	
16	FERTILIZER PACKING AREA	12M X 5M	
17	SHREDDER	3M X 3M	
18	X-FURNER AREA	10M X 10M	
19	FUR UNIT ROOMS	3M X 3M	
20	WATER TREATMENT TANK	6M X 3M	
21	WATER STORAGE TANK	5M X 5M X 4M	
22	WATER STORAGE TANK	5M X 5M X 4M	
23	FERTILIZER SHED	25M X 15M	
24	LAGOON	27M X 25M	

**AREA**  
TOTAL AREA - 21639.3 M2  
RCC ROAD - 4921 M2  
RCC STRUCTURE - 3046.09 M2 (Approx)  
SHED AREA - 1865 M2  
OPEN AREA - 11,757.21

**LEGEND**  
RCC ROAD  
RCC/POC AREA  
RCC FOUNDATION AREA  
SHED AREA  
GREEN AREA

**SITUATED SITE :- KHASRA**  
NO.218MANSAN KHURD,  
ROORKEE, UTTARAKHAND

**PROJECT LOCATION :-**  
Khasra No.1/16,1/17,1/25,1/27,1/28,1/29  
Village-Jaswa Wala,Block-Bahadabad  
District-Haridwar  
Slate-Uttarakhand-249402

**SYMBOL**  
PRE HYDANT PIPE - A/G  
PRE HYDANT PIPE - U/G  
PRE SPINALLY PIPE - A/G  
RCC FRAME PIPE  
WIND HYDANT VALVE  
FUSE BOX - 750000000  
PRE WIND MONITOR  
BUTTERFLY VALVE  
PRE EXTINGUISHER - 100 ABC  
PRE EXTINGUISHER - 100 ABC  
PRE EXTINGUISHER - 4500 120  
PRE SPINALLY  
PRE SAND BUCKET

**DESCRIPTION**  
PRE HYDANT PIPE - A/G  
PRE HYDANT PIPE - U/G  
PRE SPINALLY PIPE - A/G  
RCC FRAME PIPE  
WIND HYDANT VALVE  
FUSE BOX - 750000000  
PRE WIND MONITOR  
BUTTERFLY VALVE  
PRE EXTINGUISHER - 100 ABC  
PRE EXTINGUISHER - 100 ABC  
PRE EXTINGUISHER - 4500 120  
PRE SPINALLY  
PRE SAND BUCKET

**SCALE**  
1:1000

**DRG NO.:**  
JOG-SRE-PP-012

**PROJECT:**  
TRUNKY PROJECT - BIO CNG 5000 KGS.  
NEAREST POLICE STATION - BAHARABAD  
NEAREST RAILWAY STATION - KIKAR RAILWAY STATION

**TITLE:**  
EQUIPMENT LAYOUT OF BIO CNG SYSTEM

**REVISION**  
1. NTS R0

## IX. MARKETABILITY OF THE PRODUCTS

The plant utilization factor is assumed @100% on 365 days/year operating cycle. The manufacturing process has the following 3 products;

### A. BIO COMPRESSED NATURAL GAS

The plant has a capacity to produce about **5,000 Kg/ day** of Bio-CNG which has a gross calorific value of **12,500 Kcal/Kg**. The principal market for this is as a replacement for LPG/ CNG in industrial commercial applications. It may also be provided as automobile fuel replacement for petrol and diesel. The project proposes to supply the gas to the regular consumers via retail outlets of INDIAN OIL in the local market area. It also proposes to enter into long term supply contracts with INDIAN OIL stations situated within 25-75 Km/ onsite of the project site, for sale of Bio-CNG as an alternative to CNG fuel.

Bio-CNG, a clean and renewable fuel, has vast potential in India. It can be a supplement to petroleum products, if used in compressed form in the cylinders. Biogas originates from bacteria in the process of biodegradation of organic material under anaerobic conditions. Methane is the most valuable component under the aspect of using biogas as a fuel; the other components do not contribute to the calorific ("heating") value and thus are "washed out" in our purification plants in order to obtain a gas with almost 95-96 % CH<sub>4</sub>. Methane is the flammable compound in biogas.

#### Composition of Purified Bio-CNG

Ingredient	Value	Test Method
CH <sub>4</sub> (Percentage)	95-96 %	IS-5130 (Part3)
CO <sub>2</sub> + N <sub>2</sub> + O <sub>2</sub> (Percentage)	4-5 %	IS-15130 (Part3)
Only CO <sub>2</sub>	< 4 %	IS-15130 (Part3)
H <sub>2</sub> S (Mg/M <sup>3</sup> )	5 (Mg/M <sup>3</sup> )	ISO- 6326-3
Moisture (Mg/M <sup>3</sup> )	5 (Mg/M <sup>3</sup> )	IS-15641 (Part2)

Use of Bio-CNG: - Automobiles Fuel, Industries, Canteens, Restaurant, Hotels, Hostels, Sweet shop, Dhabas etc.



## EQUIVALENT QUANTITY OF FUEL FOR 1 CU M OF BIOGAS

Biogas	1.00 M <sup>3</sup>
Kerosene	0.620 Litre
Fire wood	3.474 Kg
Charcoal	1.458 Kg
Butane	0.433 Kg
LPG	0.456 Kg
Electricity	2.5 Kwh

### B. SOLID ORGANIC FERTILIZER

The plant has a capacity to produce **30,000 Kg/ day** of solid organic fertilizers which is to be sold to farmers at the appropriate outlets. @ **INR 2.0/Kg**. To the farming communities and is deployed for growing crops.

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 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 growing crops gives better yields as compared to other modes of its applications.

### C. LIQUID ORGANIC FERTILIZER

The plant has a capacity to produce **90,000 Litre/ day** of liquid organic fertilizers which is to be sold to farmers at the appropriate outlets. @ **INR 0.10/Kg**. To the farming communities and is deployed for growing crops.



## D. 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. 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

- Calcium : 0.39-0.65%
- Iron : 0.18-0.32%
- Magnesium : 0.032-0.01%
- Manganese : 0.0059-0.008%
- Nitrogen : 2.6-3.5%
- Phosphorous : 0.8-0.9%
- Zinc : 0.007-0.009%
- 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. Micro nutrients 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:

Sr. No.	Ingredient	Value
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 Produces Are Recommended For 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.

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

## BENEFITS OF BIOGAS PLANTS

- A non-polluting and renewable source of energy is created in biogas plants. Under 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, Restaurant, Hotels, Hostels, Sweet shop, Dhabas, etc.
- It leads to energy security via 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 21times that of carbon-di-oxide. It thus leads to reduction of global warming.
- Biogas plants also produce enriched organic manure. This can be used as fertilizers. Liquid slurry is rich in micro & macro nutrients along with NPK and can be directly applied in fields. It leads to soil improvement due to high nitrogen contents.
- Biogas as a gas provides improvement in the environment, sanitation and hygiene by proper management of waste.
- It improves ground water 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 risk to human and animal health.

## **E. BIO COAL A VIABLE AND SUSTAINABLE ALTERNATIVE TO FOSSIL COAL**

- The main output products from the Anaerobic bio digester are biogas and effluent (Organic Fertilizer), which is a potential fertilizer because the anaerobic digestion process results in conversion of organic nitrogen from manure to ionized ammonia ( $\text{NH}_4^+$ ) which can be used directly by plant roots.
- Apart from fertilizer, we can get value added product and generate revenue by making an organic Bio coal, for this we are planning for production facilities for Bio coal by Processing of Output Digested and Press mud, where bio coal will be produced and sold on a commercial scale. We are developing a production facility for bio coal on a commercial scale making bio coal a viable and sustainable alternative to fossil coal, where high-quality bio coal will be produced. This creates a relatively cheap bio fuel with a high energy density.
- The bio coal in the form of pellets can be used in traditional coal-fired plants, but also for industrial heating processes, buildings or city district heating projects. Bio-coal is a BETTER AND COST SAVING replacement for FO, coal, fire-wood. Burning a biomass briquette is far more efficient than burning FO, firewood or coal because it provides more calorific value/kg and save great amount on boiler fuel costs and at the same time it is POLLUTION FREE AND ECO-FRIENDLY FUEL. Moreover, the energy value is higher and less storage and transport is needed than traditional sustainable alternatives. During the production of bio coal, the installation also produces green electricity and heat. This bio coal can be used as sustainable fuel in power plants and heating installations all over the applicable industries, giving a boost to reducing climate change.

## **X. EFFLUENT TREATMENT AND ABETMENT**

**A. Effluent Treatment Approach:** -The philosophy underlying the effluent treatment system is predicated on the sustainability principles of renew, reuse, recycle and recover. The thrust is to use renewable resources, reuse “wastes” recycle valuable inputs such as water, energy and nutrients and recover through energy efficiency initiatives energy otherwise lost.

**B. Production Process:** - The biogas plant generates about 12,700 m<sup>3</sup>/ day of biogas, which consists of 55-60 % methane, 36-40% CO<sub>2</sub> and 2-5% water vapour, and contains about 1% of contaminants such as hydrogen sulphide (H<sub>2</sub>S) Ammonia (NH<sub>3</sub>) and N<sub>2</sub> which are removed in the gas cleaning train. The cleaned gases, which contain ppb levels of the contaminants, are injected by the biogas pump into the biogas burners, which are specially designed to operate with biogas and used as cooking fuel, replacing the LPG.

### **C. Disposal of By-Products**

- a. **Fertilizer by-products:** - The plant generates about 30,000 Kg/ day of solid organic fertilizer from the sludge separator and about 90,000 Litre/ day of liquid organic fertilizer. This is sold as fertilizer in the market.
- b. **Recycled Slurry/Water:** - The digested slurry after process from solid liquid separator 2, 28,000 Litre/ day will be reused in mixing tank as live feedstock. This is mixed with the incoming fed in the hydrolysis holding tanks.

**D. Recycling of Resources and Energy:** - This is a Green Dot Project as most of the process water is recycled, after treatment. The solid and liquid fertilizers are the only effluents and are sold off as valuable co-products.

## **XI. KEY ASSUMPTIONS**

- The project is assumed to operate for 350 day in a year @85-100% Capacity Utilization Factor (CUF).
- Capital Outlay of Project is INR.28,90,00,000.00
- The Plant Produces **44, 45,000 M<sup>3</sup>/ Year** of Biogas and **17, 50,000 Kg/ Year** of Bio-CNG.
- The selling price of Bio-CNG is assumed to be @ **INR 70/Kg** which is 80% or as IOCL pricing circular of the commercial CNG/ LPG available in the market.
- The plant also produces **10,950 MT/ Year** of solid organic fertilizer with a market price of **INR 2.0 Per Kg**, **32,850/KL/ Year** of Liquid Organic Fertilizer Booster with a market price of **INR 0.10 per L.**

### **Raw Material Consists Of.....**

- Cattle Dung as Received **3500 MT/ Year** Procured @ **INR 750/MT**
- Sugarcane press- mud or other suitable waste **42,000 MT/ Year** Procured @**INR 600/MT**
- The Cost and Selling Price are assumed to escalate @ 5% per annum on compounded basis.

## **ENVIRONMENTAL ASPECTS**

- The project has a low water footprint, as most of the process water is recycled.
- The project is zero discharge and provides valuable solid and liquid fertilizers, which recycle all the macro and micronutrients back to the soil.
- It reduces global warming by preventing fugitive emissions of methane from organic waste streams.
- For all these reasons, the project is entitled to excise and GST exemption, tax breaks and subsidies.

## **XII. PROJECT IMPLEMENTATION**

- **JOG WASTE TO ENERGY** will be the turnkey solution provider for the project, to be implemented on turnkey basis within Five-six months of zero date.
- The project responsibility of **JOG WASTE TO ENERGY** includes design, detail engineering, supply of plant and machinery, construction supervision and management services for project implementation such as documentation for subsidy and statutory approvals and clearances, project scheduling and monitoring, engineering supervision during construction, manpower specification, recruitment, training and service after sales. With collaboration and consultation of SHREE JEE BIO ENERGY.
- The directors of SHREE JEE BIO ENERGY are technical entrepreneurs with significant combination of experience and expertise in the project co-ordination and development.
- Most of the equipments will be sourced from INDIA with only critical equipments being imported from Germany and Italy.

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## **XIII. SWOT ANALYSIS OF THE PROJECT**

### **Strengths:-**

- Renewable Energy
- Biogas plants prevent deforestation.
- Solves Organic Waste disposal problem
- Kills harmful pathogens

Dumping of the organic waste in the streets or dump yards leads to the spread of disease causing organisms like Salmonella sp, E. Coli & Shigella sp which causes diseases like Typhoid Fever, Diarrhea, Shigellosis and other air born diseases. The above mentioned pathogens are killed by the fermentation process (Anaerobic Digestion of the organic waste by Methanogenic microbes in the absence of oxygen) in the Biogas plant because most of the diseases causing pathogens are Aerobic in nature.

- The manure obtained from biogas plant has higher nutritive value as compared to that of ordinary farmyard manure.
- Reduces Global warming & Carbon Foot Print.

Throwing away the organic waste in the streets or dump yards causes emission of CH<sub>4</sub>, N<sub>2</sub>O & CO<sub>2</sub> which are the major greenhouse gases that cause global warming. Among those, CH<sub>4</sub> is the third most important greenhouse gas after N<sub>2</sub>O and carbon dioxide (CO<sub>2</sub>) and has a Global Warming Potential (GWP) 25 times that of CO<sub>2</sub> & N<sub>2</sub>O which has the GWP 310 times that of CO<sub>2</sub>. In Biogas plant, the greenhouse gases generated (mainly CH<sub>4</sub>) is used for cooking/power generation thereby reducing global warming.

- Generates Gas used for Cooking, lighting & Electricity generation
- No foul smell
- Easy to relocate the plant
- One time investment
- Safer than LPG
- No Maintenance



## Weakness:-

- Biogas generated will be in atmospheric pressure

The above mentioned demerit can be overcome either by placing a counter weight or by using pressure boosters based on the capacity of the biogas plant in order to reach the target pressure.

## Opportunities:-

- 50 to 100% of LPG replacement
- Solves organic waste disposal problem
- Biogas plants keep the household and surroundings clean and green.

## Threats:-

- Either the organic waste is not continuously fed or over fed into the biogas plant will lead to less or no generation of biogas and results in feeding the Inoculum (cow dung) again in order to make the plant function.
- It is very clear from the above mentioned SWOT analysis that the strengths and opportunities are more when compared to the weakness and threats which can be easily overcome through different operation mechanisms.

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## XIV. FINANCIAL PROJECTIONS

### A. DETAILED PROJECT COST

Sr. No.	CAPITAL COST HEAD	QTY.	UNITS	UNIT RATE (INR)	AMOUNT (INR)
<b>I</b>	<b>ELECTRICITY</b>				
1	ELECTRICITY CONNECTION				
	Electricity Connection				<b>₹ 1,00,00,000.00</b>
<b>II</b>	<b>CIVIL WORK</b>				
<b>1</b>	<b>BUILDING</b>				
A	Admin Office	120	SQMT	12,500	₹ 15,00,000.00
B	Shed for Filling header with cylinder cascade	160	SQMT	6,100	₹ 9,76,000.00
C	Way Bridge cum Security Room	16	SQMT	7,500	₹ 1,20,000.00
D	Gate	2	No.	1,50,000	₹ 3,00,000.00
E	Boundary (Total Length 800Mtr.)	800	Mtr.	4,550	₹ 36,40,000.00
F	Internal Road 8 Mtr Wide) Length-730 Mtr	5,840	SQMT	700	₹ 40,88,000.00
G	Feed Preparation Platform with Pump	350	SQMT	2,800	₹ 9,80,000.00
H	Feed Mixing Tank (2 x300 CUM)	600	CUMT	4,000	₹ 24,00,000.00
I	Machinery Shed (Purification and Compressor)	519	SQMT	6,100	₹ 31,65,900.00
J	Main Digester (Dia 32 Mtr.)	7,234	CUMT	2,425	₹ 1,75,42,450.00
K	Main Digester (Dia 32 Mtr.)	7,234	CUMT	2,425	₹ 1,75,42,450.00
L	Underground Water/ Slurry Storage	100	CUMT	4,000	₹ 4,00,000.00
M	Solid Liquid Separator Platform	36	SQMT	8,000	₹ 2,88,000.00
N	Fertilizer Shed with Packing	816	SQMT	6,100	₹ 49,77,600.00
O	Digested Slurry Tank	400	CUMT	4,000	₹ 16,00,000.00
P	Lagoon	1000	SQMT	500	₹ 5,00,000.00
Q	Technical room/panel room + Lab Area + Security Office	76	SQMT	9,500	₹ 7,22,000.00
R	Staff Room with Kitchen, Bathroom (3 BHK House)	144	SQMT	16,000	₹ 23,04,000.00
S	Labours Rooms	60	SQMT	10,000	₹ 6,00,000.00
T	Toilet Block + packing	20	SQMT	4,000	₹ 80,000.00

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	<b>SUB TOTAL</b>	<b>11,284</b>	<b>SQMT</b>		<b>₹ 6,37,26,400.00</b>
<b>2</b>	<b>Equipment Foundations</b>				
A	Gas Purification & Compressor Unit	519	SQMT	1,000	₹ 5,19,000.00
B	Agitator	150	SQMT	1,000	₹ 1,50,000.00
C	Technical Room	76	SQMT	1,000	₹ 76,000.00
D	Feeding Pump	100	SQMT	1,000	₹ 1,00,000.00
E	Ladder	238	SQMT	4,000	₹ 9,52,000.00
F	Heating System	12	SQMT	1,500	₹ 18,000.00
G	Solid Liquid Separator	36	SQMT	3,500	₹ 1,26,000.00
H	Drawing, Design, Architectural, Work	1	LOT	1,00,000	₹ 1,00,000.00
	<b>SUB TOTAL</b>				<b>₹ 20,41,000.00</b>
<b>3</b>	<b>BUILDING SERVICE</b>				
A	Fire Fighting Equipments	1	SET	14,50,000	₹ 14,50,000.00
B	Bore well with Motor, Piping and Pump	1	SET	2,54,900	₹ 2,54,900.00
C	Potable Water day Storage (1500 L)	1000	Ltr.	12	₹ 12,000.00
	<b>SUB TOTAL</b>				<b>₹ 17,16,900.00</b>
<b>4</b>	<b>GST</b>				
A	GST on Bio-Gas plant	12	%	6,74,84,300	₹ 80,98,116.00
	<b>TOTAL FOR CIVIL WORKS</b>				<b>₹ 7,55,82,416.00</b>
<b>III</b>	<b>PLANT &amp; MACHINERY</b>				
<b>1</b>	<b>Biomass Handling Facility</b>				
A	Weighbridge & other equip.	1	SET	11,25,000	₹ 11,25,000.00
B	Waste shredder	1	SET	6,50,000	₹ 6,50,000.00
	<b>SUB TOTAL</b>				<b>₹ 17,75,000.00</b>
<b>2</b>	<b>Waste and BioCNG handling Equipments</b>				
A	Tractor with loader	1	SET	10,50,000	₹ 10,50,000.00
B	Tractor and trolley	1	SET	9,50,000	₹ 9,50,000.00
C	CNG Transport vehicle	2	SET	20,50,000	₹ 41,00,000.00
	<b>SUB TOTAL</b>				<b>₹ 61,00,000.00</b>

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<b>3</b>	<b>Equipments/ Machinery For Feed Mixing Tank</b>				
A	Top Entry Type Agitator 15 HP/Variable RPM	15 X 2	HP	N/A	N/A
B	SS Bar Grill	2	SET	N/A	N/A
C	Platform mixing tank	2	SET	N/A	N/A
D	Valves	2	SET	N/A	N/A
E	Flanges	4	SET	N/A	N/A
	<b>SUB TOTAL</b>	<b>2</b>	<b>Nos.</b>	<b>₹ 35,14,000.00</b>	<b>₹ 70,28,000.00</b>
<b>4</b>	<b>Pumping Equipments &amp; Grinder</b>				
A	Screw Pump for Slurry transfer	3	SET	N/A	N/A
B	Grinder	1	SET	N/A	N/A
C	Piping & Valves	1	SET	N/A	N/A
	<b>SUB TOTAL</b>				<b>₹ 65,25,000.00</b>
<b>5</b>	<b>Equipments/ Machinery For Digester Tank Equipments</b>				
A	Heating System	2	SET	N/A	N/A
B	Side Entry Agitators For mixing and circulation	12	SET	N/A	N/A
D	Heating System Valves	2	SET	N/A	N/A
E	Manual Valves	4	SET	N/A	N/A
F	Flanges	4	SET	N/A	N/A
G	Wall Flanges	8	SET	N/A	N/A
H	Pipes	2	SET	N/A	N/A
I	Pipe fittings	2	SET	N/A	N/A
J	Inspection Window	4	SET	N/A	N/A
K	Other Fitting & Fixtures	2	SET	N/A	N/A
	<b>SUB TOTAL</b>	<b>2</b>	<b>SET</b>	<b>₹ 1,75,25,000.00</b>	<b>₹ 3,50,50,000.00</b>
<b>6</b>	<b>Double Membrane Digester Roof/Balloon</b>				
A	Spider Ring	2	SET	₹41,40,000	₹82,80,000
B	Nylon Belts		SET		
C	Nylon Rope Net		SET		
D	Both side PVC coated fabric/Balloon -2 Set		SET		

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E	Under Pressure protection & over pressure Valve-2 Set		SET		
	<b>SUB TOTAL</b>				<b>₹ 82,80,000.00</b>
<b>7</b>	<b>Equipments/ Machinery For Fertilizer Tank</b>				
A	Top Entry Agitator	1	SET	N/A	N/A
B	Pump for slurry Transfer	1	SET	N/A	N/A
C	Auto Valves	1	SET	N/A	N/A
D	Manual Valves	1	SET	N/A	N/A
E	Flanges	2	SET	N/A	N/A
F	Wall mounting Flanges	1	SET	N/A	N/A
G	Fitting Material of Flanges	2	SET	N/A	N/A
	<b>SUB TOTAL</b>				<b>₹ 20,50,000.00</b>
<b>8</b>	<b>700 m3/hr Catalyst Tower based H2S Removal system (H2S &lt;= 1500 ppm)</b>				
A	H2S Removal System	1	SET	NA	NA
B	Accessories	Lum	Sum	NA	NA
	<b>SUB TOTAL</b>				<b>₹ 29,50,000.00</b>
<b>9</b>	<b>700 M3 /hr Biogas Up gradation Plant as per given scope of supply 4 Tower Based systems</b>				
A	Roots Blower	1	SET	N/A	N/A
B	700 m3/hr Biogas Moisture removal system Heat exchanger with moisture separator	1	SET	N/A	N/A
C	700 m3/hr Four Towers (Composite bed) VPSA Unit for removal of H2O, CO2 with Surge vessel and inter connected piping and valves & Instruments for safe operation of the plant	1	SET	N/A	N/A
D	Vacuum Pump with FLP Motor	1	SET	N/A	N/A
E	BioCNG Surge tank	1	SET	N/A	N/A
F	BIOCNG Storge Tank	1	SET	N/A	N/A
	<b>SUB TOTAL</b>				<b>₹ 2,35,00,000.00</b>

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10	<b>350 M3/hr Recovery System - 2 Tower Based System</b>				
A	350 m3 per hr Methane Recovery System	1	SET	N/A	N/A
B	Single membrane Balloon/Biogas Tank	1	SET	N/A	N/A
	<b>SUB TOTAL</b>				<b>₹ 85,50,000.00</b>
11	<b>350-400 m3/hr BioCNG Booster compressor</b>				
A	350-400 m3/hr Biogas Booster compressors for Providing 250 bar pressure at outlet.	1	SET	N/A	N/A
B	High pressure Fittings	1	SET	N/A	N/A
C	High Pressure line up to Compressor to Cascade	1	SET	N/A	N/A
D	Other High pressure accessories	1	SET	N/A	N/A
	<b>SUB TOTAL</b>	<b>1</b>		<b>₹ 1,50,00,000.00</b>	<b>₹ 1,50,00,000.00</b>
12	<b>BIOCNG Filling header</b>				
A	CNG cylinder Filling Header	1	SET	N/A	N/A
	<b>SUB TOTAL</b>				<b>₹ 7,50,000.00</b>
13	<b>BIO-CNG STORAGE</b>				
A	40 Cylinder Cascade	5	SET	18,50,000	₹ 92,50,000.00
	<b>SUB TOTAL</b>				<b>₹ 92,50,000.00</b>
14	<b>Electrical ,Instrumentation &amp; Control Panel etc.</b>				
A	Electrical Control panel	1	SET	N/A	N/A
B	Electrical Wiring, Bus Bar, Joints, Protectors, Earthing etc.	1	SET	N/A	N/A
C	PLC Control panel, Power panel, Cable for all these from field to panel room	1	SET	N/A	N/A
	<b>SUB TOTAL</b>				<b>₹ 70,65,000.00</b>
15	<b>Automation Elements</b>				
A	Pressure & temperature measuring system	1	SET	N/A	N/A
B	Flow measuring system	1	SET	N/A	N/A
C	Automatic valves for Biogas line and slurry line	1	SET	N/A	N/A
D	PH sensor ,Level sensor	1	SET	N/A	N/A
E	Methane leak detection and alarm system	1	SET	N/A	N/A



# SHREE JEE BIO ENERGY

GST- 05AEYFS0945L1ZB

					₹ 55,21,000.00
16	<b>Electrical &amp; Electronics Requirements</b>				
A	Electrical distribution panel	1	SET	N/A	N/A
C	Grid Transformer/LBS/HTMC for Plant	1	SET	N/A	N/A
D	DG Set FOR Backup Power 10 kVA	1	SET	N/A	N/A
E	Cables	1	SET	N/A	N/A
F	Earthing	20	SET	N/A	N/A
	<b>SUB TOTAL</b>				<b>₹ 65,20,000.00</b>
17	<b>ORGANIC FERTILIZER PLANT</b>				
A	Solid/ Liquid Fertilizer Separator Unit	2	SET	35,50,000	₹ 71,00,000.00
B	Fertilizer Unit bagging system and accessories	1	SET	32,50,000	₹ 32,50,000.00
	<b>SUB TOTAL</b>				<b>₹ 1,03,50,000.00</b>
18	<b>OTHER IMPORTANT ITEMS</b>				
A	Product Gas Analysers Online gas Monitoring system with Analyser for H2S,CH4,O2,Co2 Online dew point meter (Optional)	1	SET	10,50,000	₹ 10,50,000.00
C	Laboratory and Analytical Equipments	1	SET	5,00,000	₹ 5,00,000.00
B	Annual Operational Spares	1	LOT	10,80,000	₹ 10,80,000.00
D	EOT Single Grider Crane flame proof As per PESO	1	SET	20,50,000	₹ 20,50,000.00
	<b>SUB TOTAL</b>				<b>₹ 46,80,000.00</b>
19	Clearing Forwarding, Handling & Freight Cost				<b>₹ 20,42,746.00</b>
	<b>SUB TOTAL FOR P. &amp; MACHINERY</b>				<b>₹ 16,29,86,746.00</b>
20	GST on Plant and Machinery	12	%		₹ 1,95,58,409.52
	<b>TOTAL FOR P. &amp; MACHINERY</b>				<b>₹ 18,25,45,155.52</b>
IV	<b>MISCELLANEOUS ASSETS</b>				
1	<b>OFFICE EQUIPMENTS &amp; FURNITURE</b>				
A	Computer at factory	2	No.	35,000	₹ 70,000.00
B	Multifunction laser printer at factory	1	No.	20,000	₹ 20,000.00
C	AC for factory 1.5 Ton	2	No.	35,000	₹ 70,000.00

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D	CCTV Camera system	1	SET	2,00,000	₹ 2,00,000.00
E	Table chair set	2	SET	45,000	₹ 90,000.00
F	Conference chair and table set	1	SET	1,25,000	₹ 1,25,000.00
G	Provision for others	1	SET	25,000	₹ 25,000.00
	<b>TOTAL FOR MISC. ASSETS</b>				<b>₹ 6,00,000.00</b>
	<b>TOTAL PROJECT EXPENDITURE</b>				<b>₹ 25,87,27,571.52</b>
<b>V</b>	<b>PRELIMINARY &amp; PRE-OPERATIVE EXPENSES</b>				
1	<b>PRELIMINARY EXPENSES</b>				
A	Loan processing fee @ 0.40% of loan	0.40%	%	19,20,00,000	₹ 7,68,000
B	Other professional fees @ 0.15% of project cost	0.15%	%	28,90,00,000	₹ 4,33,500
	<b>SUB TOTAL</b>				<b>₹ 12,01,500</b>
2	<b>PRE-OPERATIVE EXPENSES</b>				
A	Working Capital Margin				₹ 16,67,000
B	Interest during construction period				₹ 1,70,62,500
	<b>SUB TOTAL</b>				<b>₹ 1,87,29,500</b>
	<b>TOTAL FOR PRELIMINARY &amp; PRE-OPERATIVE EXPENSES</b>				<b>₹ 1,99,31,000</b>
	CONTINGENCIES EXPENSES				₹ 3,41,428
	<b>TOTAL PROJECT COST</b>				<b>₹ 28,90,00,000</b>
	<b>GROSS TOTAL</b>				<b>₹ 28,90,00,000</b>

# SHREE JEE BIO ENERGY

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## B. PROJECT COST AND MEANS OF FINANCE

PROJECT COST AND MEANS OF FINANCE		
Sr. No.	CAPITAL COST HEAD	INR (LAKH)
<b>A</b>	<b>PROJECT COST</b>	
1	Electricity Connection Charge	₹ 1,00,00,000
2	Civil Work	₹ 7,55,82,416
3	Plant & Machinery	₹ 18,25,45,156
4	Miscellaneous Assets	₹ 6,00,000
5	Preliminary Expense	₹ 12,01,500
6	Working Capital Margin (WCM)	₹ 16,67,000
7	Interest During Construction (IDC)	₹ 1,70,62,500
8	Contingencies Expenses	₹ 3,41,428
	<b>TOTAL PROJECT COST</b>	<b>₹ 28,90,00,000</b>
<b>B</b>	<b>MEANS OF FINACE</b>	
1	Promoters' Contribution Margin	₹ 8,90,00,000
2	Term Loan	₹ 20,00,00,000
3	Total Project Cost	<b>₹ 28,90,00,000</b>
	Term Loan	₹ 20,00,00,000
	Cash Credit (CC) Loan-Working Capital	₹ 50,00,000
	<b>Total Loan from Banks</b>	<b>₹ 20,50,00,000</b>
	<b>Interest During Construction (IDC) Capitalized</b>	<b>₹ 1,70,62,500</b>
	Subsidy From MNRE (To be Adjusted in Loan Account after Project is Commissioned)	₹ 40,000,000

## C. DETAILED ASSUMPTION

DETAILED ASSUMPTION			
Sr. No.	PARTICUALR	Value	Unit
<b>I</b>	<b>PLANT UTILIZATION FACTOR</b>		
1	No. of daily Operation Hours	24	Hour
2	No. of days per Annum	365	Days
3	No. of Working days Per Annum	350	Days
4	Capacity Utilization Factor	85-100	%
<b>II</b>	<b>COMPUTATION OF GAS GENERATION</b>		
5	Daily Input of Cattle Dung	10,000	Kg
6	Daily Input of Sugar Cane Press Mud	1,20,000	Kg
7	Daily Volume of Biogas Generation as per Plant Design Capacity	14,100	M3
8	Daily Volume of Biogas Generation (Design Capacity x 90 %)	12,700	M3
9	Daily Volume of Biogas available for conversion into Bio-CNG	12,700	M3
10	Daily Volume of Bio-CNG Generated	7,000	M3
11	Mass of Bio-CNG Generated	5,000	Kg
12	Methane Slip or Loss during up-gradation	<2%	%
13	Net Production of Bio-CNG with 95% CH <sub>4</sub>	7,000	M3
14	Loss of Biogas by Leakage/ Seepage to Atmosphere	<1%	%
<b>III</b>	<b>ESTIMATION OF PRODUCTION</b>		
<b>A</b>	<b>SOLID BIO FERTILIZER PRODUCTION</b>		
1	Quantity of Compost produced from dry Sludge	30,000	Kg/day
<b>B</b>	<b>LIQUID FERTILIZER CONCENTRATE GENERATION</b>		
2	Quantity of Phosphorus liquid fertilizer concentrate	50,000	L/day
3	Quantity of potassium & nitrogen liquid fertilizer concentrate	40,000	L/day
4	Total quantity of liquid fertilizer concentrate	90,000	L/day
<b>C</b>	<b>WATER CONSUMPTION</b>		
5	Initial water for dilution of first charge	4,28,000	L/day
6	Daily Recycled Water	2,28,000	L/day
7	Total water requirement	2,00,000	L/day

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Sr. No.	PARTICULAR	Value	Unit
<b>IV</b>	<b>PLANT CAPACITY</b>		
1	Bio-Gas Plant Design Capacity	14,100	M3/Day
2	Biogas Plant Generation (Design Capacity x 90 %)	12,700	M3/Day
3	Bio-CNG Plant Capacity	5,000	kg/Day
4	Compost Plant Capacity	30,000	Kg/day
5	Liquid Fertilizer Concentrate Capacity	90,000	L/day
<b>V</b>	<b>PARASITIC CONSUMPTION OF POWER</b>		
1	Load of Biogas Section	165	KWe
2	Load of Biogas Up-gradation Section & Recovery	140	KWe
3	Load of auxiliaries at Bio-CNG Unit	15	KWe
4	Load of Bio-CNG Compression Unit	120	KWe
	<b>TOTAL</b>	<b>440</b>	<b>KWe</b>
	<b>Running Load</b>	<b>345</b>	<b>KWe</b>
<b>VI</b>	<b>ANNUAL OUTPUT ON 100% BASIS</b>		
1	Maximum Quantity of Biogas Generated	44,45,000	M3
2	Maximum Quantity of bio-CNG Generated	17,50,000	Kg
3	Maximum Quantity of Compost Produced	1,05,00,000	KG
4	Maximum Quantity of liquid fertilizer concentrate generated	3,15,00,000	L
<b>VII</b>	<b>ANNUAL INPUT ON 100% BASIS</b>		
1	Annual Consumption of Cattle Dung as Received	3,500	Ton
2	Annual Input of Sugar Cane Press Mud	42,000	Ton
3	Annual Consumption of Power	20,14,800	KW.h
<b>VIII</b>	<b>UNIT PRICE</b>		
1	HHV of LPG	11,950	Kcal/Kg
2	HHV of Bio-CNG	12,870	Kcal/Kg
3	Bio-CNG to LPG energy equivalence	1.08/1	ratio
4	Equivalent price of CNG (Haridwar Uttarakhand)	₹ 102.00	INR/Kg
5	Selling price of Bio-CNG as per CBG Price Circular	₹ 70.00	INR/Kg
6	Selling price of solid organic fertilizer	₹ 2.00	INR/Kg
7	Selling price of liquid fertilizer concentrate	₹ 0.10	INR/L

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## D. PROFITABILITY ESTIMATES

PRFOTIBILITY ESTIMATES (350 days)					
	PROJECTIONS	UNIT RATE (INR)	UNIT	ANNUAL QUANTITY	AMOUNT (INR)
<b>INCOME</b>					
<b>A</b>	Sale of Bio-CNG	70.00	INR/Kg	17,50,000	12,25,00,000
<b>B</b>	Sale of Compost/ Solid Manure	2.00	INR/Kg	1,05,00,000	2,10,00,000
<b>C</b>	Sale of Liquid Fertilizer	0.10	INR/Ltr.	3,15,00,000	31,50,000
	<b>Gross Annual Sale</b>				<b>14,66,50,000</b>
<b>EXPENSES</b>					
<b>VARIABLE OPERATING EXPENSES</b>					
<b>1</b>	<b>RAW MATERIAL</b>				
<b>A</b>	Annual Consumption of Cattle Dung including Transportation	750	INR/Ton	3,500	26,25,000
<b>B</b>	Annual Input of Sugarcane Press mud including Transportation	600	INR/Ton	42,000	2,52,00,000
	<b>TOTAL</b>				<b>2,78,25,000</b>
<b>2</b>	<b>POWER &amp; OTHER REQUIREMENT</b>				
<b>A</b>	For Auxiliaries for Captive Power for Bio-CNG factory	10	INR/KWh	20,14,800	2,01,48,000
<b>B</b>	BioCNG Transportation Cost	1	INR/KG	17,50,000	17,50,000
<b>C</b>	Land Lease (Rental)	1	Lum Sum/annum	50,000	50,000
	<b>TOTAL</b>				<b>2,19,48,000</b>
<b>3</b>	<b>FACTORY OVERHEAD</b>				
<b>A</b>	Misc. Factory Expenses	4000	INR/DAY	365	14,60,000
	Total Factory Overhead				14,60,000
	<b>TOTAL VARIABLE EXPENSES</b>				<b>5,12,33,000</b>

contd.



# SHREE JEE BIO ENERGY

GST- 05AEYFS0945L1ZB

	PROJECTIONS	UNIT RATE (INR)	UNIT	ANNUAL QUANTITY	AMOUNT (INR)
	<b>FIXED OPERATING EXPENSES</b>				
<b>1</b>	<b>Office and other Overheads</b>				
<b>A</b>	Professional Fees	5000	INR/MONTH	12	60,000
<b>B</b>	Postage Telephone etc.	10000	INR/MONTH	12	1,20,000
<b>C</b>	Office Supplies	20000	INR/MONTH	12	2,40,000
<b>D</b>	R & M of Plant & Machinery	0.03	%	18,25,45,156	54,76,355
<b>E</b>	Insurance @ 0.5% of assets	0.005	%	28,90,00,000	14,45,000
<b>F</b>	Factory Workers and Supervision	991000	INR/MONTH	12	1,18,92,000
<b>G</b>	Salaries to Office Staff	270000	INR/MONTH	12	32,40,000
<b>H</b>	Misc. Office Expenses	75000	INR/MONTH	12	9,00,000
	<b>TOTAL FIXED EXPENSES</b>				<b>2,33,73,355</b>
	Preliminary Expenses Written Off	1201500	INR/YEAR	10	1,20,150
	<b>TOTAL EXPENSES</b>				<b>7,47,26,505</b>
	<b>TOTAL SAVINGS</b>				<b>7,19,23,495</b>

# SHREE JEE BIO ENERGY

GST- 05AEYFS0945L1ZB

## E. PROFITABILITY PROJECTIONS

PROFITABILITY PROJECTIONS (INR Lakh)											
Particulars / YEAR	9	12	12	12	12	12	12	12	12	12	12
YEAR	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
% Production	85%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
ESCALATION FACTOR (5%)	1.00	1.05	1.10	1.16	1.22	1.28	1.34	1.41	1.48	1.55	1.63
Sale of Bio-CNG	780.94	1286.25	1350.56	1418.09	1489.00	1563.44	1641.62	1723.70	1809.88	1900.38	1995.40
Sale of Solid & Liquid Fertilizer	153.96	253.58	266.25	279.57	293.54	308.22	323.63	339.81	356.81	374.65	393.38
Gross Annual Sale	934.89	1539.83	1616.82	1697.66	1782.54	1871.67	1965.25	2063.51	2166.69	2275.02	2388.77
VARIABLE EXPENSES											
1. Raw Material	177.38	292.16	306.77	322.11	338.21	355.13	372.88	391.53	411.10	431.66	453.24
2. Power	128.44	211.55	222.13	233.24	244.90	257.15	270.00	283.50	297.68	312.56	328.19
3. Factory Overheads	9.31	15.33	16.10	16.90	17.75	18.63	19.57	20.54	21.57	22.65	23.78
Total Variable Cost	315.14	519.05	545.00	572.25	600.86	630.90	662.45	695.57	730.35	766.87	805.21
FIXED EXPENSES											
1. Office and other Overheads	149.01	245.42	257.69	270.58	284.10	298.31	313.23	328.89	345.33	362.60	380.73
2 Lease Rental	0.50	0.50	0.50	0.50	0.50	0.55	0.55	0.55	0.55	0.55	0.61
3. BioCNG Transportation Cost	13.13	18.38	19.29	20.26	21.27	22.33	23.45	24.62	25.86	27.15	28.51
4. Preliminary Expenses Written off	2.40	2.40	2.40	2.40	2.40						
Total Fixed Cost	165.03	266.70	279.89	293.74	308.28	321.19	337.23	354.06	371.74	390.30	409.84
TOTAL PRODUCTION COST	480.17	785.74	824.89	865.99	909.14	952.10	999.68	1049.63	1102.09	1157.16	1215.05
EBIDTA	454.73	754.08	791.93	831.67	873.40	919.57	965.57	1013.88	1064.60	1117.86	1173.72
Interest on Term Loan	157.24	202.65	189.00	172.20	155.40	136.50	115.50	92.40	67.20	39.90	9.45
Interest on Working Capital Loan	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25
Depreciation	391.22	336.59	289.74	249.56	215.08	185.47	160.04	138.18	119.39	103.23	89.31
PBT	-98.99	209.59	307.94	404.66	497.67	592.35	684.78	778.05	872.76	969.48	1069.71
Less : Taxation @ 33.33%	0.00	71.11	104.48	137.30	168.86	200.98	232.35	263.99	296.13	328.95	362.95
PAT	-98.99	138.48	203.45	267.36	328.81	391.36	452.44	514.05	576.63	640.54	706.76
Add : Depreciation	391.22	336.59	289.74	249.56	215.08	185.47	160.04	138.18	119.39	103.23	89.31
Cash accrual	292.24	475.07	493.20	516.92	543.89	576.83	612.48	652.24	696.02	743.76	796.07
Repayment Obligations	20.00	100.00	160.00	160.00	160.00	200.00	200.00	240.00	240.00	280.00	240.00
Net cash accrual	272.24	375.07	333.20	356.92	383.89	376.83	412.48	412.24	456.02	463.76	556.07
Cumulative Internal Accruals	272.24	647.30	980.50	1337.42	1721.31	2098.14	2510.62	2922.86	3378.88	3842.65	4398.72

# SHREE JEE BIO ENERGY

GST- 05AEYFS0945L1ZB

## F. PROFORMA BALANCE SHEET

PROFORMA BALANCE SHEET (INR Lakh)												
YEAR	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Particulars	Constr	Constr / 9M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M
<b>LIABILITIES</b>												
Equity	890.00	890.00	890.00	890.00	890.00	890.00	890.00	890.00	890.00	890.00	890.00	890.00
Reserve & Surplus	0.00	1.01	239.49	542.94	910.30	1239.12	1630.48	2082.92	2596.97	3173.61	3814.14	4520.90
Secured Loan	1980.00	1880.00	1720.00	1560.00	1400.00	1200.00	1000.00	760.00	520.00	240.00	0.00	0.00
<b>Current Liabilities</b>												
Trade Paybles	0.00	13.30	17.37	17.89	18.43	19.01	19.61	20.24	20.90	21.59	22.32	23.09
Term liabilities payable within one year	20.00	100.00	160.00	160.00	160.00	200.00	200.00	240.00	240.00	280.00	240.00	
CC Limit	0.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00	50.00
<b>TOTAL</b>	<b>2890.00</b>	<b>2934.31</b>	<b>3076.86</b>	<b>3220.83</b>	<b>3428.74</b>	<b>3598.12</b>	<b>3790.09</b>	<b>4043.15</b>	<b>4317.87</b>	<b>4655.20</b>	<b>5016.46</b>	<b>5483.99</b>
<b>Gross Assets</b>												
CIVIL WORK	809.46	809.46	809.46	809.46	809.46	809.46	809.46	809.46	809.46	809.46	809.46	809.46
PLANT & MACHINERY	1955.00	1955.00	1955.00	1955.00	1955.00	1955.00	1955.00	1955.00	1955.00	1955.00	1955.00	1955.00
OTHER FIXED ASSETS	6.43	6.43	6.43	6.43	6.43	6.43	6.43	6.43	6.43	6.43	6.43	6.43
ELECTRICITY CONNECTION	107.10	107.10	107.10	107.10	107.10	107.10	107.10	107.10	107.10	107.10	107.10	107.10
<b>Total Gross Block</b>	<b>2877.99</b>	<b>2877.99</b>	<b>2877.99</b>	<b>2877.99</b>	<b>2877.99</b>	<b>2877.99</b>	<b>2877.99</b>	<b>2877.99</b>	<b>2877.99</b>	<b>2877.99</b>	<b>2877.99</b>	<b>2877.99</b>
Depreciation	0.00	391.22	727.81	1017.56	1267.11	1482.19	1667.66	1827.70	1965.89	2085.28	2188.50	2277.81
<b>NET BLOCK</b>	<b>2877.99</b>	<b>2486.76</b>	<b>2150.17</b>	<b>1860.43</b>	<b>1610.87</b>	<b>1395.79</b>	<b>1210.32</b>	<b>1050.28</b>	<b>912.10</b>	<b>792.71</b>	<b>689.48</b>	<b>600.17</b>
<b>CURRENT ASSETS</b>	<b>0.00</b>	<b>437.94</b>	<b>919.48</b>	<b>1355.60</b>	<b>1815.46</b>	<b>2202.33</b>	<b>2579.76</b>	<b>2992.87</b>	<b>3405.77</b>	<b>3862.49</b>	<b>4326.98</b>	<b>4883.82</b>
Trade Receivables	0.00	57.74	95.11	99.86	104.86	110.10	115.60	121.38	127.45	133.82	140.52	147.54
Inventories	0.00	3.65	6.02	6.32	6.63	6.96	7.31	7.68	8.06	8.46	8.89	9.33
CASH & BANK	0.00	376.54	818.36	1249.42	1703.98	2085.27	2456.85	2863.81	3270.26	3720.20	4177.58	4726.95
PRELIMINARY EXPENSES W/off	12.02	9.61	7.21	4.81	2.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00
<b>TOTAL</b>	<b>2890.00</b>	<b>2934.31</b>	<b>3076.86</b>	<b>3220.83</b>	<b>3428.74</b>	<b>3598.12</b>	<b>3790.09</b>	<b>4043.15</b>	<b>4317.87</b>	<b>4655.20</b>	<b>5016.46</b>	<b>5483.99</b>

# SHREE JEE BIO ENERGY

GST- 05AEYFS0945L1ZB

## G. CASH FLOW STATEMENT

CASH FLOW STATEMENT (INR Lakh)												
YEAR	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Particulars	Const r	Const r/ 9M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M	12 M
A. SOURCE OF FUND												
Net Profit	0.00	-98.99	138.48	203.45	267.36	328.81	391.36	452.44	514.05	576.63	640.54	706.76
Increase in Equity / Share Capital	890.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Increase in TL	2000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Increase in CC Limit	0.00	50.00										
Depreciation	0.00	391.22	336.59	289.74	249.56	215.08	185.47	160.04	138.18	119.39	103.23	89.31
Prelim Exps w/off	0.00	2.40	2.40	2.40	2.40	2.40	0.00	0.00	0.00	0.00	0.00	0.00
Trade payables	0.00	13.30	4.07	0.52	0.54	0.57	0.60	0.63	0.66	0.69	0.73	0.77
Subsidy Inflow		100.00	100.00	100.00	100.00							
<b>TOTAL</b>	<b>2890.00</b>	<b>457.94</b>	<b>581.54</b>	<b>596.12</b>	<b>619.87</b>	<b>546.86</b>	<b>577.43</b>	<b>613.11</b>	<b>652.90</b>	<b>696.72</b>	<b>744.49</b>	<b>796.84</b>
B. APPLICATION OF FUNDS												
Capital Expenses	2877.99	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Decrease in Term Loan	0.00	20.00	100.00	160.00	160.00	160.00	200.00	200.00	240.00	240.00	280.00	240.00
Trade Receivable	0.00	57.74	37.36	4.76	4.99	5.24	5.50	5.78	6.07	6.37	6.69	7.03
Inventory	0.00	3.65	2.36	0.30	0.32	0.33	0.35	0.37	0.38	0.40	0.42	0.44
Preliminary Expense	12.02											
<b>TOTAL</b>	<b>2890.00</b>	<b>81.40</b>	<b>139.73</b>	<b>165.06</b>	<b>165.31</b>	<b>165.57</b>	<b>205.85</b>	<b>206.15</b>	<b>246.45</b>	<b>246.78</b>	<b>287.11</b>	<b>247.47</b>
Opening Balance	0.00	0.00	376.54	818.36	1249.42	1703.98	2085.27	2456.85	2863.81	3270.26	3720.20	4177.58
Net Surplus/ Deficit	0.00	376.54	441.82	431.06	454.56	381.29	371.58	406.96	406.45	449.94	457.38	549.37
Cumulative Balance	0.00	376.54	818.36	1249.42	1703.98	2085.27	2456.85	2863.81	3270.26	3720.20	4177.58	4726.95

## H. DEBT SERVICE COVERAGE RATIO

DSCR CALCULATION											
Particulars	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
PAT (Profit After Tax)	-98.99	138.48	203.45	267.36	328.81	391.36	452.44	514.05	576.63	640.54	706.76
Depreciation	391.22	336.59	289.74	249.56	215.08	185.47	160.04	138.18	119.39	103.23	89.31
Interest	157.24	202.65	189.00	172.20	155.40	136.50	115.50	92.40	67.20	39.90	9.45
<b>Subtotal</b>	<b>449.48</b>	<b>677.72</b>	<b>682.20</b>	<b>689.12</b>	<b>699.29</b>	<b>713.33</b>	<b>727.98</b>	<b>744.64</b>	<b>763.22</b>	<b>783.66</b>	<b>805.52</b>
Interest	157.24	202.65	189.00	172.20	155.40	136.50	115.50	92.40	67.20	39.90	9.45
Loan Repayment	20.00	100.00	160.00	160.00	160.00	200.00	200.00	240.00	240.00	280.00	240.00
<b>Subtotal</b>	<b>177.24</b>	<b>302.65</b>	<b>349.00</b>	<b>332.20</b>	<b>315.40</b>	<b>336.50</b>	<b>315.50</b>	<b>332.40</b>	<b>307.20</b>	<b>319.90</b>	<b>249.45</b>
DSCR	2.54	2.24	1.95	2.07	2.22	2.12	2.31	2.24	2.48	2.45	3.23
<b>Average DSCR</b>	<b>2.32</b>										

# SHREE JEE BIO ENERGY

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## I. LOAN ASSUMPTION

Particulars	Assumptions
1st Disbursement	Jul-23
IDC Start & End Month	July-23 to June-24
IDC Period	12 Month
Commencement /Operation Start	Jul-24
Moratorium Start & End Month (only interest to pay)	July-24 to Dec-24
Moratorium Period	6 Month
<b>Repayment of Loan</b>	
Repayment Start	Jan-25
Repayment End	Dec-34
Repayment Period	10 Years (120 Months)
Rate of Interest	10.50%

## J. LOAN REPAYMENT SCHEDULE

Loan Schedule													Rs in Lakhs	
FY	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	Total	
Opening Bal	0	2000	1980	1880	1720	1560	1400	1200	1000	760	520	240.00		
Disbursement	2000	0	0	0	0	0								
Repayment	0	20	100	160	160	160	200	200	240	240	280	240.00	2000	
Closing Principal o/s	2000	1980	1880	1720	1560	1400	1200	1000	760	520	240	0.00		
Interest	118.13	209.74	202.65	189.00	172.20	155.40	136.50	115.50	92.40	67.20	39.90	9.45	1508	
IDC	118.13	52.50											171	
TL Interest	0.00	157.24	202.65	189.00	172.20	155.40	136.50	115.50	92.40	67.20	39.90	9.45	1337	

Loan Schedule						
Loan Amount	2000	Rs in Lakhs	Rep Year	10.00		
Interest Rate	10.50%		Quarterly Pay	Bulleted	%age p.a	Repay (%)
	Op Bal	Repay	CI Bal	Interest	Disbursement	
<b>2023-24</b>						
July	500.00	0.00	500.00	4.38	25%	
Aug	900.00	0.00	900.00	7.88	20%	
Sept	1200.00	0.00	1200.00	10.50	15%	
Oct	1400.00	0.00	1400.00	12.25	10%	
Nov	1600.00	0.00	1600.00	14.00	10%	

# SHREE JEE BIO ENERGY

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Dec	1900.00	0.00	1900.00	16.63	15%	
Jan	2000.00	0.00	2000.00	17.50	5%	
Feb	2000.00	0.00	2000.00	17.50		
Mar	2000.00	0.00	2000.00	17.50		
<b>2024-25</b>						4%
Apr	2000.00	0.00	2000.00	17.50		
May	2000.00	0.00	2000.00	17.50		
June	2000.00	0.00	2000.00	17.50		
July	2000.00	0.00	2000.00	17.50		
Aug	2000.00	0.00	2000.00	17.50		
Sept	2000.00	0.00	2000.00	17.50		
Oct	2000.00	0.00	2000.00	17.50		
Nov	2000.00	0.00	2000.00	17.50		
Dec	2000.00	0.00	2000.00	17.50		
Jan	2000.00	6.67	1993.33	17.47		
Feb	1993.33	6.67	1986.67	17.41		
Mar	1986.67	6.67	1980.00	17.35		
<b>2025-26</b>						5%
April - June	1980.00	25.00	1955.00	51.65		
July-Sep	1955.00	25.00	1930.00	50.99		
Oct-Dec	1930.00	25.00	1905.00	50.33		
Jan-March	1905.00	25.00	1880.00	49.68		
<b>2026-27</b>						8%
April - June	1880.00	40.00	1840.00	48.83		
July-Sep	1840.00	40.00	1800.00	47.78		
Oct-Dec	1800.00	40.00	1760.00	46.73		
Jan-March	1760.00	40.00	1720.00	45.68		
<b>2027-28</b>						8%
April - June	1720.00	40.00	1680.00	44.63		
July-Sep	1680.00	40.00	1640.00	43.58		
Oct-Dec	1640.00	40.00	1600.00	42.53		
Jan-March	1600.00	40.00	1560.00	41.48		
<b>2028-29</b>						8%
April - June	1560.00	40.00	1520.00	40.43		
July-Sep	1520.00	40.00	1480.00	39.38		
Oct-Dec	1480.00	40.00	1440.00	38.33		
Jan-March	1440.00	40.00	1400.00	37.28		
<b>2029-30</b>						10%
April - June	1400.00	50.00	1350.00	36.09		
July-Sep	1350.00	50.00	1300.00	34.78		
Oct-Dec	1300.00	50.00	1250.00	33.47		
Jan-March	1250.00	50.00	1200.00	32.16		
<b>2030-31</b>						10%
April - June	1200.00	50.00	1150.00	30.84		
July-Sep	1150.00	50.00	1100.00	29.53		



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Oct-Dec	1100.00	50.00	1050.00	28.22		
Jan-March	1050.00	50.00	1000.00	26.91		
<b>2031-32</b>						12%
April - June	1000.00	60.00	940.00	25.46		
July-Sep	940.00	60.00	880.00	23.89		
Oct-Dec	880.00	60.00	820.00	22.31		
Jan-March	820.00	60.00	760.00	20.74		
<b>2032-33</b>						12%
April - June	760.00	60.00	700.00	19.16		
July-Sep	700.00	60.00	640.00	17.59		
Oct-Dec	640.00	60.00	580.00	16.01		
Jan-March	580.00	60.00	520.00	14.44		
<b>2033-34</b>						14%
April - June	520.00	70.00	450.00	12.73		
July-Sep	450.00	70.00	380.00	10.89		
Oct-Dec	380.00	70.00	310.00	9.06		
Jan-March	310.00	70.00	240.00	7.22		
<b>2034-35</b>						16%
April - June	240.00	80.00	160.00	5.25		
July-Sep	160.00	80.00	80.00	3.15		
Oct-Dec	80.00	80.00	0.00	1.05		
Jan-March	0.00	0.00	0.00	0.00		
<b>Total</b>		<b>2000</b>		<b>1508</b>		

Working Capital	RoI	10.50 %									
<b>FY</b>	<b>2025</b>	<b>2026</b>	<b>2027</b>	<b>2028</b>	<b>2029</b>	<b>2030</b>	<b>2031</b>	<b>2032</b>	<b>2033</b>	<b>2034</b>	<b>2035</b>
WC LIMIT	50	50	50	50	50	50	50	50	50	50	50
Interest	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25
Operational Month	12	12	12	12	12	12	12	12	12	12	12
<b>WC Interest</b>	<b>5.25</b>	<b>5.25</b>	<b>5.25</b>	<b>5.25</b>	<b>5.25</b>	<b>5.25</b>	<b>5.25</b>	<b>5.25</b>	<b>5.25</b>	<b>5.25</b>	<b>5.25</b>

# SHREE JEE BIO ENERGY

GST- 05AEYFS0945L1ZB

## K. FINANCIAL RATIOS

YEAR	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
NET PROFIT BEFORE INT. & DEP.		455	754	792	832	873	920	966	1014	1065	1118	1174
PROFIT BEFORE INT & TAX		58	412	497	577	653	729	800	870	940	1009	1079
PBT		-99	210	308	405	498	592	685	778	873	969	1070
PAT		-99	138	203	267	329	391	452	514	577	641	707
TERM LOAN INTEREST		157	203	189	172	155	137	116	92	67	40	9
WORKING CAPITAL INTEREST		5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25
CAPITAL EMPLOYED	2870	2771	2849	2993	3200	3329	3520	3733	4007	4304	4704	5411
CAPITAL INVESTMENT	890	890	890	890	890	890	890	890	890	890	890	890
NET WORTH	890	891	1129	1433	1800	2129	2520	2973	3487	4064	4704	5411
SECURED LOAN	1980	1880	1720	1560	1400	1200	1000	760	520	240	0	0
ToL	2000	2043	1947	1788	1628	1469	1270	1070	831	592	312	73
TNW	878	881	1122	1428	1798	2129	2520	2973	3487	4064	4704	5411
SALES REVENUE		935	1540	1617	1698	1783	1872	1965	2064	2167	2275	2389
NET BLOCK	2878	2487	2150	1860	1611	1396	1210	1050	912	793	689	600
TERM LOAN		1880	1720	1560	1400	1200	1000	760	520	240	0	0
CURRENT ASSETS		437.94	919.48	1355.60	1815.46	2202.33	2579.76	2992.87	3405.77	3862.49	4326.98	4883.82
CURRENT LIABILITIES		113.30	177.37	177.89	178.43	219.01	219.61	260.24	260.90	301.59	262.32	23.09
RETURN ON SALE (%)		-11%	9%	13%	16%	18%	21%	23%	25%	27%	28%	30%
RETURN ON CAPITAL (%)		2%	14%	17%	18%	20%	21%	21%	22%	22%	21%	20%
RETURN ON INVESTMENT		-11%	16%	23%	30%	37%	44%	51%	58%	65%	72%	79%
RETURN ON NET WORTH		-11%	12%	14%	15%	15%	16%	15%	15%	14%	14%	13%
AVERAGE DSCR		2.54	2.24	1.95	2.07	2.22	2.12	2.31	2.24	2.48	2.45	3.23
FIXED ASSETS COVERAGE		1.32	1.25	1.19	1.15	1.16	1.21	1.38	1.75	3.30		
INTEREST COVERAGE RATIO		2.8	3.6	4.1	4.7	5.4	6.5	8.0	10.4	14.7	24.8	79.8
CURRENT RATIO		3.87	5.18	7.62	10.17	10.06	11.75	11.50	13.05	12.81	16.49	211.53
ToL / TNW	2.28	2.32	1.74	1.25	0.91	0.69	0.50	0.36	0.24	0.15	0.07	0.01
DEBT - EQUITY RATIO	2.22	2.11	1.52	1.09	0.78	0.56	0.40	0.26	0.15	0.06	0.00	0.00
BREAK EVEN POINT												
TOTAL SALES		934.89	1539.83	1616.82	1697.66	1782.54	1871.67	1965.25	2063.51	2166.69	2275.02	2388.77
LESS ; VARIABLE COST		315.14	519.05	545.00	572.25	600.86	630.90	662.45	695.57	730.35	766.87	805.21
CONTRIBUTION		619.76	1020.78	1071.82	1125.41	1181.68	1240.76	1302.80	1367.94	1436.34	1508.15	1583.56
FIXED COST		165.03	266.70	279.89	293.74	308.28	321.19	337.23	354.06	371.74	390.30	409.84
INTEREST		157.24	202.65	189.00	172.20	155.40	136.50	115.50	92.40	67.20	39.90	9.45
DEPRECIATION		391.22	336.59	289.74	249.56	215.08	185.47	160.04	138.18	119.39	103.23	89.31
TOTAL FIXED COST		713.50	805.94	758.63	715.50	678.76	643.16	612.77	584.65	558.33	533.42	508.60
Profit / PBT		-93.74	214.84	313.19	409.91	502.92	597.60	690.03	783.30	878.01	974.73	1074.96
PV RATIO		66%	66%	66%	66%	66%	66%	66%	66%	66%	66%	66%
BEP Sales		248.95	402.31	422.21	443.10	465.03	484.52	508.70	534.09	560.76	588.75	618.23
BEP%		27%	26%	26%	26%	26%	26%	26%	26%	26%	26%	26%

# SHREE JEE BIO ENERGY

GST- 05AEYFS0945L1ZB

## L. WORKING CAPITAL PROJECTIONS

WORKING CAPITAL										(Rs in Lakh)	
Month	12	12	12	12	12	12	12	12	12	12	12
Particulars	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Sales	935	1,540	1,617	1,698	1,783	1,872	1,965	2,064	2,167	2,275	2,389
Raw Material	177	292	307	322	338	355	373	392	411	432	453
Power	128.44	211.55	222.13	233.24	244.90	257.15	270.00	283.50	297.68	312.56	328.19
Overheads	149.01	245.42	257.69	270.58	284.10	298.31	313.23	328.89	345.33	362.60	380.73
Opening Stock	0.0	3.7	6.0	6.3	6.6	7.0	7.3	7.7	8.1	8.5	8.9
Add - Purchase During the year	177	292	307	322	338	355	373	392	411	432	453
Less - Closing Stock	3.7	6.0	6.3	6.6	7.0	7.3	7.7	8.1	8.5	8.9	9.3
Days	7	7	7	7	7	7	7	7	7	7	7
COGS	177	292	307	322	338	355	373	392	411	432	453
Days											
Trade Payables	3.65	6.02	6.32	6.63	6.96	7.31	7.68	8.06	8.46	8.89	9.33
(days)	7	7	7	7	7	7	7	7	7	7	7
Power	2.64	4.36	4.57	4.80	5.04	5.29	5.56	5.84	6.13	6.44	6.76
(days)	7	7	7	7	7	7	7	7	7	7	7
Overheads	3.07	5.05	5.31	5.57	5.85	6.14	6.45	6.77	7.11	7.47	7.84
(days)	7	7	7	7	7	7	7	7	7	7	7
<b>Total Trade Payables</b>	<b>13.30</b>	<b>17.37</b>	<b>17.89</b>	<b>18.43</b>	<b>19.01</b>	<b>19.61</b>	<b>20.24</b>	<b>20.90</b>	<b>21.59</b>	<b>22.32</b>	<b>23.09</b>
Trade Receivables	57.74	95.11	99.86	104.86	110.10	115.60	121.38	127.45	133.82	140.52	147.54
(days)	21	21	21	21	21	21	21	21	21	21	21
Inventories	3.7	6.0	6.3	6.6	7.0	7.3	7.7	8.1	8.5	8.9	9.3
Current Assets	<b>61.40</b>	<b>101.12</b>	<b>106.18</b>	<b>111.49</b>	<b>117.06</b>	<b>122.91</b>	<b>129.06</b>	<b>135.51</b>	<b>142.29</b>	<b>149.40</b>	<b>156.87</b>
Net WC	48.10	83.75	88.29	93.05	98.06	103.31	108.82	114.62	120.70	127.08	133.79
Working Cap Margin	12.02	20.94	22.07	23.26	24.51	25.83	27.21	28.65	30.17	31.77	33.45
CC Loan	36.07	62.81									

# SHREE JEE BIO ENERGY

GST- 05AEYFS0945L1ZB

## M.SCHEDULE OF SALARIES AND WAGES

SCHEDULE OF SALARIES AND WAGES				
I. FACTORY WAGES & SUPERVISION				
a) Workers' Wages		COST (INR)		COST (INR)
Category	Number	Average Monthly Salary	No. of months/ year	Total Annual Salary
Skilled Workers	12	25,000	12	3,600,000
Semi-Skilled Workers	4	20,000	12	960,000
Un-Skilled Worker	20	12,000	12	2,880,000
Sub Total	36		12	7,440,000
b) Factory Supervision				
Category	Number	Average Monthly Salary	No. of months/ year	Total Annual Salary
Shift Supervisor	4	45,000	12	2,160,000
Field Officer	2	35,000	12	840,000
Store In-Charge	2	22,000	12	528,000
Store Assistant	2	20,000	12	480,000
Chemist	2	18,500	12	444,000
Sub Total	12			4,452,000
Total Wages & Salaries	48			11,892,000
II. OFFICE STAFF				
General Manager	1	80,000	12	960,000
Accounts Manager	1	50,000	12	600,000
Accounts Assistant	2	35,000	12	840,000
Office Assistant	2	25,000	12	600,000
Office boy	2	10,000	12	240,000
Total for Office Staff	8			3,240,000

# SHREE JEE BIO ENERGY

GST- 05AEYFS0945L1ZB

## N. DEPRECIATION SCHEDULE

Particulars	Amt	WCM, IDC & Cont.		Total CoP			WDV rate
Civil Work / Construction	756	53.64		809			10.00%
Plant & Machinery	1825	129.55		1955			15.00%
Other Misc. Fix Assets	6.00	0.43		6			15.00%
Electricity connection (Fix Assets)	100.00	7.10		107			15.00%
<b>Total CoP</b>	<b>2687</b>	<b>190.71</b>		<b>2878</b>			

## DEPRECIATION DSCHEDULE AS PER INCOME TAX ACT

(Lakh INR)

YEAR/ ASSET HEAD	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Building	809.46	728.52	655.67	590.10	531.09	477.98	430.18	387.16	348.45	313.60	282.24
Less : Depreciation	80.95	72.85	65.57	59.01	53.11	47.80	43.02	38.72	34.84	31.36	28.22
WDV of Building	728.52	655.67	590.10	531.09	477.98	430.18	387.16	348.45	313.60	282.24	254.02
Plant & Machinery	1,955.00	1,661.75	1,412.49	1,200.61	1,020.52	867.44	737.33	626.73	532.72	452.81	384.89
Less : Depreciation	293.25	249.26	211.87	180.09	153.08	130.12	110.60	94.01	79.91	67.92	57.73
WDV of Plant & Machinery	1,661.75	1,412.49	1,200.61	1,020.52	867.44	737.33	626.73	532.72	452.81	384.89	327.16
Other Fix Assets	6.43	5.46	4.64	3.95	3.35	2.85	2.42	2.06	1.75	1.49	1.27
Less : Depreciation	0.96	0.82	0.70	0.59	0.50	0.43	0.36	0.31	0.26	0.22	0.19
WDV of Other Fix Assets	5.46	4.64	3.95	3.35	2.85	2.42	2.06	1.75	1.49	1.27	1.08
Electricity connection	107.10	91.03	77.38	65.77	55.91	47.52	40.39	34.33	29.18	24.81	21.08
Less : Depreciation	16.06	13.65	11.61	9.87	8.39	7.13	6.06	5.15	4.38	3.72	3.16
WDV of Electricity connection	91.03	77.38	65.77	55.91	47.52	40.39	34.33	29.18	24.81	21.08	17.92
Total WDV	2,395.73	2,072.79	1,794.66	1,554.96	1,348.27	1,169.93	1,015.95	882.92	767.90	668.40	582.25
<b>Total WDV Depreciation</b>	<b>391.22</b>	<b>336.59</b>	<b>289.74</b>	<b>249.56</b>	<b>215.08</b>	<b>185.47</b>	<b>160.04</b>	<b>138.18</b>	<b>119.39</b>	<b>103.23</b>	<b>89.31</b>

# SHREE JEE BIO ENERGY

GST- 05AEYFS0945L1ZB

## O. PROJECT IMPLEMENTATION SCHEDULE

PROJECT IMPLEMENTATION SHEDULE																																			
Sr. No.	TASK	Week From Zero Date							Note:6 working days per week																										
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	30	31	32	33	34	
1.	Detailed Engineering Work																																		
2.	Fencing and Main Gate																																		
3.	Site preparation and development																																		
4.	Foundations for the mixing tank, digested slurry tank and digester tank																																		
5.	Casting for the mixing tank, digested slurry tank and digester tank																																		
6.	Fixing of stirrer in tank, Gas Holder membrane, heating coil and installation of heat pumps, heat exchangers.																																		
7.	Installation of feed mixer, feed pump, cutter pump, solid liquid separator and fertilizer																																		
8.	Installation of Shredder and related other equipment's and its accessories																																		
9.	Arrangement of raw material such as cow dung, Sugarcane press mud																																		
10.	Installation of gas PSA plant, Bio-CNG compressor, CNG filling header.																																		
11.	Installation of backup generator & firefighting equipment's																																		
12.	Installation of Piping electrical and instrumentation including PLC control panel																																		
13.	Testing of individual piping loop and connections																																		
14.	Commissioning of Bio-CNG plant and trial run pre-production																																		
15.	Commencement of commercial production																																		