

INTEGRATED BIOGAS PROJECT

ROHTAK, HARYANA

DETAILED PROJECT REPORT



15000 m³/d Raw Biogas & 45 tpd Solid Organic Manure

And 6 tpd of Dry Ice plant

OCTOBER 2018

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Beneficiary Organisation

1.1. Name: Spectrum Renewable Energy Private Limited

Registered Office: J-1/160, Ground Floor, Rajouri Garden, New Delhi 110027.

- (i) Telephone No.: +91-11-47634400
- (ii) Fax No.: +91-11-47634423
- (iii) Website: www.srel.com
- (iv) Contact Person: Mohit Gupta
- (v) Designation: General Manager
- (vi) Mobile No.: +91-9831960660
- (vii) Email: info@srel.in
- (viii) Telephone No.: +124 271 9020

1.2. Plant Address:

- (i) Village : Maraudi Jatan
- (ii) Tehsil: Kalanaur
- (iii) District: Rohtak
- (iv) State: Haryana

1.3. Constitution : Private Limited Company,

Board of Directors

- (i) **Dr. AV Mohan Rao - Chairman cum Managing Director**
- (ii) **Mr Sarvesh Sindhu - Director**
- (iii) **Ms Sumati Maharia - Director**
- (iv) **Mr. Akula Srikant Rao - Director**

1.4. Date of Establishment: Spectrum Renewable Energy Private Limited Regd. On 11-03-2002, Renamed on 13-12-2007 (U40101DL2002PTC319806)

1.5. Promoters

(i) Dr. A.V. Mohan Rao – Chairman cum Managing Director

As Founder and Chairman of Spectrum Renewable Energy Private Limited, Dr. Rao brings industry expertise arising from over 30 years of experience in the international energy sector. In 1972, he joined GE Power Systems, where he was involved with various aspects of power generation, including engineering, design and the operation of power plants. In 1990, he joined Spectrum Technologies USA (STUSA) as the Vice President of Marketing and shortly thereafter led STUSA's initiatives in India. Dr. Rao was responsible for developing Spectrum Power Generation Limited, a 208 MW gas-based power plant in India. In 1995, he led the predecessor company of Spectrum Coal & Power Limited in obtaining equity, implementing US clean coal technology, securing partial funding from USAID, and negotiating an EPC and O&M contract. Dr. Mohan Rao holds a Ph.D. in mechanical engineering from Rensselaer Polytechnic Institute. Being a pioneer with a clear vision Dr. A.V. Mohan Rao with a vast experience in the power and coal industry ventured into the Renewable Energy Industry with an intention to display the best of the Renewable Energy Projects in India and abroad.

(ii) **Srikant Akula – Director**

As a Managing Partner of Akula Energy Ventures, Mr. Akula brings deep finance and operational experience from his work in the international energy sector. As Vice President of Finance at Spectrum Coal & Power Limited in India, Mr. Akula secured financing for company expansion, as well as arranging the final entity sale to private equity investor, Warburg Pincus, in 2008. Since this sale, Mr. Akula founded Akula Energy Ventures with a determination to re-focus his energy efforts on the growing renewables space, and has sourced Akula Energy Ventures' new deals in the biogas and solar power sectors. Prior to joining Akula Energy Ventures, Mr. Akula was at General Electric Energy Financial Services, where he was part of a team that underwrote energy deals across the capital structure spectrum, including senior debt, preferred equity, and limited partnership equity. Prior to GE, Mr. Akula worked at Accenture and designed strategies and innovative solutions to complex technical and business challenges faced by Fortune-500 companies. Mr. Akula holds a B.S. in Finance from the NYU Stern School of Undergraduate Business.

(iii) **Akula Energy Ventures, LLC**

Akula Energy Ventures contributes to this rapid growth by investing in and forming strategic partnerships with innovative energy companies around the world.

Since 2008, Akula Energy Ventures has used its expertise in the energy space to make early stage investments in the solar, biogas and battery energy storage sectors.

Today, the development of renewable energy technologies and companies is occurring at an unprecedented pace. Climate change initiatives, supportive global policies, volatile fossil fuel prices and technological innovations have all played a key role in enabling the rapid growth of today's green energy industry.

Akula Energy Ventures has over 15 years of experience in the energy sector and has been involved in the development of natural gas power plants and coal preparation plants in India. Akula Energy Ventures was founded in 1998 as the primary investor and developer for the first private sector coal preparation company in India. Since selling its stake in Spectrum Coal & Power Limited in India in 2008, Akula Energy Ventures has utilized its vast experience in the energy sector to form strategic partnerships with companies that are developing and implementing exciting and cutting-edge renewable energy projects.

1.6. **Investor**

Capt. Rudra Sen Sindhu is presently the Chairman cum Managing Director of ACB (India) Limited. In April, 1976, he completed his graduation from Birendra Narayan Chakraborty University, Kurukshetra. He joined the Indian Army in 1976 and after completing the short service commission, joined his family concern M/s Mitter Sen & Company, which was engaged in Iron Ore and Manganese mining at Barbil, Orissa. Since 1984 Captain Sindhu has been active in the field of coal mining, logistics, coal washing, thermal power, media, education and finance. Over a span of about three decades he excelled in building efficient business management systems, cost effective and efficient state of art equipment, skills and highly motivated teams in the field of coal mining, coal washing, coal reject based power plants and mining logistics. On February 15, 2016 he was awarded the "2016 Global Excellence Award in Coal Sector" by Energy and Environment Foundation for his vision, leadership and outstanding contribution and for demonstrating excellence in the Coal Sector.

Group has business interests in number of companies engaged mainly in mining & logistics, coal beneficiation, power generation, sponge iron & steel, stock broking, media, finance and tourism.

He chaired the Expert Committee on Coal since 2008 and has been the Co-Chairman of the National Coal Committee of ASSOCHAM since 2009.

His commitments to protecting the environment, the eco systems, soil health and bringing back the social, cultural and economic vibrancy of the ancient village life has led him to support various charitable and initially unviable pilot technology start ups that aim at addressing these issues.

Currently Mr Sindhu is nourishing a dream to create local solutions for the problems of unemployment, unhygienic living conditions, poor soil health, poor quality of food by appropriate tweaking of technology for value addition and use of biogas and bio slurry. These are two products that are generated when a gober gas plant anaerobically digests the local rural resources of cattle dung and agro waste. It may be mentioned that rotting of the organic waste is biggest headache of the Swatch Bharat Mission. Deployment and popularization of this process shall help the mission tremendously. The beginning has been made by investing in the Spectrum Renewable Energy Pvt. Ltd. The objective is to create a high tech model plant where the capex and apex are low and all the end products namely methane, Co₂, H₂S and bio slurry are value added to create local sources of energy and manuring systems for rejuvenating the soil health by adding organic carbon, necessary microbes and micro nutrients.

2. Plant Details

Spectrum Renewable Energy Pvt. Ltd. (SREL) a Company registered under Companies Act, 1956 and having its registered office at Rajouri Garden, New Delhi proposes to set up integrated **Biogas Project** (Project), to be situated at Village Maraundi Jatan, District Rohtak. It shall be the largest integrated biogas, organic manure and dry ice generation plant in India based on the substrate press mud, a sugarcane waste and cattle dung and possibly vegetable waste from Rohtak Municipal Corporate, with which discussions are on. The project is a renewable energy and waste management project. SREL will convert 240 tons of sugarcane waste and cattle dung per day into about 6000 kgs BIO CNG gas to be used in vehicles that can replace petrol and diesel, the fossil fuels, and into about 45 tons of organic solid manure per day. We shall be experimenting for the first time in the country to develop solid and liquid manures and bio pesticides and insecticides by using the effluent bio slurry and adding naturally available products like rock phosphate, neem cakes, microbes etc. so that, the health of the soil can be restored. The Organic Carbon (OC) content in Haryana Soil is dangerously low at 0.1 to 0.4 % against 1.8 to 3.4 % that a healthy soil should have. There is no other better soil amendment than bio slurry that is rich in OC and micronutrients. Apart from biogas and organic manure the project will also generate 6079 kgs of dry ice per day which will be sold in the open market.

Background: India's potential for biogas

India is one of the largest importers of fossil fuels in the world. Biogas industry can provide to be a great import Substitution of Fossil Fuels and Chemical fertilizers by much better products possible to a great extent along with Swachh Bharat and Rural Employment

ANNUAL CRUDE IMPORTS	= ABOUT 200 Million Ton
METHANE Production potential	= ABOUT 65.85 millionTon (33%)
NPKS ANNUAL consumption	= ABOUT 25 million Ton
ORGANIC NPKS Potential+micronutrients+OC	= ABOUT 18 million Ton (72%)
CO ₂ Capture	= ABOUT 100 million Ton

If we consider availability of green organic waste from cattle dung, poultry litter, human waste, slaughter house waste and press mud from 642 sugar mills considering each mill produces 15000 tons press mud per year then as per IIT data we have 2194 million tons of waste available per year. This waste can produce green fuel, methane, and organic high quality bio slurry based solid manure as per FCO specifications of far superior quality than urban compost. The relevant figures are
Organic manure production would be 658.419 million MT
Methane production would be 65841.9 million kg or say 65.85 million tons

The Project would aim at a daily production of about 6000 kgs of Bio CNG, 45 tons of Organic Manure apart from research and development work on liquid component of bio slurry and 6079 kgs of dry ice per day from 240 MT of cattle dung and Press mud. The impact of the project would be

1. About 46,500 MT/year procurement of cattle dung and purchase of about 27,900 MT of press mud from nearby co-operative sugar mill resulting in cleaning up of the dairies and Gaushalas in the local area, and direct and indirect jobs to about 550 local people.
2. Approximately 1860 Tons/year of Bio CNG to be sold as clean vehicular fuel and approximately 13,950 tons/year of Solid Organic Fertilizer + 62000 m³/year of Liquid Fertilizer (containing dissolved ammonium and potassium, humic acid etc.) which shall be sold to the farmers around the plant. The total fertilizer generated can easily remedy more than 25000 acres of surrounding agricultural land area in terms of OC and micronutrients.

Development timeline

Construction of the above said Biogas Project is scheduled to begin by September 2018 after getting the clearance from HAREDA, MNRE and other relevant departments, and is expected to take approximately 9 months to complete. The project will take additional 3 months to reach maximum capacity.

Technology

The Rohtak Biogas plant will, use sophisticated and proven Anaerobic Digestion technology to convert cattle dung and press mud into Bio-CNG, Organic solid as well as liquid fertilizer and Dry Ice. Anaerobic digestion is a waste management and renewable energy generation process in which microorganisms break down biodegradable organic waste in the absence of oxygen. Anaerobic digestion technology is considered the greenest process to make renewable energy and OC rich organic manure.

Economics

Once operational, the Project will generate revenues through the sale of BioCNG, Organic manure and Dry Ice. The BioCNG is expected to be sold at about Rs. 43/kg. The slurry that comes out of the biogas plant is rich manure and shall be sold to the local farmers as well as the Sindhu Farms Pvt. Ltd. who have shown the interest in buying away the entire liquid fertilizer generated @ Rs 0.20/- per Lit The generated liquid fertilizer may be further value added. The combination of dried and liquid fertilizer production and rate of the same may vary depending upon season and market demand. The price of the same may change accordingly. However, for calculation purpose and revenue model we have assumed sale of solid dried fertilizer (with 30% moisture) only at Rs. 2/- per Kg. Dry ice is estimated to be sold @ Rs 15/- per kg (the above rates are standard rates available in and around Rohtak).

The project is expected to achieve 15.99% IRR (before tax) after 10 years and pay back of 7.03 years.

Team

SREL has a dedicated team of about 45 persons working at Rohtak, Warana, Hyderabad and Delhi who have developed the engineering, project planning, process related, R&D, marketing and management expertise in their own large size bio gas plant at Warana (Kolhapur). The team for the Rohtak project shall consist of the following

1. Dr. A.V. Mohan Rao
2. Mr. Sitaramaiah Ravipati
3. Mr. Dalel Singh
4. Mr. Mohit Gupta
5. Mr. Anjani Yadav

Financing needs

The total cost of the Biogas Project is estimated to be Rs 4803.48 Lakhs, consisting primarily of construction, land and capital expenditure.

The equity share of the project shall be Rs. 1803.48 Lakhs which shall be 37.5% of the Project Cost and the remaining 62.5% of Rs. 3000.00 Lakhs shall be the Debt portion.

2.1. Project Innovation Summary:

The various innovation in the project are given below as:

- It is the first Biogas plant in India where CO₂ would be captured from the biogas cleaning system and turned into liquid CO₂ and Dry ice.
- Probably we would be first to use Glass Lined Steel 32 m digester insulated from outside.
- The slurry management system proposed by us would have a Solid liquid separator followed by microfiltration system to produce Solid organic manure from the sludge component and drip irrigation compatible liquid component .It shall be value added with humic acid/fulvic acid/nitrogen, fungus, microbes, etc to make healthy manuring system. This manure shall improve the soil and plant health by providing organic carbon and micro nutrient of which the Indian soils are deficient.

- We are also exploring possibilities of installing membrane based gas cleaning system in place of PSA. This would be the first membrane based gas cleaning system installed in India.
- We shall set up a CBG dispenser station for vehicle .we hope to use the entire Bio-CNG/CBG so produced as vehicle fuel.
- We are also exploring possibility of meeting power requirement from solar systems.

2.2 Installed Capacity:

2.2.1 Organic Waste Treatment:

Sr. No.	Organic Waste	Tonne/day	Tonne/year
	Press mud	90	27,900
	Cattle dung	150	46,500
	Any other feed-stock (may be vegetable waste from Rohtak Municipality)** if required		
	Total	240	74,400

2.2.2 Biogas Generation (m³/d): 15000

2.2.3 Bio-fertilizer/Manure Production (Tonne/day): 45 TPD

2.2.4 Power Generation (kW):-

2.2.5 Bio-CNG Production (Tonne/day): 6

2.3 Annual Production:

Sr. No.	Product/By-product Output	Quantity	Unit	Amount ₹ (lakh)
1	Raw Biogas	4650000	m ³	
2	Bio-CNG (97%CH ₄)	1860	Tons	799.80
3	Purified CO ₂ (99.9% CO ₂)	1884	Tons	263.83
4	Bio-fertilizer/Manure(Solid)	13950	Tons	279.00
5	Bio-fertilizer/Manure (Liquid)	62,000	m ³	124.00

3 EPC/Technology Consultant/ Supplier

3.1 Name: SLPP RE-NEW LLP

- (i) Office Address: #30, 2nd Floor, 7th B Main, Jayanagar 4th Block, Bangalore 560 011.
- (ii) Telephone No.: 080 41109259
- (iii) Fax No.: -
- (iv) Website: www.slppre-new.in
- (v) Contact Person: Mr. Praveen Badiger
- (vi) Designation: COO
- (vii) Mobile No.: +91 9986789900
- (viii) Email: praveen@slppre-new.in

Apart from the SLPP RE-NEW LLP team, the in-house team of Spectrum Renewable Energy Pvt. Ltd. have extensive experience of operating the Warana, Kolhapur plant over 5 years.

3.2 Imported Equipment, Instrumentation

Sr. No.	Equipment details (Make and Model)	Supplier Details
1	Mixers for the Digesters TBM18,5/4N (2.00832) 18 Nos. TBM9/4N (2.00837) 6 Nos.	CRIMAN, Italy

4 Project Cost

Sr. No.	Cost Item	Cost ₹ (lakh)
1	Land*	374.02
2	Site development	
3	Building and other civil work Plant and machinery**	3726.46
4	Electrical installation	120
5	Piping and plumbing	60
6	SCADA/Data acquisition	59.57
7	Misc. fixed assets	
8	Commissioning	30
9	Preliminary and preoperative expenses	90
10	Provision for contingencies	40.46
11	Initial working capital	
12	Feasibility-cum-DPR preparation cost	10
13	Consultation fees	50.20
14	1 st year operation and maintenance cost	-
15	Interest during Construction	202.31
16	Financing Cost	40.46
Total Project Cost		4803.48

* Not to be supported

** Inclusive of biogas utilization option (electrical generator/ Upgradation system/ Bio-CNG compressor, filling system and cascades/ blowers/ vehicle engine change over kits/ cylinders) and manure packaging, enrichment facilities, CO₂ compressor, filling system and cascades

5 Project Finance

Sr. No.	Parameter	Amount ₹ (lakh)
1	Promoter's contribution	1803.48
2	Other sources (Please specify) (MNRE grant)**	-
	User agency contribution	-
	Term loan	3000.00
	CFA - MNRE assistance	
Total		4803.48

Note**- MNRE policy is yet to be announced.

6 Term Loan

Sr. No.	Parameter	Value	Unit
1	Rate of interest	12.25	%
2	Repayment period	5.5	Years
3	Moratorium period	1.5	Years
4	Working capital (Requirement & Source)	39.24	Lakh

7 Annual Input Requirement(at optimized capacity)

- (i) Raw Material: Rs. 253.89 (Lakh)
- (ii) Power: Rs. 247.41 (Lakh)
- (iii) Water: -
- (iv) Manpower: Rs. 161.78 (Lakh)

8 Implementation Schedule

- (i) Name of the implementing agency: Spectrum Renewable Energy Pvt Ltd
- (ii) Duration of implementation: 9 Months (additional 3 months for stabilization)
- (iii) Scheduled date of commissioning: Sept, 2019

9 Salient Project Performance Data

- 9.1 D.S.C.R. (Debt service coverage ratio): Average 7 years - 1.44%
- 9.2 B.E.P. (Break-even point): 8 th year % - 23.84%
- 9.3 Pay-back period: - 7.03 Years
- 9.4 IRR (Internal rate of return): After 10thYear (before Tax) - 15.99%

Note **- The above calculations are without assuming the Central Government Subsidy .

III. General Information

10 Proposed Capacity of the Project (on daily basis)

(i) Quantity of Organic Wastes to be processed (Average Tonne/day):

For accurate calculations the plant operation schedule has been taken to be 310 days in the year in the financials. As this table is for the proposed capacity, we have considered the maximum requirement on full 365 days capacity.

Organic Waste	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.
Press mud	2790	2520	2790	2700	2790	2700	2790	2790	2700	2790	2700	2790	2737.50
Cattle dung	4650	4200	4650	4500	4650	4500	4650	4650	4500	4650	4500	4650	4562.50
TOTAL	7440	6720	7440	7200	7440	7200	7440	7440	7200	7440	7200	7440	7300.00

- (ii) Raw Biogas generation (m³):15000
- (iii) Purified biogas generation: (97 % methane) (kg): 6000
- (iv) Purified CO₂ generation (kg): 6079
- (v) Bio-fertilizer/manure production (Tonne):45
- (vi) Liquid Fertilizer (CUM); 200 CUM

11 Project Promoter

- (i) **Type of organization and structure:** Spectrum Renewable Energy Private Limited Regd. On 11-03-2002, Renamed on 13-12-2007
- (ii) **Registration Number:** U40101DL2002PTC319806
- (iii) **Place of registration:** New Delhi
- (iv) **Date of registration:** 11-03-2002
- (v) **Income tax number:** AABCJ1167B
- (vi) **GST No. (If applicable):** 06AABCJ1167B1Z4

(vii) Project Execution and Management Team:

SREL has a dedicated team of about 45 persons working at Rohtak, Warana, Hyderabad and Delhi who have developed the engineering, project planning, process related, R&D, marketing and management expertise in their own large size bio gas plant at Warana (Kolhapur). The team for the Rohtak project shall consist of the following:

Sitaramaiah Ravipati

Ramu brings over 45 years of experience in chemical technologies, entrepreneurship and company management. His technical expertise includes a 30-year career at Norton, where he worked in R&D, becoming an expert in coatings, textile finishing, non-wovens, air and water pollution and chemical technology. As Managing Partner of Crescent Village Apartments and Tri-City Real Estate offices, he managed large apartment complexes in the New York State capital region. He is also the founder of SRR Consulting, an international chemical engineering consulting firm. He has also held various positions with United Way of North-eastern New York, including as Chairman of its Hands-on Capital Land Program. He holds a Masters in Chemistry from Polytechnic Institute of Brooklyn and an M.B.A from Rensselaer Polytechnic Institute.

Dalel Singh

Advisor

Mr. Dalel Singh, aged 62 years, holds M.A. Post Graduate Degree in English from Maharshi Dayanand University Rohtak.

Mr Singh served India Trade Promotion Organization, a Ministry of Commerce PSU for over 32 years since 1982 till his retirement in September 2014. He was appointed Director of ITPO's Office in Latin America during 2001 -2014 and Tokyo (Japan) during 2007-2010.

Mr. Singh has excellent skills in project management and international marketing. Since 2010 Mr. Singh has been involved in researching on the ways of creating decent jobs for rural youth by use of local resources specially the organic waste material like cattle dung and crop wastes. He has also developed a rural development model based on Bio Slurry, the effluent from the anaerobic digesters. He is an advocate of Bio slurry, its management and value addition. Mr Dalel Singh is also coordinating Capt. Sindhu's foray into biogas plant business.

Mohit Gupta

Mohit Gupta is the General Manager at Spectrum Renewable Energy Pvt. Ltd. He is from a Business Management background with an M.Sc. in Management from the Nottingham University Business School, Business Law diploma from West Bengal National University of Judicial Science and a B. Com from St. Xavier's College, Kolkata. He has an entrepreneurial approach to issues and is focused in problem solving, implementation of right practices and fast decision making. Mohit was previously the Managing Director of Krishna Merchants Pvt. Ltd. Where he was responsible for the growth of the Company. Apart from this he has been a consultant specializing in Company management for different Companies. He is also interested in Philanthropy and is a member of the committee of Asha Niketan, Kolkata.

Anjani Yadav

Anjani Yadav is a Senior Technical Officer at Spectrum Renewable Energy Pvt. Ltd. He holds a Bachelor degree in Science and having his Master's degree in Business Administration. He has an overall experience of 7 years in the field of waste to energy projects as well as Organic Waste Management projects. He has successfully installed and commissioned more than 15 biogas plants, including Parliament House, across North India. His core strength is in operating and maintaining the biogas plants and ensuring the profitability in the business.

12 Proposed Location of the Project

- (i) Village: Marodhi Jattan
- (ii) Taluka: Kalanaur
- (iii) District: Rohtak
- (iv) State: Haryana
- (v) Telephone: 0124 2719000
- (vi) Fax: 0124 271 9000
- (vii) Web address – www.srel.in

13 Accessibility to Proposed Location of the Project

Sr. No.	Particulars	Name	Distance from Project Site (km)
	Nearest Tehsil/ Block	Kalanaur	25 Km
	Nearest Road Head	Rohtak –Hissar Road	2 Km
	Nearest Railway Station	Rohtak Railway station	10 Km
	Nearest Airport	Delhi	80 Km
	Nearest Grid/Substation	Banyani village	9 Km

14. Special Category if any – Location based

NE States & Sikkim	Islands & Estuaries	Hilly Areas	Jammu& Kashmir	Deserts	Newly formed states	Not applicable
						√

Note- : The project site falls under ‘C’ category block as per Haryana Govt. industrialization index.

15. Details of proposed Project Land (Please tick appropriate)

Sl. No.	Particular	Area	Acquired**	Whether land can be pledged for mortgage*
1.	Govt. Land	--	-	-
2.	Panchayatt- Land	-	-	-
3.	Private Land	11.64	11.64	Yes
4.	Forest Land	-	-	-
5.	Other Specify	-	-	-
6.	Total	11.64	11.64	-

***Enclosed is the copy of plant site plan and layout at Annexure 10 &11 respectively

16. Biogas Generation:

a. Availability of Organic Wastes

- (i) **Identification of substrates:** Press mud is produced during the regular operation of the sugar mill and cattle dung is also produced in the dairies which are usually flushed with water into drains. Both of the material will be used as a substrate to produce biogas through anaerobic digestion process inside the digester. Other than this vegetable waste will be used as substrate.
- (ii) **Collection, transport, storage, shelf life requirement:** This plant is proposed to be set-up in the Land surrounded by a large number of dairies and Gaushalas where, currently the dung is a headache and a problem for the dairy owners. They are ready to support regular supply provided we make arrangement for collection and transportation. Daily 150 tons of Cattle dung will be added along with 90 tons of Press mud. Pressmud shall be available from 1st week of November till May. So we have provision of storage of about 15,000 Tons of Pressmud. For cattle dung supply shall be on daily basis. We also expect to get vegetable waste from Sabji Mandi Rohtak only in case if the waste availability to the plant is not as per the designed capacity.

Table – 1 Details of the month-wise average substrate availability though out the year

Substrate	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Avg.	Total
	T/M	T/M	T/M	T/M	T/M	T/M	T/M	T/M	T/M	T/M	T/M	T/M	T/M	T/Y
Press Mud	2790	2520	2790	2700	2790	2700	2790	2790	2700	2790	2700	2790	2737.50	32850
Cattle Dung	4650	4200	4650	4500	4650	4500	4650	4650	4500	4650	4500	4650	4562.50	54750
TOTAL	7440	6720	7440	7200	7440	7200	7440	7440	7200	7440	7200	7440	7300.00	87600

Raw material availability near the plant:

- 1- Pressmud Availability : Please see Annexure – 13 enclosed.
- 2- Cattle Dung availability At Annexure -13 enclosed
- 3- We are also expecting other miscellaneous organic waste like poultry waste, fruit and vegetable waste, malt waste etc. from farmers/poulties and beer factories nearby us.

b. Innovation component of the project

- Biogas contains between 55% and 65% methane. The remaining gas is mostly CO₂. Biogas plants generally allow the CO₂ component to escape in the air. It is the first Biogas plant in India where CO₂ would be captured from the biogas cleaning system and turned into liquid CO₂ and Dry ice. It shall further reduce the carbon footprint as about 6 MT of CO₂ would have been released into the atmosphere on daily basis is being trapped and made into a commercially saleable product.
- This plant would be first in the country to use Glass Lined Steel 32 meter diameter digester insulated from outside . Glass Lined steel digesters are used in the European countries .These digester help in reduction of maintenance costs and also give a higher life when compared to the traditional concrete digesters.
- The slurry management system proposed by us would have a Solid liquid separator followed by microfiltration system to produce Solid organic manure from the sludge component and drip irrigation compatible liquid component .It shall be value added with humic acid/fulvic acid/nitrogen, fungus, microbes, etc to make healthy manuring system. This manure shall improve the soil and plant health by providing organic carbon and micro nutrient of which the Indian soils are deficient. The concept of the plant would not be to treat slurry/manure as a bi-product of biogas production, but of this plant being for the manufacture of both biogas as well as organic manure. To show our efforts, agreements are being made with large manure distributors to sell our Organic Manure through the retail channel. The agreement with Indian Oil also includes that their retail outlets would also be used to sell the manure being generated from this plant.
- We are also exploring possibilities of installing membrane based gas cleaning system. This would be the first membrane based gas cleaning system installed in India. The advantages of membrane based cleaning systems are very compact with least methane loss in the purification as well as providing 97% pure Bio-CNG(Euro 4 Level). Till now, the industry has been hesitant in implementing the membrane based cleaning system because of higher cost and requirement of as stringent inlet biogas parameters .
- Bottling, Cylinder filling and Dispensing as Vehicle fuel - At our Rohtak plant we proposes to convert it into Bio-CNG and sell as vehicle fuel. There is already a CNG station at Rohtak getting about 800 kg/hour CNG and still there are queues all the times. We also have a MOU with IOCL to sell the Bio –CNG through their network(Annexure -14 enclosed
- Use of solar system ,to meet more than 50% electricity requirement of the bio-CNG plant.

Key Features of the Plant

- (i) **Waste collection logistics, storage:** Cattle Dung from Gaushalas and dairies will be transported daily and Press Mud produced by the sugar factory will be transported to the storage area adjacent to the Rohtak plant during the sugar cane crushing season (6 months).
- (ii) **Pre-treatment of the waste:** No pre-treatment is required for cattle manure. Vehicles or trucks shall be transporting cattle dung and press mud. Cattle dung shall be collected daily and the fresh cattle manure shall be fed directly to the feeding tank. Press mud shall be available only for 5-6 months and shall be stored at site.
- (iii) **Anaerobic digestion Process:** The biological degradation of the substrates takes place in the anaerobic digester. Under anaerobic conditions, a temperature of 40.0°C and a continuous mixing, biogas is being produced by the conversion of the dissolved organic matters. The process is basically a bacterial decomposition of wet organic matters, comprising of the hydrolysis of insoluble biodegradable organic food matters, the acidogenesis forming acids from smaller soluble organic molecules and the methanogenesis, where biogas is produced. The digesters shall be insulated with expanded polystyrene and covered with coated sheets from outside. This is to avoid heat losses and overheating due to external conditions. The digesters are also provided with internal heat management system where the constant temperature is maintained within the digesters. The digester accepts the crushed press mud mixed with re-circulated slurry as well as fresh cattle dung to convert the same into acids, basically final product being acetates. This waste then breaks down into biogas and isolates cellulosic mass. The cellulosic mass separated is then taken for a longer retention time to be converted into biogas by further break down. Retention time considered in this case is around 24 - 30 days.

Biogas is formed when organic matter is digested in the absence of oxygen; this process is called anaerobic digestion. The digestion is made by enzymes and bacteria during the below described four main steps.

HYDROLYSIS – In this step the organic polymers are broken down by enzymes which are emitted when fermentative bacteria attach to the molecules in the waste. Proteins are broken down to amino acids, carbohydrates to sugars and lipids to fatty acids. The carbohydrates take a few hours to break down and the fats a few days. Lignocellulose and lignin are only hydrolyzed to a limit extent. The residue from the anaerobic digestion contains about 40-50% of lignin and 40-50% of cellulose and hemicelluloses.

ACIDIOGENESIS – During this step the molecules from the previous step is broken down further by bacteria, without the help from enzymes. The main products from acidification are short chained fatty acids, alcohols, carbon dioxide gas and hydrogen gas. The carbon dioxide and hydrogen gas can be converted into methane directly by methanogenic bacteria.

ACETOGENESIS – In this step the fatty acids and the alcohols are broken down to smaller components, mainly carbon dioxide, acetate and hydrogen gas. During acetogenesis, hydrogen and carbon dioxide are reduced to acetic acid; this is made by homoacetogenic microorganisms. The acetogenic bacteria produces H₂, but the break-down of long-chain fatty acids to acetate can only take place during a very low hydrogen partial pressure.

METHANOGENESIS – This is the last step in the process, where different methanogenic bacteria convert carbon dioxide, hydrogen gas and acetate into methane. These bacteria cannot operate in the presence of oxygen.

- (iv) **Bio-reactors or bio-digesters:** A biogas digester is a large tank where inside Biogas is produced through the decomposition/breakdown of organic matter through a process called anaerobic digestion. It's called a

digester because organic material is eaten and digested by bacteria to produce biogas. A biogas digester forms the most critical part of biogas production because without it, no biogas would be produced without the breakdown of organic waste or material. A digester has another container that holds the gas that has been produced after the organic matter is broken down. The digester has connecting systems in the form of pipes that feed the digester with slurry and connect the container holding slurry to the container that is holding the gas. There is also a transport system to take the biogas to where it will be used. The digester also has a mechanism for ejecting the residue. Each digester is comprised of a concrete/GFS tank 32 meters in diameter and 8.45 meters high with a liquid volume of 6400 m³ and a head space for gas storage. For the first time in India, Bio-reactors/Bio-digesters of are being installed of an industrial capacity using GFS technology. This would reduce the weight on the ground, but repairable, have a longer life, make maintenance easy and have a shorter construction time.

- (v) **Biogas collection and storage system:** Each The digesters are installed with a top dome covering of double membrane with two layers and an approximate pressure of 4-5 milibars maintained between the two layers. This maintains a natural air pocket insulation layer from the top. A blower of 0.25 HP maintains a constant pressure between the bladders constantly. The selection of fabric is taken from our inhouse experience of Warana Biogas Plant. The double membrane will be mounted at the top of circumferential wall of GLS tank. The double membrane is fitted with under and over pressure sensors so that the operation of the plant can be made smoother and automation can be achieved .
- (vi) **Biogas scrubbing and up gradation:** The generated biogas consists of various gases such as Methane, Carbon di-oxide, Hydrogen sulphide (in minor quantities) and moisture in vapor form. The generated gas is scrubbed with the help of membrane unit to remove the CO₂ and contain around 97 – 98% pure methane and the rest 2-3% of CO₂, which is Euro VI standard. In this plant the generated CO₂ shall also be captured, purified and converted to liquid CO₂/Dry ice.

Process description:

- 1) The Hydrogen Sulphide gas is corrosive.
- 2) Water vapour may cause corrosion when combined with H₂S on metal surfaces and reduce the heating values.
- 3) The H₂S free gas would be cleaned using membrane technology, another first in India, to produce BioCNG as per Euro 6 standards ready to be compressed and sold to vehicles.

Compressed Biogas Properties:

Daily BioCNG generated	6000 kgs/day
Upgraded Biogas (Bio CNG)	The up graded Biogas would be as per BIS standards. Expected quality parameters shall be: Wobble Index : 44.6 to 44.7 Methane : > 97% and above Carbon Dioxide:< 3% Others : <0.5%
Transportation	Stored in cylinders and cascades, Cascades of various sizes shall be used

DESIGN BASIS FOR BIOGAS PURIFICATION UNIT:

Influent characteristics

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

Table 1: Inlet gas composition

Flow	: 700 M ³ /hr
CH ₄	: 55-65%
H ₂ S	: 1500-2000 ppm
CO ₂	: 45-35%
Pressure	: 0.5 Kg/cm ² g

Table 2: Outlet gas composition

Flow	: 440 - 450 M ³ /hr
CH ₄	: 97% (+-1%)
H ₂ S	: < 10 ppm
CO ₂	: 2- 3% (max.)
Pressure	: 16 kg/cm ² g

Biogas Wash & Dehumidifying Process

During the gas washing and drying process, the gas, which is saturated with water vapor, flows upwards through the packed column in the Biogas Wash Dryer in the opposite direction to cold water. In this packing material layer, intensive heat and substance exchange takes place between the inflowing gas and the cold water. The gas cools down and its oversaturated water vapor content condenses directly into the downwards-flowing washing water. Solid and liquid gas contaminants, such as dust or particles, are completely washed out during this process and gaseous contaminants, H₂S and Ammonia, are reduced according to their water solubility, too.

Second Step Desulfurization

Already in digester reduction of H₂S to S₂ can take place by integrated desulphurization through targeted injection of air, as mentioned earlier and also partly at Biogas Wash-Dryer stage. As adsorption of H₂S in later refinery is normally irreversible in the adsorbents, thus a process to eliminate this gas must be placed beforehand at any means. A Second Step Desulfurization unit therefore also acts as a police filter. Before entering the further refinery process the biogas will have to pass through this, filled with a catalyst bed known as oxide (Fe₃O₄). That catalyst reacts with sulphur dioxide and converts to S₂ and H₂O. During this reaction, most of the remaining sulphur dioxide gets removed.



Membrane Technology of Biogas upgradation.

Biogas Upgradation Module:

Biogas Upgradation Module is based on Hollow Fibre Membrane Technology to upgrade Biogas to Bio-CNG ensuring the national statutory standards for Auto Fuel, Cooking gas and Gas grid connectivity.

The biogas is a mixture of CO₂, methane, and the typical by-products. It is first desulfurized with active carbon, filtered, and pre-dried. The pre-cleaned gas is then drawn in with a compressor, compressed to 15–20 bar, and upgraded in several membrane stages to give biomethane and a CO₂-rich off-gas stream. By judicious combination of membranes, methane of

purity higher than 99% can be obtained. The only equipment needed is a compressor. The methane concentration is obtained as natural gas quality.

How does membrane-based separation work?

Gas separation membranes work on the principle of selective permeation through a membrane surface. The driving force for permeation of the gas through the membrane is the difference between the partial pressures of the gas on the potentate side (the interior of the hollow fiber) and the permeate side (the exterior of the hollow fiber) is called selectivity. Membranes have the highest selectivity and provide a superior technology for processing of crude biogas.

In a separation of Biogas between carbon dioxide and methane, permeation of carbon dioxide through the membrane is much faster while methane is retained within.

Benefits

- Low methane slip (loss) of <1% during upgrading
- High methane yield of up to 99%, which means maximum added value for the operator
- Highest energy efficiency for upgrading (<0.2 kWel/Nm³ crude biogas, <0.4 kWel/Nm³ biomethane)
- No additional ancillary materials or consumables such as water or sorbents (amines, glycols) are required, so no emissions into the environment
- Easily regulated for changes in flow rate or composition
- Following the upgrading process with membranes, the biomethane is already dry and satisfies the dew-point requirement for feeding into the grid
- Easily scalable; can be used for small plants (10 Nm³/h) as well as large (>1000 Nm³/h)
- Starting and stopping of the plant is possible at short intervals, ensuring high flexibility; therefore ideally suited for operation of a biomethane filling station at the site
- The simple, easy-to-handle set-up takes up less space in the upgrading plant.
- The continuous separation process results in very high energy efficiency.

Online Gas Monitoring

There are three Online analyzers for analyzing Bio-CNG Gas. The Gas is analyzed with online CH₄, H₂S and Moisture Analyzers (Dew point meter). These are connected with surge vessel (Output tank). By this the constant quality of the Bio-CNG will get ensured.

(vii) Bio-methane compression and storage:

Gas Booster compression: From Surge Vessel the refined biogas gets supplied to the Booster Compressors. One or two compressors are installed for compressing the purified biogas from 16bar to 250 bar pressures and bottled into cascades of cylinders. These Booster Compressors are multistage reciprocating type compressors specially designed for Biogas applications. They are air cooled and suitable for intermittent as well as continuous operation.

The characteristics of Compressed Biogas (Bio-CNG / CBG) are as follows:

- | | | |
|---|---|-----------------------|
| • BioCNG/CBG | : | approx. 6000 kg/day |
| • Biogas pressure | : | 200-250 bar |
| • Methane (CH ₄) | : | approx. 97 % |
| • Carbon Dioxide(CO ₂) | : | approx. 2.5 to 3 % |
| • NITROGEN (N ₂) | : | approx. 1 % |
| • Hydrogen Sulphide (H ₂ S): | : | less than 10 ppm |
| • Water vapor | : | Dew point (-70 Deg C) |
| • Oxygen | : | 0-0.5% |

- Hydrogen : Nil
- Methanol/Glycerol : Absent

Details of Gas High Pressure (booster) Compressor:

Number of stages	3		
Gas handled	Biogas		
Capacity (at suction conditions)	410	450	Nm ³ /hr
Suction Pressure	1-3	1-3	kg/Cm ² g
Suction Temperature	35		Deg C
Discharge Pressure	230-255		kg/Cm ² g
Compressor Speed	1230		Rpm
Piston Stroke	100		Mm
Max. Ambient Temperature	45		Deg C
Compressor Shaft Power Input	65	70	kW
Recommended Motor Power	90		kW
Tolerance on Specific Power Input	+/- 5%		
Tolerance on Capacity	+/- 5%		

Bio-CNG Storage System:

The upgraded and compressed Bio-CNG storage cylinders (cascades) are placed on specially designed trucks and brought to a fuelling station or at the customer site, where it can be distributed into vehicles or use for their application in furnaces. The cascades are made up of high strength stainless steel which can handle pressure up to 250 bars. The cascade of capacity 500 kg, 400 kg and 100 kg are used for transportation at customer end. The total No's of cylinders, to be packed into cascades are 400 of each with a volume of 75 litres, which have a capacity of 10.5 kg each at 250 bars. At the IOCL or our own bio-CNG dispenser station the vehicles will be sold bio- CNG same way as CNG is dispensed.

(viii) Other Biogas applications; viz. power generation, heating, any other:

- **Power generation: 270 kW CHP** – 270 kW Power shall be generated for internal parasitic load consumption and the heat from the exhaust heat, engine jacket and intercooler shall be the sources of heat where this will be exchanged with the help of water medium and this generated hot water will be used to circulate within the digesters to maintain the temperature at the desired levels. There is an additional biogas fired boiler if hot water requirement is more than the boiler shall be run on generated raw biogas and additional hot water shall be generated.
- **Heating:** The heat and temperature maintenance system inside the feeding buffer tank takes care of a stable temperature inside the digester. This project also has a 270 kW CHP and a biogas boiler which shall help to maintain the temperature throughout the year with the help of the heat exchangers installed within the digester.



Heating arrangement inside the Digester

- **Dry Ice** – Daily 6079 kgs of Dry ice will be generated with above 85% purity and will be sold. The 40-45% Carbon dioxide from the 15000 m³ biogas will be trapped and will be liquefied to CO₂ further which will be converted to solid form of CO₂ (Dry Ice). Since the complete system is a closed loop system where release of CO₂ and CH₄ is almost negligible.

(ix) **Plant operation and maintenance:** The Rohtak plant is proposed to be operated and maintained through PLC and Scada Systems, an automated system to monitor plant operations. In addition, approximately 51 employees will be needed to oversee project O&M, including a Project Manager, Site Supervisor, Gas Compressor Supervisor, Compression Unit Supervisors, Lab Technician, Electrician, Vehicle operators, Site Skilled Labour, Site Unskilled Labour and Security personnel. (Please refer to Appendix 2 for a full description of operation and maintenance)

(x) **Financing model**

The equity share of the project shall be Rs. 1803.48 Lakhs which shall be 37.5% of the Project Cost and the remaining 62.5% of Rs. 3000.00 Lakhs shall be the Debt portion.

Term Loan:

Rate of Interest	12.25%
Repayment period	5.5 Years
Moratorium Period	1.5 Year

(xi) **If any other, specify**

c. Pre-treatment/slurry preparation and handling

- (i) No. of days of treatment to be mentioned for each of the feed-material types: Since we are feeding cattle manure with pressmud it does not requires any pre treatment as the pH range between 6-7 and the mixed slurry is ready to feed inside the digester. For complete digestion of TS we have kept the retention time between 24-30 days.

- (ii) Estimated requirement of each feed-material per cubic meter of raw biogas:

- Pressmud: 10 kg
- Cattle dung: 25 kg

- (iii) Slurry consistency and dilution water requirement.

Slurry Preparation: The 90 TPD Press mud and 150 TPD cattle manure is mixed with equal quantity of liquid component of the slurry coming out of separator. Both are mixed in mixing tank to converted into slurry . Each mixing tank is of approx. 200 m³ capacity, made of RCC and is equipped with Submersible Agitators for proper mixing of feedstock and slurry coming from digester or separator. We prepare the ready to feed slurry by mixing suitable quantity of recirculate to maintain the TS between 8%-12%.



- (iv) **Possibility of water recycling:** The digester will release 483 m³/day of effluent after digestion of the required HRT. Out of the effluent 250 m³/day will be recirculated with the next day's feed material whereas 200 m³ will be sold as the liquid fertilizer after evaporation as well as transit losses. The daily overflow will contain around 4-5% TS in the slurry. The suspended solids out of this slurry will be removed with a solid liquid separator. The separator uses a simple screw technique to generate high pressure and allow maximum separation of the solids. The liquid overflow out of the separator will contain approximately 1.5% TS. The separated liquid can then be used to adjust the daily water mass for the anaerobic digestion. The final volume of liquid organic fertilizer on daily basis shall be 200 m³.
- (v) Size reduction- In case of pressmud and cattle dung size reduction is not needed. In case of vegetable waste/food waste pulverisation is needed to reduce the feed stock size to below 0.4mm for bacteria to work effectively.
- (vi) Type: - mechanical, manual, water and power requirement-Size reduction not required, Mechanical agitation will be done in presence of recirculated digested slurry. In total slurry preparation for 1 day the power consumption is 345 Units.
- (vii) Slurry charging: manual, mechanical power, manpower requirement- Details are at (III) above
- (viii) Special equipment for size reduction for slurry (shredder, Pulveriser) preparation and handling, pumping, availability of equipment indigenous, imported- Not required in our case as mentioned at (V) above.

d. Biogas Digester design and sizing suitable for multi-feed stock

- (i) **Digester retention time:** 24-30 days
(Hydraulic retention time (HRT)/ Solid retention time (SRT):
- (ii) **Type of high rate bio-methanation digester:** Not Applicable
- (iii) **Digester Model:** - USAB, Modified UASB, completely mixed, Fixed bed, Plug flow, CSTR, any other.:
CSTR
- (iv) **Hydraulic Retention Time (HRT):**24-30 days
- (v) **Ability to handle different substrates:** Yes
- (vi) **Special design manufacturing, operation and maintenance requirement:** The Digester is innovative. It is made of Glass Lined Steel which is a norm in Europe. It can withstand H_2S corrosion, is strong, relocatable with comparatively better insulation than RCC digesters.
- (vii) **Indigenous availability, import requirement:** The make of GLS digester is totally indigenous.
- (viii) **Specific design, operation maintenance requirement:** Leakages are identified and rectified easily by removing the plates. The dimension is uniform everywhere e.g. Its diameter is same at all heights.
- (ix) **Specific advantages over conventional design:** In GLS Digester there is less chance of corrosion, leakages are identified and rectified easily by removing the plates. Its dimension is uniform throughout and it takes very less construction time.
- (x) **Specific operation monitoring and control system:** The Rohtak plant is proposed to be operated and maintained through PLC and Scada Systems, an automated system to monitor plant operations. In addition, approximately 51 employees will be needed to oversee project O&M, including a Project Manager, Site Supervisor, Gas Compressor Supervisor, Compression Unit Supervisors, Lab Technician, Electrician, Vehicle operators, Site Skilled Labour, Site Unskilled Labour and Security personnel.
- (xi) **Specific advantages over other:** Machines and Manpower monitoring is very important for the success of organisation. The layout of the plant is in such a way that it is easily controlled by the central control room managed by trained personnel.

e. Biogas Storage

- (i) Built-in digester storage.
- (ii) **Flexible Double Membrane:** The digesters are installed with a top dome covering of double membrane with two layers and an approximate pressure of 4-5 milibars maintained between the two layers. This maintains a natural air pocket insulation layer from the top. A blower of 0.25 HP maintains a constant pressure between the bladders constantly. The selection of fabric is taken from our inhouse experience of Warana Biogas Plant. The double membrane will be mounted at the top of circumferential wall of GLS tank. The double membrane is fitted with under and over pressure sensors so that the operation of the plant can be made smoother and automation can be achieved.
- (iii) **Pressure – operational and max designed:** The biogas is stored here between 0.5 and 3.5 (mili bar) pressure as minimum and maximum respectively.

- (iv) **Special material requirement and availability including infrastructural needs:** The digesters are installed with a top dome covering of PVC membrane with two layers and an approximate pressure of 4-5 millibars maintained between the two layers. The fabric has been considered so that it can resist H₂S and can last for long time.
- (v) **Cost effectiveness of storage:** Since the membrane is mounted over the digester top so there is no need of roof of Digester, hence the cost of roof and several piping cost is saved in case of Double membrane gas storage system.

f. Biogas Scrubbing/Upgradation/Enrichment Technology

(i) Biological scrubbing:

The most well-known scrubber system for removal of H₂S from biogas is Biological scrubbing. The Bioscrubber system can be regarded as a caustic scrubber in which the spent caustic solution is continuously regenerated in a bioreactor by natural occurring microorganisms. In the scrubber the H₂S contained biogas is brought in a counter-current mode with the alkaline liquid of the bioreactor (pH ranging from 8.2 to 9) causing the H₂S in the biogas to be absorbed into the liquid phase. The solution leaving the scrubber (NaHS + H₂O) is directed to the bioreactor. The bioreactor operates near atmospheric pressure and is aerated (constant mix) with a controlled inflow of ambient air. Colourless sulfur bacteria react with the spent scrubber solution and convert the dissolved sulfide to solid elemental sulfur ($\text{NaHS} + 0.5\text{O}_2 \rightarrow \text{S} + \text{NaOH}$).

A small portion of the dissolved sulfide (less than 5%) is completely oxidized to sulfate ($2\text{NaHS} + 4\text{O}_2 \rightarrow \text{NaHSO}_4 \rightarrow \text{Na}_2\text{SO}_4 + \text{H}_2\text{SO}_4$). According to this, the solution alkalinity is partially regenerated during the production of elemental sulfur and to maintain pH above 8.2 less than 5% of NaOH must be added as compared to a conventional chemical caustic scrubber. A continuous bleed stream is required to avoid accumulation of sulphate and the produced elemental sulfur is removed from the system. This can be used as raw material in sulfuric acid production factories or it is disposed of. H₂S removal efficiency is claimed to be typically about 99% for properly operated systems.

(ii) Membrane separation

Membrane separations are particularly appealing for biogas upgrading due to their lower energy consumption, good selectivity, easily engineered modules, and therefore lower costs. High CH₄ recovery efficiency can be reached (>96%), while pure CO₂ can be obtained. The main disadvantage of membrane separation is that multiple steps are required to reach high purity. This technology for biogas upgrading is based on gas dissolution and diffusion into polymer materials (membranes). When a differential pressure is applied on opposing sides of a polymer, gas transport across the permeation occurs. The gas rate of permeation is controlled by the solubility coefficient and diffusion coefficient of the gas-membrane system. Polysulfone, polyimide or polydimethyl siloxane are the common membrane materials for biogas upgrading. In the mid-1980, Cynara (Natco), Separex (UOP), and Grace Membrane Systems were already selling membranes made from cellulose acetate to remove CO₂ from CH₄ in natural gas.

One of the crucial points of biogas upgrading is the methane emission (often called methane slip). Methane is a 23 times stronger greenhouse gas than CO₂. Consequently, if methane slip is higher than 2%, it can reverse the positive environmental effect of a biomethane installation (Wellinger, 2009). Compared to technologies such as water scrubbing and pressure swing adsorption, the high selective membrane technology has a significant lower methane slip.

(iii) **Quality of upgraded gas**

Upgraded Biogas (Bio CNG)

The up graded Biogas would be as per BIS standards. Expected quality parameters shall be:

Wobble Index	: 44.6 to 44.7
Flow	: 440 - 450 M ³ /hr
CH ₄	: 97% (+-1%)
H ₂ S	: < 10 ppm
CO ₂	: 2- 3% (max.)
Pressure	: 0.2 kg/cm ² g
Water vapor	: Dew point (-70 Deg. C)
Oxygen	: 0-0.5%
Hydrogen	: Nil
Methanol/Glycerol	: Absent

(iv) **Availability of technology – Indian / Imported.**

The technologies to remove CO₂ and H₂S from the biogas now are easily available in India. The membrane system being deployed by us is sourced from Evonika by M/S SLPP.

g. Biogas Utilization/Application

(i) Bottling/ Cylinder filling, Piped distribution, balloon, Cooking & heating fuel, Pressure/ compressed storage, any other. The traditional biogas utilisation has been as follows:

- **Bottling and Cylinder filling:** The upgraded and compressed BioCNG storage cylinders (cascades) are placed on specially designed trucks and brought to a fuelling station or at the customer site, where it can be distributed into vehicles or use for their application in furnaces. The cascades are made up of high strength stainless steel which can handle pressure upto 250 bars. The cascade of capacity 500 kg, 400 kg and 100 kg are used for transportation at costumer end. The total No's of cylinders, to be packed into cascades are 400 of each with a volume of 75 liters, which have a capacity of 10.5 kg each at 250
- **Piped distribution:** Pressure Reducing System are used to reduce from high pressure to low pressure at different stages. Pressure Reducing System ensures safety and precise control of pressure and flow. Pressure Reducing System are highly useful for high flow application like in furnaces, Forging industries, bakery industry etc. Diaphragm or Piston type of regulators is used in Pressure Reducing System.
- **Balloon (Biogas storage):** The digesters are installed with a top dome covering of imported German make gas rubber bladders with two layers and an approximate pressure of 4-5 millibars maintained between the two layers. This maintains a natural air pocket insulation layer from the top. A blower of 0.25 HP maintains a constant pressure between the bladders constantly. The digesters are fitted in with hot water circulation lines embedded inside it. These lines are essential as the ambient temperature of 40oC must be maintained and the gas production is maximized at this temperature.
- **Cooking & heating fuel:** The Project's output is determined by capacity of the Plant, plus the amount of resource (feedstock) available for conversion into biogas.

Project aims at daily production of about 6000kgs of clean biogas out of which 6000kgs of BioCNG will be sold. The power produced from CHP will reduce our requirement of commercial power as well as it will also provide heat which will be used to maintain the suitable temperature inside the digester which is required to produce Methane.

- **Pressure/ compressed storage:** From Surge Vessel the refined biogas gets supplied to the Booster Compressors. One or two compressors are installed for compressing the purified biogas from 16bar to 250 bar pressures and bottled into cascades of cylinders. These Booster Compressors are multistage reciprocating type compressors specially designed for Biogas applications. They are air cooled and suitable for intermittent as well as continuous operation.
- **Bottling, Cylinder filling and Dispensing as Vehicle fuel** - At our Rohtak plant we proposes to convert it into Bio- CNG and sell as vehicle fuel. There is already a CNG station at Rohtak getting about 800 kg/hour CNG and still there are queues all the times. We also have a MOU with IOCL to sell the Bio –CNG through their network.(Annexure -14 enclosed).

(ii) **Power generation for captive utilization: 100% biogas/dual fuel genset, 100% biogas/ dual fuel pump set, grid connectivity, paralleling with grid, other power generation source conventional, renewable, any other**

- **CHP(Combined heat and Power Unit):** A 270 kW CHP shall be installed synchronizing with additional 270 kW Engine where sequential generation of electricity and heat for the purpose of heating/ circulating hot water within the digesters to maintain the internal temperatures of the digesters, to the most efficient utilization of biogas for consumption will be done. 270 kW power shall also be generated for parasitic load consumption on regular day to day operational use whereas the additional 270 kW Engine will be run only when there are power cuts more than 6-7 hrs on any normal day.

(iii) **Vehicle fuel - upgrading requirement, gas composition and storage, distribution network**

- **upgrading requirement:**

Biogas with methane (CH₄), 60–65 per cent; carbon dioxide (CO₂), 30–35 per cent; and hydrogen sulphide (H₂S), 1000–1500 ppm was produced from high rate anaerobic digester. As a value addition and to reduce greenhouse gas emissions, the biogas produced has been upgraded to biomethane (equivalent to natural gas) and is being utilized in industries and as vehicular fuel as a substitute fuel to natural gas. Removal of CO₂ from biogas enhances the calorific value closer to the range of natural gas, which is nothing but CH₄, that is, natural gas

Presence of CO₂ in biogas poses following problems:

- It lowers the power output from the engine; – It takes up space when biogas is compressed and stored in cylinder;
- It can cause freezing problems at valves and metering points where the compressed gas undergoes expansion during engine running.

- The traces of H₂ S produce H₂ SO₄ which corrode the internals of pipes, fittings etc.

Upgraded Biogas (Bio CNG)

- **Gas composition:**

The up graded Biogas would be as per BIS standards. Expected quality parameters shall be:

- Wobble Index : 44.6 to 44.7
- Flow : 440 - 450 M³/hr
- CH₄ : 97% (+-1%)
- H₂S : < 10 ppm
- CO₂ : 2- 3% (max.)
- Pressure : 0.2 kg/cm²g
- Water vapor : Dew point (-70 Deg. C)
- Oxygen : 0-0.5%
- Hydrogen : Nil

- Methanol/Glycerol : Absent

- **Storage:**

The upgraded and compressed BioCNG storage cylinders (cascades) are placed on specially designed trucks and brought to a fuelling station or at the customer site, where it can be distributed into vehicles or use for their application in furnaces. The cascades are made up of high strength stainless steel which can handle pressure upto 250 bars. The cascade of capacity 500 kg, 400 kg and 100 kg are used for transportation at customer end. The total No's of cylinders, to be packed into cascades are 400 of each with a volume of 75 liters, which have a capacity of 10.5 kg each at 250 bars.

For our plant, we will be majorly selling our BioCNG for vehicle fuel. For the same we have already made a tie up with Indian Oil. They would be setting up the BioCNG dispensing and filling station in and around the plant. We have also considered setting up one of our own dispensing station in this project

h. Carbon dioxide (CO₂) Disposal or Recovery

- (i) **Method of disposal / Recovery:** The cleaning system off gas is taken to RECO2™ bioCO₂ recovery module. The gas is first inlet into a system of packed columns filled with adsorption media such as molecular sieves and activated carbon. Here biCO₂ is further enriched and conditioned for low temperature purification. After compression bioCO₂ passes through the second packed column purification battery in the RECO2™ process. Finally, the bioCO₂ is dried to (-) 60 deg C dew point and is inlet into the low temperature purification system where the temperature and pressure are carefully varied to separate the liquified bioCO₂ from gaseous biomethane. This process operates in the range of 16 to 20 bar(g) and (-) 20 to (-) 35 deg C. The separated biomethane is recovered at each step in the RECO2™ process, considerably reducing methane slip and boosting biomethane purity.
- (ii) **Form of recovery:** Liquid CO₂ and DRY ICE
- (iii) **Utilization or Application:** It is a versatile industrial material, used, for example, as an inert gas in welding and fire extinguishers, as a pressurizing gas in air guns and oil recovery, as a chemical feedstock and as a supercritical fluid solvent in decaffeination of coffee and supercritical drying. It is added to drinking water and carbonated beverages including beer and sparkling wine to add effervescence. The frozen solid form of CO₂, known as dry ice is used as a refrigerant and as an abrasive in dry-ice blasting. M/S Divya Carbonic Pvt Ltd. Have shown interest to purchase the entire quantity from us. The dry ice/liquid CO₂ mix ,however ,shall change with the season (Annexure-15)

i. Post Treatment of Digested Slurry

- (i) **Dewatering and recycling system:** The slurry management system proposed by us would have a Solid liquid separator followed by microfiltration system to produce Solid organic manure from the sludge component and drip irrigation compatible liquid component .It shall be value added with humic acid/fluvic acid/nitrogen, fungus, microbes etc to make healthy manuring system. These manure shall improve the soil and plant health by providing organic carbon and micro nutrient of which the Indian soils are deficient
- (ii) **Drying, Manual management:** The daily overflow will contain around 4.5% TS in the slurry. The suspended solids out of this slurry can be effectively removed with a separator. The overflow out of the separator will contain approximately 1.5% TS and is redirected to the storage lagoon for further aeration treatment. The COD and BOD is brought down in the lagoon by allowing a 30 days storage with maximum exposure to surface. Total separated manure will contain approximately. 70% moisture and can be taken to further drying on the drying bed. This can further pelletized to allow effective distribution and packing of the remnant product
- (iii) **Mechanical, Pneumatic concentration**

- (iv) **Value addition and packaging:** The slurry management system proposed by us would have a Solid liquid separator followed by microfiltration system to produce Solid organic manure from the sludge component and drip irrigation compatible liquid component .It shall be value added with humic acid/fulvic acid/nitrogen, fungus, microbes, etc to make healthy manuring system. This manure shall improve the soil and plant health by providing organic carbon and micro nutrient of which the Indian soils are deficient.
- (v) **Composting / Vermicomposting:** The digester will release 483 m3/day of effluent after digestion of the required HRT. Out of the effluent 253 m3/day will be recirculated with the next day's feed material whereas 200 m3 will be sold as the liquid fertilizer after evaporation as well as transit losses. The daily overflow will contain around 4-5% TS in the slurry. The suspended solids out of this slurry will be removed with a solid liquid separator. The separator uses a simple screw technique to generate high pressure and allow maximum separation of the solids. The liquid overflow out of the separator will contain approximately 1.5% TS. The separated liquid can then be used to adjust the daily water mass for the anaerobic digestion. The final volume of liquid organic fertilizer on daily basis shall be 200 m3 of separated water after secondary separation. The additional heat from the solar concentrators, as mentioned above, will be used for drying the water and evaporation if required. This process can ensure zero discharge of the plant. Total separated solid organic manure will contain approximately 30% moisture. This can further be packed in the bags with the help of a packing unit to allow effective distribution and packing of the remnant product.
- Note-** M/S Sindhu Farm Pvt Ltd has entered into an MOU with us to take up the entire quantity.(copy of MOU enclosed at Annexure -16)

j. Biogas Distribution

- (i) **High pressure cylinders:** The supply of Biogas to the industries as well as to the dispensing stations would be done through high pressure Cylinders. There are Type 1 cylinders available in the market in India, but through this project, an attempt is also being made to launch Type 4 (composite) cylinders. The cylinders are combined together to form a cascade where BioCNG is compressed up to 250 bar. These cascades are loaded onto trucks specially allotted for transport of gas to be supplied to the customers.
- The cascades are directly connected to the burners at the industrial clients end through a Pressure Reduction System to reduce the pressure from 250 bar to the pressure desired by the customer. The gas being sold for vehicle fuel would be sent to the designated Indian Oil retail outlet in the area where, according to the agreement between Indian Oil and Spectrum Renewable Energy Pvt. Ltd., the BioCNG would be sold as vehicle fuel. The necessary arrangement in the Retail outlet of compressors and dispensing point of sale units would be done before the start of commercial sale of BioCNG.

k. Utility Requirement

- (i) **Captive Power (in house/outside):** A 270 kW CHP shall be installed synchronizing with additional 270 kW Engine where sequential generation of electricity and heat for the purpose of heating/ circulating hot water within the digesters to maintain the internal temperatures of the digesters, to the most efficient utilization of biogas for consumption will be done. 270 kW power shall also be generated for parasitic load consumption on regular day to day operational use whereas the additional 270 kW Engine will be run only when there are power cuts more than 6-7 hrs on any normal day.
- (ii) **Water:** Unlike other biogas plants, the plant will require minimal fresh water/day for normal operation mode. Most of the slurry will be re-circulated out of the digester to be mixed with the daily substrate, to form pump able slurry. However, unlike most biogas projects that use mostly the same amount of water like the feedstock for preparing a pump able mixture for feeding, the project will use only separated slurry to maintain proper operation. This project we are aiming at zero liquid discharge as the slurry generated after the solid liquid separation shall be recirculated on daily basis to avoid fresh water usage.

1. Chemicals and other Requirements

- (i) Flocculants and additives : No flocculants, may be we use organic origin plant nutrients like rock phosphate to enrich the slurry based manure.
 - (ii) Culture (anaerobic, aerobic): Anaerobic
- The above details as per the experience of our in house team of experts.

m. Land Requirement

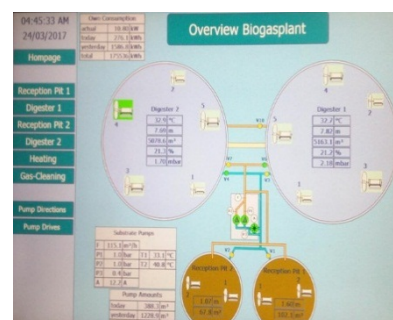
The plot of land is marked by the following characteristics:

- (i) Total plot is approximately 11.64 acres.
- (ii) Land is isolated, without any vegetation and tree plantation, and is therefore ideal for construction.
- (iii) Located near Rohtak-Hissar Highway.

n. Monitoring and Control

- (i) **Quantity and quality of organic waste, biogas, power, CO₂, Bio-CNG, Bio-fertilizer:** At our our Rohtak plant we will feed daily about 150 Tons cattle dung and 90 Tons pressmud into the digester and maintain the TS of the slurry ranging between 8%- 12% as required by adding about 250m³/day recirculates of digesters..After the anaerobic digestion into our CSTR digester we will get about 15000m³/day of raw biogas which is further upgraded into 6000kg /day Bio-CNG and 6079 kg/day dry ice. The effluent bio-slurry will be seperated with solid into 200m³/day liquid and 45Tons/day solid manures out of 450m³ about 250 will be recirculated..The balance 200m³/day decanted slurry may be sold as same or value added with humic acid/fulvic acid/nitrogen, fungus, microbes ,etc to make healthy drip irrigation compatible liquid component .

- (ii) **Supervisory Control and Data Acquisition (SCADA).** The plant is equipped with SCADA software so that daily performance of the plant can be easily monitored and evaluated in a streamline way. The entire biogas generation plant, with all its actuators, and monitoring instrumentation is controlled by a central ACP/PLC Automatic Control Panel (ACP) & Programmable Logic Controller (PLC) for the biogas generation plant, standardized & modularized in design, integrating consumers/actuators (as mixers, pumps, pneumatic valves, inline crusher etc.), & monitoring sensors & auto-switches (as temperature sensors, pressure sensors, level control, PTC-thermistor switches, PIS-sensors, flow meter, CAP-sensors, etc.) as per requirement, and with integrated visualization.



o. Operation and Maintenance requirement

- (i) Operation and maintenance Manuals- We have existing plant at WARANA ,successfully running from 6 years. All mannuals are in place.
- (ii) Spares and tools tackle requirement : As above at (i)
- (iii) Availability of spares: As required based on discussion with supplier and our own experience at Warana.
- (iv) Training facility: By our own key team at Warana Plant.
- (v) Servicing set up and facility-Inhouse workshop shall be created for minor problems .We shall also have tie ups with equipments suppliers.

* ISO certification of the technology will be given an additional weightage

17. Estimated cost of Biogas Plant

The actual cost of the BioGas plant including all its ancillaries is Rs. 3586.35 Lakhs. There would be a further GST charge on it assumed to be Rs. 459 Lakhs. This tax element would be further reduced depending on the waivers as per policy of the Govt. The cost of Land would be 374.02 Lakhs.

Further details of the distribution of this cost has been incorporated in the Annexure 2 of the DPR.

18. Project Cost

Sr. No.	Cost Item	Cost ₹ (lakh)
1	Land*	374.02
2	Site development	-
3	Building and other civil work Plant and machinery**	3726.46
4	Electrical installation	120
5	Piping and plumbing	60
6	SCADA/Data acquisition	59.57
7	Misc. fixed assets	-
8	Commissioning	30
9	Preliminary and preoperative expenses	90
10	Provision for contingencies	40.46
11	Initial working capital	-
12	Feasibility-cum-DPR preparation cost	10
13	Consultation fees	50.20
14	1 st year operation and maintenance cost	-
15	Interest during Construction	202.31
16	Financing Cost	40.46
Total Project Cost		4803.48

19. Means of finance

19.1 Financial Overview

Deployment	Rs. Lacs
Land	374.02
Site Development	-
Building, Plant & Machinery	4.046.22
Preliminary & Pre-ops Expenses & Provision For Contingencies	140.46
Working Capital Margin	-
Interest during Construction	202.31
Financing Cost	40.46
Total Project Cost	4803.48

Sources	Rs. In Lakhs
Promoters Equity	1803.48
Fin. Inst. / Bank Loan	3000.00
MNRE Assistance*	-
Total Project Cost	4803.48

* expected after one year of operation after commissioning

20. Any other financial support expected – MNRE / UNIDO

The Equity of the project shall be Rs 1803.48 Lakhs which shall be 37.5% of the Project Cost and the Debt shall be Rs. 3000.00 Lakhs which shall be 62.5% of the total Project Cost

Term Loan:

Rate of Interest	12.25%
Repayment period	5.5 Years
Moratorium Period	1.5 Years

(a). Annual Input Requirement (at Optimum Capacity) (Rs. In lakhs)

- i) Raw Material: Rs. 253.89 Lakhs
- ii) Power & Fuel: Rs. 247.41 Lakhs**
- iii) Manpower: Rs. 161.78 Lakhs

** (270 kW additional power shall be generated in house with the use of 270 kW CHP for self consumption)

(b). Implementation Schedule:

- i) Name of the implementing agency: Spectrum Renewable Energy Pvt Ltd
- ii) Implementation Period: 9 Months (additional 3 months for stabilization)
- iii) Schedule date of commission: September 2019

(c). Salient Projected Performance Data:

Assuming no tax on sale of BIO-CNG and bio-fertilizer

- i) D.S.C.R (Debt service coverage ratio): Average 7 Years – 1.44
- ii) B.E.P. (Break-even point): 8th year (%) – 23.84 %
- iii) Pay-back period - 7.03 Years
- iv) IRR(Internal rate of return): After 10th Year (before Tax) 15.99 %

Note: The above calculations are without assuming the Central Government Subsidy.

Government Investment Subsidy & CDM Benefits

Government Investment Subsidy

SREL will apply to the state, central and UN agencies for various incentives and investment subsidy. The investment subsidy will likely provide a grant based on eligible project costs and benefits that the project is providing for various stakeholders. SREL in house team members shall be working with the state and central agencies to obtain the investment subsidy that this project will qualify for. The project is expected to be closely monitored by the government agency which will provide the subsidy through their state level implementing agency.. The July 30, 2018 Government of India Waste to Energy Policy provides for financial subsidy of Rs. 4 Crore for 4800 kg of BIO CNG per day with a cap of Rs. 10 Crore. For 6000 kg of BIO CNG proposed to be made at Rohtak plant we shall get Rs. 5.00 Crore subsidy.

Realizing Government of India Bio-Vision:

The proposed project is eligible for subsidies from the Government of India which is required for such project of “Technology Demonstration” establishing the footprint for future commercial projects; with enhanced confidence inculcated in equipment suppliers, growth/demand driven cost reduction and established market for products i.e. Upgraded Bio Gas (CBG) and Organic Fertilizer, etc.

The Project perfectly fits into the criteria of the MNRE letter No. 30-4/2010-BE/BGFP Dated 08.07.2010 on “Demonstration of BGFP for Generation, Purification / Enrichment, Bottling and Piped distribution of Biogas....” is

directly applicable to the proposed project since the present large size Commercial Demonstration Project is being set up in Haryana to utilize the raw biogas after purification as vehicle fuel and solid and liquid manures for soil conditioning and as organic source of major and minor plant nutrients. We also propose to undertake R&D on value addition of the effluent bio slurry to make bio pesticides and insecticides/repellents as there is crying need for healthy and pesticide free food.

This project also perfectly fits into the criteria of Technology Demonstration Project in policy of MNRE on Research, Design, Development, Demonstration (RDD&D) vide No. 1/1/2005-R&D, Dated: 17.03.2009 which aims “..... to make industry competitive and renewable energy generation supply self-sustainable/ profitable”; identifying the Broad Area of “Green Initiative for Future Transport (GIFT) based on Alternate Fuels for land, air & sea applications to supplement and eventually substitute fossil-fuel systems” with a System Focus on “Biogas energy systems and plants for cooking, heating, refrigeration, space cooling, power generation, motive and automotive applications.”

In addition, the MNRE policy No. 7-2/2008-BE Dated 03.07.2009 on “Demonstration of BGFP for Generation, Purification / Enrichment, Bottling and Piped distribution of Biogas....” is directly applicable to the proposed project since the present Commercial Demonstration Project is being set up.

CDM Benefits

The projects involves the capturing of methane and carbon dioxide gases. Conversion to methane and carbon dioxide (by burning/thermal/vehicular fuel) before it's released to the atmosphere. Methane has 21 times the global warming impact compared to carbon dioxide and therefore this project will be seen as a Global Warming mitigation project that generates “Carbon Credits”. The project also generates renewable energy from the conversion of waste into bio CNG and will be eligible for “Carbon Credits” because the project is mitigating the use of fossil fuels.

Unlike Other Environmental Benefits that usually don't have a market value these “Carbon Credits” are potentially tradable. The trading in Carbon is seen as a market based instrument for the control of Global Warming.

Base Case Model

The annual pro-forma for the Project is contained in Appendix. A summary of the key project assumptions, financing assumptions and financial results appear in the table below. This is based on Rs. 43/Kg of Bio CNG SREL selling rate. The Base Case Model can analyze multiple financing and operating scenarios (e.g., including changes to Project cost, debt/equity ratios, Bio CNG prices, CDM Benefits, an Investment Subsidy, and other financial and operating assumptions).

Annexure1: Civil Structure as part of the plant

Civil Structure as part of the plant.					
S.no	Utility /Building Title	Size (Length x Breadth or Diameter)	Area	Remarks	Amt in lakh Max
A	<u>Feeding and Digestion Segment</u>				
1	Pressmud storage yard(rcc slab)	80m x120m	9600m2		185
2	Cattle dung Storage yard(rcc slab)	40m x 38m	1520m2		25
3	Mixing tank (RCC)	Height 3m, Dia 9.2 m	199 m2	3 Nos	30
4	Feed Pump platform (rcc slab)	8m x12m	96 m2		10
5	Digester raft (RCC)	Height 8.45 m and 32 m Diameter	1608 m2	2 Nos	60
6	Boiler room with rcc roof.	10m x 12m	120m2		10
7	CHP room with rcc roof.	12m x12m	144m2		12
8	Panel room with rcc roof.	10m x12m	120m2		15
9	PLC room with rcc roof.	10m x12m	120m2		15
10	Lab room with rcc roof.	10mx12m	120m2		15
11	Transformer Platform & fencing	8m x 12m	96m2		7
12	Workshop shed	25m x 9m	225m2		20
13	Store shed	8m x 12m	96m2		10
14	Water storage Tank	15m x 15m	225m2		30
15	Flare Unit platform (rcc slab)	4m x 4m	16m2		3
16	Weigh bridge platform (rcc slab)	9m x 3m	27m2		5
17	Condense pit				5
B	<u>Gas cleaning and filling segment.</u>	-	-	-	-
18	Pretreatment unit shed	31m x73m	2263 m2		70
19	Upgradation unit shed				
20	Compression unit shed				
21	Filling and cascades storage shed				
C	<u>Organic Liquid and solid fertilizer</u>				
22	Circular lagoon rcc/rubble masonry.(Buffer Tank)	Height 4 m deep and 32 m Diameter	1608 m2	2 Nos	65
23	Rectangular Lagoon	50m x47m	2350m2		55
24	Solid/Liquid Separator platform & shed.	8m x 10m	80m2		12
25	Bagging and Storage shed of Solid organic Fertilizer	22m x 48m	1056m2		55
26	Bottling and Storage shed of Liquid Fertilizer .	22m x22m	484m2		30
27	Windrows platform rcc	50m x 50m	2500m2		45
D	<u>Other Section</u>				
28	Office room with rcc roof	10mx12m	120m2		50
29	Inner Roads	633m x 9m	6700 m2		90
30	Beautification and others.				41
31	Fencing along with perimeter of plant	1800m	1800m2		30
	Total A+B+C+D				1000

Annexure 2: List of Plant and Machinery

₹ (In Lakh)

Sr. No.	Suggested Source	Scope of Supply	Qty.	UNIT	Cost in Rs.	Equipment Cost	Civil & Other Cost	Sub Total Rs.	Tax in %	Tax Amount Rs.	TOTAL Rs.
SECTION A - FEEDING & DIGESTION SEGMENT											
1	CRIMAN through SLPP RENEW LLP	Submersible Agitators for Feed Tank	6	nos	331,640	1,989,840		1,989,840	5%	99,492	2,089,332
2	NETZSH pumps	Feed pump	4	nos	146,727	644,791	500,000	1,144,791	5%	122,240	1,267,031
3	Wilo/Cri pump/Kirlosker	Water storage tank and pump	2	nos	50,000	100,000	3,000,000	3,100,000	5%	545,000	3,645,000
4	Essae Digitronics Private Limited	Weigh Bridge	1	nos	465,000	514,000	500,000	1,014,000	18%	182,520	1,196,520
5	Ganesh auto Company	Front loader	2	nos	770,000	1,540,000		1,540,000	5%	77,000	1,617,000
6	Ganesh auto Company	Tractors with trolleys	2	nos	960,000	1,920,000		1,920,000	18%	345,600	2,265,600
7	SLPP RENEW LLP	Feed preparation tank with Belt Conveyor, silo for dry bio mass with screw conveyor	2	nos	2,200,000	4,400,000	16,500,000	20,900,000	18%	3,762,000	24,662,000
8	SLPP RENEW LLP	Double membrane Biogas Holder	2	set	3,452,000	7,491,000		7,491,000	5%	374,550	7,865,550
9	SLPP RENEW LLP	Heating Coil & Hot Water Boiler with Pump	2	set	2,528,500	5,057,000	1,000,000	6,057,000	5%	432,850	6,489,850
10	CRIMAN through SLPP RENEW LLP	Submersible Agitators for Digester & Buffer tank	16	nos	750,672	12,010,747		12,010,747	5%	600,537	12,611,284

11	Rostfrei Steels Private Limited	Digester GFS works (Wall, Manhole, Nozzles and digester platform	2	set	12,050,878	24,342,774	6,000,000	30,342,774	18%	5,461,699	35,804,473
12	Rostfrei Steels Private Limited	Digester Insulation	2	set	750,000	1,500,000	-	1,500,000	18%	270,000	1,770,000
Total (SECTION - A)					24,455,416	61,510,152	27,500,000	89,010,152		12,273,488	101,283,640
SECTION B - GAS CLEANING & FILLING SEGMENT											
13	SLPP RENEW LLP	Pretreatment Units - Biogas H2S Scrubber system, dryer, carbon tower, demister pad with drain, receiver tank, biogas flow meter, gas analyser	1	nos	10,800,000	10,800,000	1,000,000	11,800,000	5%	720,000	12,520,000
14	SLPP RENEW LLP	Biogas Upgradation unit	1	nos	26,500,000	26,500,000	2,000,000	28,500,000	5%	1,685,000	30,185,000
15	SLPP RENEW LLP	CNG compressor (250bar)	2	no	5,000,000	10,000,000	2,000,000	12,000,000	18%	2,160,000	14,160,000
16	Super Technical (India) Pvt Ltd	Filling station	1	set	1,207,500	1,267,875	500,000	1,767,875	18%	318,218	2,086,093
17	Puti Energy	Flaring Unit	1	set	350,000	367,500	300,000	667,500	5%	72,375	739,875
18	S S Gas Lab Asia	CO2 capturing	1	set	13,100,000	13,100,000	-	13,100,000	5%	655,000	13,755,000
19	Rama Cylinders Private	Cascades	20	nos.	1,184,000	24,153,600	-	24,153,600	18%	4,347,648	28,501,248

	Limited										
20	Control plus oil & gas solutions private limited	Odourizer	1	nos.	1,390,000	1,417,800	-	1,417,800	5%	70,890	1,488,690
21	GGE Powers pvt. Ltd.	CHP	1	nos.	16,000,000	16,000,000	1,200,000	17,200,000	5%	1,016,000	18,216,000
22	Sprint/Cen tury/GM Engineers	EOT Crane	1	nos	1,000,000	1,000,000	1,500,000	2,500,000	5%	320,000	2,820,000
23	SREPL	BIO-CNG Dispenser Filing Station	1	set	8,510,000	8,510,000	1,500,000	10,010,000	18%	1,801,800	11,811,800
Total (SECTION - B)					85,041,500	113,116,775	10,000,000	123,116,775		13,166,931	136,283,706

SECTION C - ORGANIC LIQUID AND SOLID FERTILIZER

24	Shyam Indus Power Solutions Private Limited	Buffer Tank Civil Constructio n	2	set	5,000,000	10,000,000	5,000,000	15,000,000	18%	2,700,000	17,700,000
25	NETZSH pumps	Pump	2	nos	300,000	600,000	500,000	1,100,000	5%	120,000	1,220,000
26	NETZSH pumps	Rectangle Lagoon with pump	1	nos	300,000	300,000	5,500,000	5,800,000	5%	1,005,000	6,805,000
27	Urja Bio System Pvt. Ltd	Decanter	3	nos	1,550,000	4,788,000	1,200,000	5,988,000	5%	455,400	6,443,400
28	Ambika Engineerin g works	Aerotiller	1	nos	1,510,000	1,510,000		1,510,000	5%	75,500	1,585,500
29	Bhansali Traillors	Tanker	3	nos	500,000	1,500,000		1,500,000	18%	270,000	1,770,000
30	Tyco India Pvt. Ltd.	Bagging Unit	1	set	2,500,000	2,500,000	5,500,000	8,000,000	5%	1,115,000	9,115,000
31	J Pee Engineers	Bottling Unit	1	set	1,500,000	1,500,000	3,000,000	4,500,000	5%	615,000	5,115,000
Total (SECTION - C)					13,160,000	22,698,000	20,700,000	43,398,000		6,355,900	49,753,900

SECTION D - OTHERS

32	Tata/Eicher/Mahindra/Ashok Leyland	Trucks	3	nos	1,000,000	3,000,000		3,000,000	28%	840,000	3,840,000
33	Lab Man	Lab Material	1	nos	2,500,000	2,500,000	1,500,000	4,000,000	18%	720,000	4,720,000
34	SLPP RENEW LLP	Field Instruments & Automation Spare automation software	1	set	5,857,000	5,857,000	1,500,000	7,357,000	18%	1,324,260	8,681,260
35	Essar Pneumatics & Equipment,	Air compressor with dryer	2	nos	127,500	255,000	-	255,000	5%	12,750	267,750
36	SAPPHIRE FIRE PROTECTION PROJECTS PVT. LTD.	Fire system	1	set	3,442,411	3,580,107		3,580,107	5%	179,005	3,759,112
37			1	LS	8,040,000	8,040,000		8,040,000	18%	1,447,200	9,487,200
38			1	LS	3,000,000	3,000,000		3,000,000	5%	150,000	3,150,000
39			1	LS	6,000,000	6,000,000		6,000,000	18%	1,080,000	7,080,000
40		Electricals - Panels, vfd, transformers & lighting, high-mast etc.	1	LS	12,000,000	12,000,000	2,200,000	14,200,000	5%	996,000	15,196,000
41		Misc. Civil Works	1	LS	36,600,000		36,600,000	36,600,000	18%	6,588,000	43,188,000
Total (SECTION - D)					78,566,911	44,232,107	41,800,000	86,032,107		13,337,215	99,369,322
46		Contingencies @ 5% of Total Cost				12,077,852	5,000,000	17,077,852	5%	853,893	17,931,745
						253,634,886	105,000,000	358,634,886		45,987,427	404,622,313

Annexure 3: Calculation of Annual Manpower Cost

LABOUR EXPENSES WORKSHEET	Nos.	RATE	TOTAL
Drivers	6	15000	90000
Cleaners and helpers	12	15000	180000
Site supervisors (each shift 2 people - 1 mechanical & 1 electrical in 2 shifts)	6	50000	300000
Lab technician	1	45000	45000
Head Electrician	1	50000	50000
Site Labour (5 each shift daily 3 shifts)	15	17000	255000
JCB Vehicle operators / drivers	2	15000	30000
Cleaning system Incharge	3	50000	150000
Security	4	15000	60000
project incharge	1	100000	100000
	Total salary	per month	1260000
	Total Salary		15120000.00
	per year		

Annexure4: Working Capital Calculation

Details of Working Capital Requirement

Particulars	No. of days	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026	2026-2027	2027-2028
		1	2	3	4	5	6	7	8	9
Receivables	15	61.21	65.32	69.89	74.79	80.02	85.62	91.61	98.03	104.89
Total		61.21	65.32	69.89	74.79	80.02	85.62	91.61	98.03	104.89
Stock of raw material	14	9.30	9.74	10.23	10.74	11.27	11.84	12.43	13.05	13.70
Less Creditors	14	18.20	19.24	20.40	21.63	22.93	24.62	26.46	28.47	30.66
NWC		52.31	55.82	59.72	63.89	68.36	72.84	77.58	82.61	87.94
Working capital Margin	25%	13.08	13.95	14.93	15.97	17.09	18.21	19.40	20.65	21.98
Working capital loan	75%	39.24	41.86	44.79	47.92	51.27	54.63	58.19	61.96	65.95
Rate of interest	12.25%	2.40	2.56	2.74	2.93	3.13	3.34	3.55	3.78	4.03

Annexure 5: Statement of Profitability Projections (P&L)

PROJECTED PROFIT & LOSS STATEMENT

Particulars (Rs. Lacs)	Year									
	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026	2026-2027	2027-2028	2028-2029
Revenue	1	2	3	4	5	6	7	8	9	10
Income from sale of CBG	399.90	855.79	915.69	979.79	1,048.37	1,121.76	1,200.28	1,284.30	1,374.21	1,470.40
Income from sale of Dry Ice	141.34	302.46	323.63	346.29	370.53	396.46	424.22	453.91	485.69	519.68
Income from sale of fertilizers	201.50	431.21	461.39	493.69	528.25	565.23	604.79	647.13	692.43	740.90
Total Revenue	742.74	1,589.46	1,700.72	1,819.77	1,947.15	2,083.45	2,229.30	2,385.35	2,552.32	2,730.98
Direct Expenses										
Cost of Feed Stock	120.90	253.89	266.58	279.91	293.91	308.60	324.04	340.24	357.25	375.11
Wages	75.60	161.78	173.11	185.23	198.19	212.07	226.91	242.79	259.79	277.98
Power & Fuel	117.80	247.41	259.78	272.77	286.41	300.73	315.76	331.55	348.13	365.54
Depreciation	82.40	164.81	164.81	164.81	164.81	164.81	164.81	164.81	164.81	164.81
Total Direct Cost	396.71	827.89	864.28	902.71	943.31	986.20	1,031.51	1,079.39	1,129.97	1,183.43
Operating Profit	346.03	761.57	836.44	917.06	1,003.84	1,097.25	1,197.78	1,305.96	1,422.35	1,547.56
Administration Expenses										
Operation & Maintenance	43.21	92.47	98.95	105.87	113.28	129.14	147.22	167.83	191.33	218.12
Selling & Distribution	18.60	39.80	42.59	45.57	48.76	52.17	55.83	59.74	63.92	68.39
Interest on Term Loan/ICD	183.75	293.03	229.69	174.01	118.32	62.64	10.44	-	-	-
Interest on Working capital	2.40	2.56	2.74	2.93	3.13	3.34	3.55	3.78	4.03	4.29
Sub Total	247.96	427.86	373.96	328.38	283.50	247.30	217.04	231.35	259.27	290.79
Net Profit Before Tax	98.07	333.71	462.48	588.68	720.34	849.95	980.74	1,074.61	1,163.07	1,256.76
Income Tax Liability	20.19	68.70	95.21	121.19	148.29	174.98	201.90	221.23	239.44	258.73
Profit After Tax	77.88	265.01	367.27	467.49	572.04	674.98	778.84	853.38	923.63	998.04
Cash Accruals	160.29	429.81	532.08	632.29	736.85	839.78	943.64	1,018.18	1,088.44	1,162.84

Annexure 6: Cash Flow Statement

Particulars (Rs. Lacs)	2018-19	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026	2026-2027	2027-2028	2028-2029
	1	2	3	4	5	6	7	8	9	10	
<u>Sources Funds</u>											
Cash from Operations	-	160.29	429.81	532.08	632.29	736.85	839.78	943.64	1,018.18	1,088.44	1,162.84
Capital	1,803.48	-	-	-	-	-	-	-	-	-	-
Subsidy	-	250.00	250.00	-	-	-	-	-	-	-	-
Term Loan	3,000.00	-	-	-	-	-	-	-	-	-	-
Increase in Working Capital	-	39.24	2.63	2.93	3.13	3.35	3.36	3.56	3.77	3.99	4.23
Increase in Current Liabilities	-	18.20	1.04	1.16	1.23	1.30	1.69	1.84	2.01	2.19	2.39
Increase in Other Current Liabilities	-	1.00	2.00	2.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Total Funds Available [A]	4,803.48	468.72	685.48	538.16	639.65	744.50	847.83	952.04	1,026.96	1,097.62	1,172.46
<u>Application Of Funds</u>											
Fixed Assets	4,343.61	-	-	-	-	-	-	-	-	-	-
<u>Increase in Current Assets</u>											
Increase in Receivables	-	61.21	4.11	4.57	4.89	5.23	5.60	5.99	6.41	6.86	7.34
Increase in Stock of raw materials	-	9.30	0.44	0.49	0.51	0.54	0.56	0.59	0.62	0.65	0.69
Increase(Decrease) in Loans & Advances	459.87	(54.01)	(115.79)	(122.61)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Increase in Other Current Assets	-	0.50	1.00	1.50	-	-	-	-	-	-	-
Repayment of Term Loan	-	250.00	704.55	454.55	454.55	454.55	454.55	227.27	-	-	-
Total Funds Used [B]	4,803.48	267.00	594.30	338.50	459.95	460.32	460.71	233.86	7.03	7.51	8.03
<u>Opening Balance of Cash [C]</u>	-	0.00	201.72	292.90	492.57	672.27	956.46	1,343.58	2,061.76	3,081.69	4,171.79
<u>Net Surplus/ (-) Deficit [D] - [A - B]</u>	0.00	201.72	91.19	199.66	179.71	284.19	387.12	718.18	1,019.93	1,090.11	1,164.43
<u>Closing Balance [C + D]</u>	0.00	201.72	292.90	492.57	672.27	956.46	1,343.58	2,061.76	3,081.69	4,171.79	5,336.23

Annexure 7: Calculation of Debt Service Coverage Ratio

	DSCR						
	1	2	3	4	5	6	7
Year	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026
Cash Accruals	410.29	679.81	532.08	632.29	736.85	839.78	943.64
Add							
Interest on Term Loan	183.75	293.03	229.69	174.01	118.32	62.64	10.44
Total Cash Accruals	594.04	972.84	761.76	806.30	855.17	902.42	954.08
Interest on Term Loan	183.75	293.03	229.69	174.01	118.32	62.64	10.44
Repayment of Term Loans	250.00	704.55	454.55	454.55	454.55	454.55	227.27
	433.75	997.57	684.23	628.55	572.87	517.19	237.71
DSCR	1.37	0.98	1.11	1.28	1.49	1.74	4.01
Average DSCR							1.44

Statement showing calculation of Payback period			
(Rs. In lacs)			
Year	Cash Inflow	Cum. Cash Inflow	Period (Year)
1.0	410.29	410.29	-
2.0	429.81	840.10	-
3.0	532.08	1,372.18	-
4.0	632.29	2,004.47	-
5.0	736.85	2,741.32	-
6.0	839.78	3,581.10	-
7.0	943.64	4,524.74	-
8.0	1,018.18	5,542.93	7.03
9.0	1,088.44	6,631.37	-
10.0	1,162.84	7,794.21	-

PROJECT IRR CALCULATION

PROJECT IRR CALCULATION

Particulars (Rs. Lacs)	2018-19	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026	2026-2027	2027-2028	2028-2029
	0	1	2	3	4	5	6	7	8	9	10
Cash Outflow											
Capital Cost	4343.61	0.00									
Total Outflow	4,343.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cash Inflow											
PAT	0.00	77.88	265.01	367.27	467.49	572.04	674.98	778.84	853.38	923.63	998.04
Depreciation	0.00	82.40	164.81	164.81	164.81	164.81	164.81	164.81	164.81	164.81	164.81
Interest on Term Loan	0.00	183.75	293.03	229.69	174.01	118.32	62.64	10.44	0.00	0.00	0.00
Income Tax	0.00	20.19	68.70	95.21	121.19	148.29	174.98	201.90	221.23	239.44	258.73
Total Inflow	0.00	364.23	791.54	856.97	927.49	1,003.47	1,077.40	1,155.98	1,239.41	1,327.88	1,421.57
Total Inflow before Tax	(4,343.61)	364.23	791.54	856.97	927.49	1,003.47	1,077.40	1,155.98	1,239.41	1,327.88	1,421.57
Tax	0.00	20.19	68.70	95.21	121.19	148.29	174.98	201.90	221.23	239.44	258.73
Total Inflow after Tax	(4,343.61)	344.04	722.84	761.76	806.30	855.17	902.42	954.08	1,018.18	1,088.44	1,162.84
PROJECT IRR BEFORE TAX											15.99%

Annexure 8: Calculation of Break-Even Point based on Optimum Capacity Utilization

(Rs in Lakh)

Calculation of Break-Even Point based on Optimum Capacity Utilisation

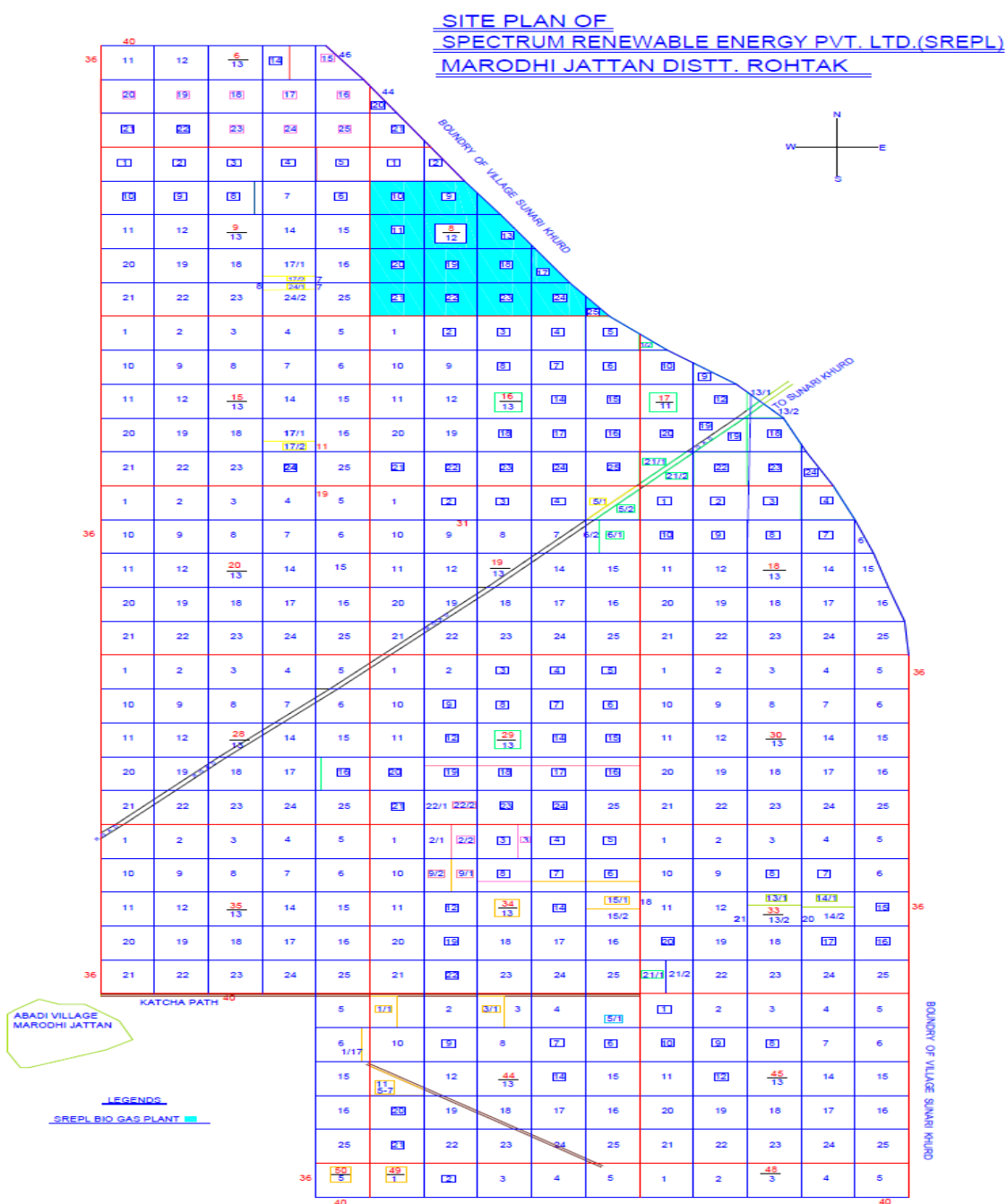
Sl. No.	Particulars	2019-2020	2020-2021	2021-2022	2022-2023	2023-2024	2024-2025	2025-2026	2026-2027	2027-2028	2028-2029
		1	2	3	4	5	6	7	8	9	10
1	Total Revenue	742.74	1,589.46	1,700.72	1,819.77	1,947.15	2,083.45	2,229.30	2,385.35	2,552.32	2,730.98
2	Variable Expenses										
	Cost of Feed Stock	120.90	253.89	266.58	279.91	293.91	308.60	324.04	340.24	357.25	375.11
	Wages	75.60	161.78	173.11	185.23	198.19	212.07	226.91	242.79	259.79	277.98
	Power & Fuel	117.80	247.41	259.78	272.77	286.41	300.73	315.76	331.55	348.13	365.54
	Selling & Distribution	18.60	39.80	42.59	45.57	48.76	52.17	55.83	59.74	63.92	68.39
	Total Variable Expenses	332.90	702.89	742.06	783.48	827.27	873.57	922.54	974.32	1,029.08	1,087.01
3	Contribution	409.83	886.57	958.66	1,036.29	1,119.88	1,209.88	1,306.76	1,411.03	1,523.24	1,643.97
4	Fixed Costs:										
	Operation & Maintenance	43.21	92.47	98.95	105.87	113.28	129.14	147.22	167.83	191.33	218.12
	Interest on Term Loan	183.75	293.03	229.69	174.01	118.32	62.64	10.44	-	-	-
	Interest on Working capital	2.40	2.56	2.74	2.93	3.13	3.34	3.55	3.78	4.03	4.29
	Depreciation (Under SLM)	82.40	164.81	164.81	164.81	164.81	164.81	164.81	164.81	164.81	164.81
5	Total Fixed Cost	311.76	552.86	496.17	447.61	399.54	359.93	326.02	336.42	360.16	387.21
6	Break-Even Point in (%) (Fixed Cost/ Total Contribution) X 100	76.07%	62.36%	51.76%	43.19%	35.68%	29.75%	24.95%	23.84%	23.64%	23.55%

Annexure 9: Projected Balance Sheet for 10 Years

PROJECTED BALANCE SHEET

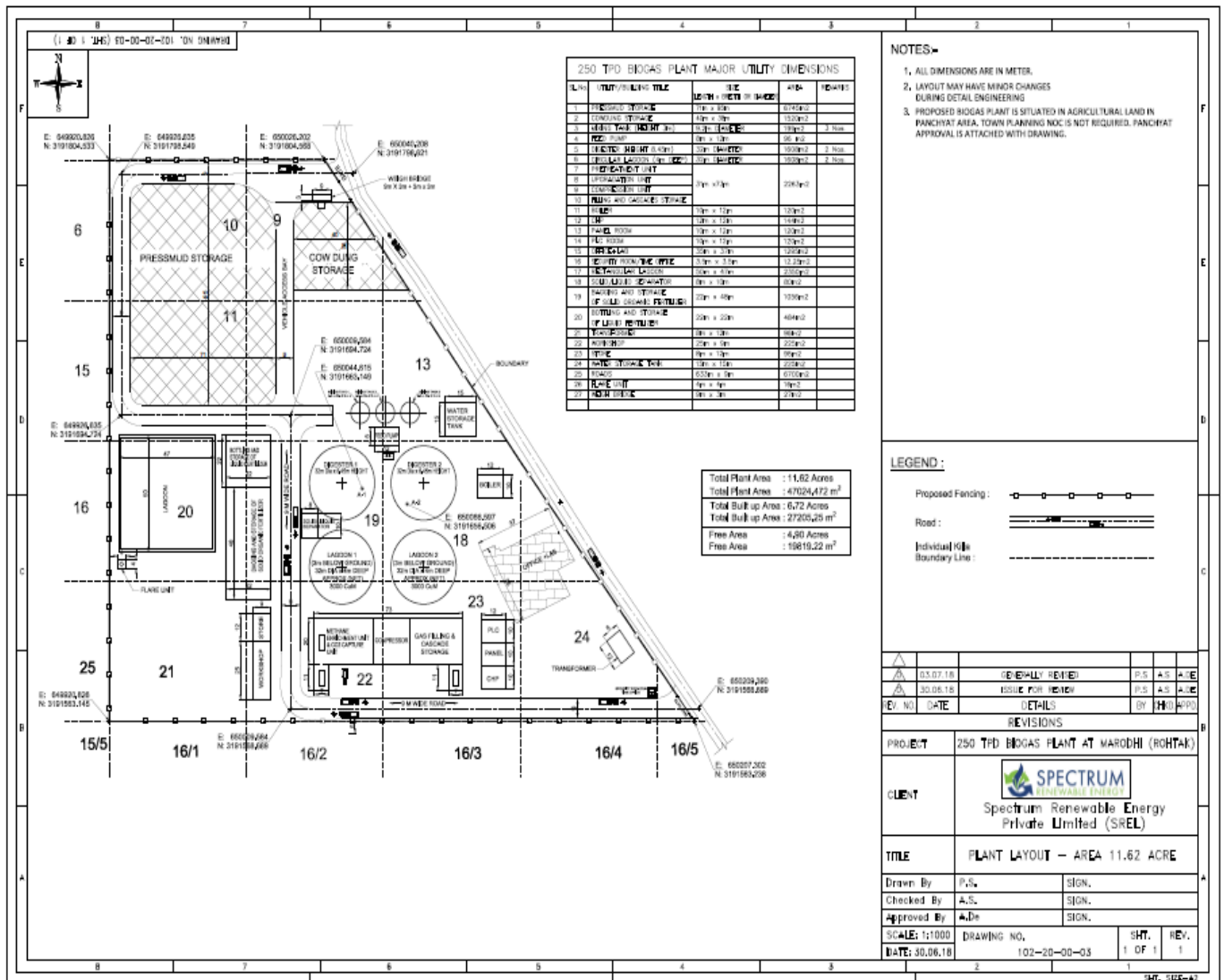
Particulars (Rs. Lacs)	2018- 2019	2019- 2020	2020- 2021	2021- 2022	2022- 2023	2023- 2024	2024- 2025	2025- 2026	2026- 2027	2027- 2028	2028- 2029
	1	2	3	4	5	6	7	8	9	10	
<u>Liabilities:</u>	-										
Capital	1,803.48	1,803.48	1,803.48	1,803.48	1,803.48	1,803.48	1,803.48	1,803.48	1,803.48	1,803.48	1,803.48
Profit & Loss Account	-	77.88	342.89	710.16	1,177.65	1,749.70	2,424.67	3,203.51	4,056.89	4,980.52	5,978.56
Term Loan	3,000.00	2,750.00	2,045.45	1,590.91	1,136.36	681.82	227.27	0.00	0.00	0.00	0.00
Working Capital Borrowings	-	39.24	41.86	44.79	47.92	51.27	54.63	58.19	61.96	65.95	70.18
Sundry Creditors	-	18.20	19.24	20.40	21.63	22.93	24.62	26.46	28.47	30.66	33.05
Other Current Liability	-	1.00	3.00	5.00	8.00	11.00	14.00	17.00	20.00	23.00	26.00
Inter Corporate Deposits	-	-	-	-	-	-	-	-	-	-	-
Total Liabilities	4,803.48	4,689.80	4,255.93	4,174.74	4,195.04	4,320.20	4,548.68	5,108.64	5,970.79	6,903.61	7,911.26
<u>Assets:</u>	-										
Fixed Assets (gross)	4,343.61	3,843.61	3,843.61	3,843.61	3,843.61	3,843.61	3,843.61	3,843.61	3,843.61	3,843.61	3,843.61
Less: Depreciation	-	82.40	247.21	412.01	576.82	741.62	906.43	1,071.23	1,236.04	1,400.84	1,565.65
Net Block Current Assets:	4,343.61	3,761.20	3,596.40	3,431.59	3,266.79	3,101.98	2,937.18	2,772.37	2,607.57	2,442.76	2,277.96
<u>Assets:</u>	-										
Receivables	-	61.21	65.32	69.89	74.79	80.02	85.62	91.61	98.03	104.89	112.23
Stock of raw materials	-	9.30	9.74	10.23	10.74	11.27	11.84	12.43	13.05	13.70	14.39
Loans & Advances	459.87	405.86	290.07	167.46	167.46	167.46	167.46	167.46	167.46	167.46	167.46
Other Current Assets	-	250.50	1.50	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Cash & Bank Balance	0.00	201.72	292.90	492.57	672.27	956.46	1,343.58	2,061.76	3,081.69	4,171.79	5,336.23
Sub Total	459.87	928.60	659.53	743.15	928.26	1,218.22	1,611.50	2,336.27	3,363.23	4,460.85	5,633.31
Total Assets	4,803.48	4,689.80	4,255.93	4,174.74	4,195.04	4,320.20	4,548.68	5,108.64	5,970.79	6,903.61	7,911.26

Plant Site Plan.



Annexure -11:

Plant Layout.



Land Registry.

1-370

विक्रेता रुद्रसैन का आधार कार्ड नं० 7207 0892 2433
 सपैक्टम रिन्युवेबल एनर्जी प्राईवेट लिमिटेड का पैन कार्ड नं० AABCJ1167B

भूमि रकबा :- 93 कनाल 3 मरले
 किस्म :- नहरी
 मौजा:- माडोदी जाटान
 कृषि भूमि कमाकं 13

बयनामा जरई मालियती= 3,74,02,054/-रूपये
 स्टाम्प= माफ

नोट :- हरियाणा सरकार न्यु व रिन्युवेबल एनर्जी महकमा की अधिसूचना नं० 19/6/2018-05 पावर आदेश दिनांक 09-03-2018 हरियाणा बायो एनर्जी पालिसी 2018 के अनुसार स्टाम्प ड्युटी माफ है। जिसे अधिसूचना के चैप्टर 3 बिन्दु (V) में दर्शाया गया है।

मैं कि रुद्रसैन पुत्र श्री मित्र सैन पुत्र श्री शीशराम निवासी 23 राजदुत चाणक्यपुरी नई दिल्ली बजरिया अश्वनी शर्मा पुत्र श्री सतदेव शर्मा निवासी मकान नं० 214 विशाल नगर एक्सटेंशन रोहतक जिला रोहतक मुखत्यार खास बरुवे मुखत्यारनामा खास दस्तावेज नं० 55 दिनांक 23-04-2018 महकका सब रजिस्टार साहब गुरुग्राम जिला गुरुग्रामका हुं जो कि अपने स्वस्थ चित व स्थिर बुद्धि से प्रतिज्ञा करता व लिख देता हुं इस बात पर कि तकसीम इन्तकाल नं० 1923 के अनुसार खेवट नं० 125 मिन खतौनी नं० 182 मिन किला नम्बरान 8/9मिन पश्चिम(7-10), 10(8-0), 11(8-0), 12(8-0), 13मिन पश्चिम(4-14), 18मिन पश्चिम(9-16), 19(8-0), 20(8-0), 21(8-0), 22(8-0), 23(8-0), 24मिन पश्चिम(7-3), किते 12 रकबा 93 कनाल 3 मरले मौजा माडोदी जाटान तह० कलानौर जिला रोहतक मलकियत व मकबुजा बरुए तकसीम इन्तकाल नं० 1923 मुन्दर्जा फर्द जमाबन्दी साल 2012 - 2013 मनमुकिर है। है। जो मनमुकिर की तरफ से पाक व साफ है कोई रोक व आदेश जारी नहीं है, इस वक्त मनमुकिर ने अपनी उपरोक्त भूमि रकबा 93 कनाल 3 मरले बामय जमीं हकुक दाखली व ,खारजी राह व रास्ता, बटट बन्ना खाल वृक्ष आदि हर किस्म के बिलईवज मुबलिग-3,74,02,054/-रूपये (तीन करोड चौहतर लाख दो हजार चौवन रूपये) आधे जिसके मुबलिग- 1,87,01,027/-रूपये होते हैं मैं बदस्त सपैक्टम रिन्युवेबल एनर्जी प्राईवेट लिमिटेड जे-1/160 ग्राउंड फ्लोर, रजोरी गार्डन, नई दिल्ली-110027 बजरिया सुमित पुनिया पुत्र श्री सतबीर पुनिया निवासी मकान नं० 32 ई गली नं० 10 जवाहर नगर हिसार जिला हिसार के पास बय कर दी है। कब्जा मौका पर हवाले सपैक्टम रिन्युवेबल एनर्जी प्राईवेट लिमिटेड कर दिया है। रजिस्ट्री बयनामा का तमाम खर्चा सपैक्टम रिन्युवेबल एनर्जी प्राईवेट लिमिटेड ने स्वयं लगाया है। मनमुकिर

Handwritten signature

प्रलेख नं: 370

दिनांक 30/05/2018

डॉक सर्बधी विवरण		
डॉक का नाम SALE FOR SETTING BIO-ENERGY PROJECTS		
तहसील/सब-तहसील कलानीर	गांव/शहर माडोरी जाटान	स्थित माडोरी जाटान
भवन का विवरण		
भूमि का विवरण		
चाली/नहरी	11 Acre 5 Kanal 3 Marla	
धन सर्बधी विवरण		
राशि 37,402,054.00 रुपये	कुल स्टाम्प ड्यूटी की राशि 0.00 रुपये	
स्टाम्प नं	स्टाम्प की राशि 0.00 रुपये	
रजिस्ट्रेशन फीस की राशि 0.00 रुपये	पेस्टिंग शुल्क 3.00 रुपये	

Drafted By: Ajay Rohilla Advocate

Service Charge: 200.00 रुपये

यह प्रलेख आज दिनांक 30/05/2018 दिन बुधवार समय 11:19:00AM बजे श्री/श्रीमती/कुमारी रुद्र सेन वैरु Ashwani Sharma s/o पुत्र/पुत्री/पत्नी श्री/श्रीमती/कुमारी निवासेन निवासी 23 Rajdoot Chanakypuri New Delhi द्वारा पंजीकरण हेतु प्रस्तुत किया गया।

हस्ताक्षर प्रस्तुतकर्ता

 उप/सर्वोक्त अधिकारी
 कलानीर

प्रलेख में वर्णित क्षेत्र नगर एवं ग्रामिण आयोजना विभाग के अधिनियम 1975 की धारा 7-ए के अन्तर्गत अधिसूचित है इसलिए दस्तावेज को पंजीकृत करने से पूर्व संबंधित विभाग से अनापत्ती प्रमाण पत्र प्राप्त कर लिया गया है।

या

प्रलेख में वर्णित क्षेत्र नगर एवं ग्रामिण आयोजना विभाग के अधिनियम 1975 की धारा 7-ए के अन्तर्गत अधिसूचित नहीं है इसलिए दस्तावेज को पंजीकृत करने से पूर्व संबंधित विभाग से अनापत्ती प्रमाण पत्र की आवश्यकता नहीं है।

दिनांक

श्री रुद्र सेन वैरु Ashwani Sharma s/o Satdev Sharma(GPA)

 उप/सर्वोक्त अधिकारी
 कलानीर

उपरोक्त विवेक श्री/श्रीमती/कुमारी Spectrum Renewable Energy Private Limited by Sumit Punia केत हाजिर है। प्रस्तुत प्रलेख के अनुसार 0.00 रुपये की राशि केत ने मेरे समक्ष विवेक को अदा की तथा प्रलेख में वर्णित अग्रिम अदा की गई राशि के लेन देन को स्वीकार किया।

दोनों पक्षों की पहचान श्री/श्रीमती/कुमारी Satbir singh lambedar पुत्र/पुत्री/पत्नी श्री/श्रीमती/कुमारी निवासी Kalansur व श्री/श्रीमती/कुमारी Jai Singh पुत्र/पुत्री/पत्नी श्री/श्रीमती/कुमारी Nawal Singh निवासी Sec 4 Rohtak ने की। साक्षी नं: 1 को हम नम्बरदार/अधिवक्ता के रूप में जानते हैं तथा वह साक्षी नं:2 की पहचान करता है।

दिनांक 30/05/2018

 उप/सर्वोक्त अधिकारी
 कलानीर

यह प्रमाणित किया जाता है कि पंजीकृत दस्तावेज की स्कैन प्रति jamabandi.nic.in पर डाल दी गई है।

 उप/सर्वोक्त अधिकारी
 कलानीर

Revenue Department Haryana

HARIS-EX

NIC-HSU

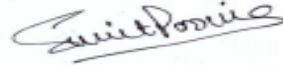
2-गैर

सालिम जर बय में से मु0 10,00,000/-रुपये चैक नं0 940516 दिनांक 05-09-2017 जारी करदा इण्डियन ओवरसीज बैंक पश्चिम विहार नई दिल्ली व मु0 3,64,02,054/-रुपये बरुवे चैक नं0 370926 दिनांक 24-05-2018 जारी करदा इण्डियन ओवरसीज बैंक पश्चिम विहार नई दिल्ली प्राप्त कर चुका है। कोई लेन-देन बकाया ना रहा है। अगर बाद अजी बय हजा मे कोई नुक्स साबित होगा तो मनमुकिर बापसी जर समन के बामय हर्जा व खर्चा के अपनी जात खास व जायदाद हर प्रकार से जिम्मेवार होगा। वारसान व कायम मकामान मनमुकिर बय हजा के पाबन्द होंगे। जमुला खर्च रजि0 सपैक्टम रिन्यूवेबल एनर्जी प्राईवेट लिमिटेड मजकुर ने अपने गृह से खर्च किये है। उपरोक्त मुनि का इन्तकाल मेरी गैर हाजरी मे बहक सपैक्टम रिन्यूवेबल एनर्जी प्राईवेट लिमिटेड मजकुर दर्ज व तसदीक करने पर मुझे कोई एतराज ना होगा। मुख्त्यार खास देहिन्दा आज तक जिवित मौजूद है तथा उसने आज तक अपना मुख्त्यारनामा खास कौन्सिल नहीं किया है। लिहाजा यह बयनामा जरई लिख दिया है ताकि सनन्द रहे। दिनांक:- 30/05/2018

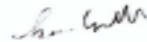
मुकिर
रुद्रसैन बजरिया अश्वनी शर्मा
मुख्त्यार खास



केता- सपैक्टम रिन्यूवेबल एनर्जी प्राईवेट लिमिटेड
बजरिया सुमित पुनिया पुत्र श्री सतबीर पुनिया



साक्षी न0-1
सतबीर सिंह
नम्बरदार कलानौर
जिला रोहतक



साक्षी न0-2
जय सिंह पुत्र श्री
नवल सिंह निवासी
सेक्टर-4 रोहतक




A. ROHILLA
Advocate Rohatk

Reg. No. 370 **Reg. Year** 2018-2019 **Book No.** 1



पिछेना



क्रेता



गवाह



उप /संयुक्त पंजीयन अधिकारी

विक्रेता

Ashwani Sharma s/o Satdev Sharma

क्रेता

Spectrum Renewable Energy Private Limited by Sumit Punia

गवाह 1:- Satbir singh lambardar



गवाह 2:- jai Singh



प्रमाण-पत्र

प्रमाणित किया जाता है कि यह प्रलेख क्रमांक 370 आज दिनांक 30/05/2018 को बही न: 1 जिल्द न: 0 के पृष्ठ न: 93 पर पंजीकृत किया गया तथा इसकी एक प्रति अतिरिक्त बही सख्या 1 जिल्द न: 9 के पृष्ठ सख्या 58 से 59 पर बिपकाई गयी। यह भी प्रमाणित किया जाता है कि इस दस्तावेज के प्रस्तुतकर्ता और गवाहों ने अपने हस्ताक्षर/निशान अंगुल मेरे सामने किये है ।

दिनांक 30/05/2018


संयुक्त पंजीयन अधिकारी
कलानीर

Annexure 13:

Availability of raw material:

We require per day approx. 240 tonnes raw material in the form of

(1) Cattle Dung 150 TPD

(2) Press Mud 90 TPD.

1-Cattle Dung

We have got following confirmation:

Sr. No.	Name of Party	Description of Raw Material	Nos. of trolleys available per day	Qty. (In tonnes) @ 3.5 tonne per trolley	Remarks
1	Municipal Corporation, Rohtak	Cattle Dung/Waste	80	280	Enclosed Letter dated. 08-06-2018
2	Hira poultry farm, Gohana Bye Pass, Rohtak	Poultry waste	3	10.5	Enclosed Letter dated 12/06/2018
3	Sri Krishna Gausala Samiti, Mokhra, Rohtak	Cattle Dung	3	10.5	Enclosed Letter dated 15/06/2018
4	Akhil Bhartiya Gausala, Pahrawar, Rohtak	Cattle Dung	10	30.5	Enclosed Letter dated 11/06/2018
5	Dharmarth Gausala, Sisana, Sonapat	Cattle Dung	6	21	Enclosed Letter dated 18/06/2018
Confirmed per day supply			102	352.5/Day	

2- Pressmud

During 2017-2018 season Spectrum Renewable Energy Pvt Ltd was the highest bidder for pressmud coming out of "The Haryana Cooperative Sugar Mills Limited". The bid was Rs 30,500 payment for pressmud coming out from crushing of 1,00,000 Quintals of sugarcane.

On the basis of measurements of the picked up pressmud we found that the output of pressmud is above 4% of the weight of sugarcane crushed. We got 25408 Tonnes of pressmud where the sugarcane crushed was 6351817

quintals. The cost to us for 25408 tonnes including transport was Rs 40,00,000 . The net cost to us was Rs 160/Ton .

There is another sugar mill named “ The Meham Cooperative sugar mills Limited Rohtak ” which is 10 Km from the plant. Presuming we get the pressmud at the same rate and the pressmud output is 4% , the production at Meham mill shall come to 17580 Tonnes. So the availability of pressmud from just two mills is 25408 tons + 17580 = 42988 Tons/year. Even if we do not get the tender, the purchase price taken by us in our DPR calculation is comfortable enough to buy from the successful bidder. We are also in touch with both the mills and the Govt to give us supply for next 10 years at predefined price as anaerobic digestion is the most environment friendly disposal of the pressmud..

Based on above logic following is the likely annual availability of pressmud for our plant from only two mills. There are, in fact, two more mills at Gohana and Sonipat within 50 Km radius of the plant.

Sr. No	Name of Party	Description of Raw Material	Sugarcane crushed in season 2017-2018.	Pressmud in Tonnes	Remarks
1	The Haryana Cooperative Sugar Mill Limited	Pressmud	6351817 Quintals	25408	Enclosed Cane crushing sheet.
2	The Meham Cooperative Sugar Mills Ltd, Meham, Distt Rohtak	Pressmud	4395235 Quintals	17580	Enclosed Cane crushing sheet.
Per day availability				42988/year 118/Day	



नगर निगम रोहतक

प्रेषक

आयुक्त,
नगर निगम रोहतक।

प्रेषित

SPECTRUM RENEWABLE ENERGY Pvt. Ltd.,
Rohtak.

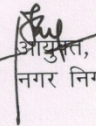
विषय:-

क्रमांक MCR/TP/170

दिनांक 8/06/18

250 TPD Biogas Plant at Village Madhodi Jattan, Rohtak.

उपरोक्त विषय पर आपके पत्र क्रमांक MOU/HR/1/2015 दिनांक 07.06.2018 के संदर्भ में लिखा जाता है कि नगर निगम रोहतक के अन्तर्गत आने वाली दुग्ध डेयरीयों से तथा नगर निगम की गौशाला और Animal Dung/Waste की लगभग 70/80 ट्रालियां प्रतिदिन अपने स्वयं के ट्रांसपोर्ट वाहन से उठा सकते हैं।



आयुक्त,
नगर निगम, रोहतक।



HIRA POULTRY FARM

Behind 132 KV Power House, Gohana Bye-Pass, Rohtak

Ref. No.....

Date..12/06/2018

इकरारनामा

यह इकरारनामा दिनांक 12/06/18 दिन मंगलवार से निम्न पार्टियों के बीच हुआ है :-

हिरा पौल्ट्री फार्म
श्रीमान N.S. Dahiya (फर्स्ट पार्टी)

स्पेक्ट्रम रिन्यूएबल एनर्जी प्राइवेट लिमिटेड क०
श्रीमान बिजेंद्र सिंह (सेकेण्ड पार्टी)

फर्स्ट पार्टी की गौशाला में लगभग 1 लाख मुर्गे हैं और वह इन मुर्गों का बीठ सेकेण्ड पार्टी को निम्न शर्तों पर उनके बायो गैस प्लांट के लिये देने को तैयार है।

- 1 फर्स्ट पार्टी को रोजाना 2-3 ट्रेक्टर ट्राली बीठ सेकेण्ड पार्टी को 5 साल तक देना है। ट्रेक्टर ट्राली और ड्राइवर सेकेण्ड पार्टी द्वारा उपलब्ध कराये जायेंगे। बीठ को ट्राली में भरने की व्यवस्था फर्स्ट पार्टी द्वारा की जायेगी।

- 2 500 रुपये प्रति गोबर की ट्राली सेकेन्ड पार्टी फर्स्ट पार्टी को अदा करेगी।
- 3 दोनों पार्टियाँ इकरार करती हैं कि फर्स्ट पार्टी मासिक बिल बनाकर देगा व सेकेन्ड पार्टी बिल मिलने के 10 दिन के भीतर भुगतान करेगा।
- 4 यह कि प्रति ट्राली बीठ का भाव जो कि क्रमांक नं.2 में उल्लेख है वह 3 साल सप्लाई के बाद 5 प्रतिशत प्रति वर्ष बढ़ के अदा किया जायेगा।
- 5 यह कि इकरारनामा 5 साल (Jan-2019 to Dec 2024) के लिए प्रतिबंध और दोनों पार्टी इस इकरारनामा की शर्तों पर सहमति व्यक्त करते हुए पालन करने की जिम्मेवारी लेते हैं।
- 6 इकरारनामा को 5 साल के बाद स्पेक्ट्रम रिन्यूएबल एनेर्जी प्राइवेट लिमिटेड के पास इसकी रिन्यू करवाने का विकल्प भी है।
- 7 यह इकरारनामा भारतीय कानून के तहत व्याख्यित और शासित समझा जावे।
- 8 दोनों पार्टी किसी भी तरह के भेदभाव को आपस की बातचीत से सुलझाने का प्रयास कर सकते हैं। यदि 30 दिन के भीतर भेदभाव नहीं सुलझता है तो कोई भी पार्टी

दूसरी पार्टी को Arbitration Notice लिखने की हकदार है,
Arbitration & conciliation act 1996 के तहत।

9 नोटिस- इस इकरानामा व दूसरे पत्र व्यवहार की भाषा हिन्दी है। नोटिस या कोई भी दूसरा पत्र-व्यवहार भविष्य में लिखित में ही होवे और भिजवाने के बाद उसकी रसीद प्राप्त होवे या रजिस्टर्ड कोरियर की रसीद होवे।

10 यह कि इस इकरानामा के प्रावधान अलग-अलग हैं और यदि इसका कोई भी हिस्सा कानून के तहत आमान्य हो तो इसका बाकी हिस्सा मान्य होगा। यदि आमान्य का कोई प्रावधान भी होगा तो दोनों पार्टियां बातचीत से इसको बदने का प्रावधान निकाल लें।

11 यह कि इस इकरानामा में आपसी समझ से संशोधन और बदलाव लाया जा सकता है।

12 यह इकरानामा किसी भी पार्टी के उदाहरण से विशेषरूप से निशेधात्मक होगा।

13 इस इकरानामा व दूसरे पत्र व्यवहार का कोई हिस्सा जो लिखित में नहीं है वह मान्य नहीं होगा।

साक्षी है कि दोनों पार्टियां उपर लिखित दिनांक व दिन से इस इकरानामा पर सहमत हैं।

.....शिरा पौलसी नाम..... की तरफ से हस्ताक्षित व प्रति

नाम-N.S. Dahiya (Mr. N.S. Dahiya)

.....सप्टेकम रिन्यूबल एनर्जी प्रा. लि...... की तरफ से हस्ताक्षित व प्रति

नाम-Bijender Singh (Mr. Bijender Singh).

संस्थापक/अध्यक्ष : 9996644483
महासचिव : 9992847565

॥ ॐ शिवहरे ॥

Website : www.abgprohtak.org
E-mail : abg.pehrawar@gmail.com

गौशाला कार्यालय : 9992136748

अखिल भारतीय गौशाला (रजि०)

पहरावर (रोहतक) - 124001



पंजीकृत :

1. रजिस्ट्रार फर्मज एवं सोसायटी, रोहतक
2. आयकर विभाग, रोहतक

मान्यता प्राप्त :

भारतीय जीव-जन्तु कल्याण बोर्ड, चेन्नई-41
पर्यावरण एवं वन मन्त्रालय, भारत सरकार, नई दिल्ली

सदस्य :

दान आयकर मुक्त
सर्वदलीय गौ रक्षा महाभियान समिति, दिल्ली-54
भारत गौ सेवक समाज, दिल्ली-6
हरियाणा राज्य गौशाला संघ, रोहतक

क्रमांक.....

दिनांक 11/06/2018

इकरारनामा

यह इकरारनामा दिनांक 11/06/18 दिन सोमवार से निम्न
पार्टियों के बीच हुआ है :-

अखिल भारतीय गौशाला, पहरावर
श्रीमान लक्ष्मी शर्मा (फर्स्ट पार्टी)

सर्वोच्च न्यायालय के
श्रीमान बिजेंद्र सिंह (सेकेण्ड पार्टी)

फर्स्ट पार्टी की गौशाला में लगभग 3500 गायें हैं और वह इन
गायों का गोबर सेकेण्ड पार्टी को निम्न शर्तों पर उनके बायो गैस
प्लांट के लिये देने को तैयार है।

- 1 फर्स्ट पार्टी को रोजाना 7/100 ट्रेक्टर ट्राली गोबर सेकेण्ड
पार्टी को 3 साल तक देना है। ट्रेक्टर ट्राली और

Signature
11/06/2018

Signature
11/06/18



ड्राईवर सेकेन्ड पार्टी द्वारा उपलब्ध कराये जायेगे। गोबर को ट्राली में भरने की व्यवस्था ~~फर्स्ट~~ ^{सेकेन्ड} पार्टी द्वारा की जायेगी।

- 2 ~~1000~~ रुपये प्रति गोबर की ट्राली सेकेन्ड पार्टी फर्स्ट पार्टी को अदा करेगी।
- 3 दोनों पार्टियां इकरार करती हैं कि फर्स्ट पार्टी मासिक बिल बनाकर देगा व सेकेन्ड पार्टी बिल मिलने के 10 दिन के भीतर भुगतान करेगा।
- 4 यह कि प्रति ट्राली गोबर का भाव जो कि कमांक नं.2 में उल्लेख है वह 3 साल सप्लाय के बाद 5 प्रतिशत प्रति वर्ष बढ़ा के अदा किया जायेगा।
- 5 यह कि इकरारनामा 3 साल (1 जनवरी 2019 to 31/12/2021) के लिए प्रतिबंध और दोनों पार्टी इस इकरारनामा की शर्तों पर सहमति व्यक्त करते हुए पालन करने की जिम्मेवारी लेते हैं।
- 6 इकरारनामा को 3 साल के बाद स्पेक्ट्रम रिन्यूवेबल एनेर्जी प्राइवेट लिमिटेड के पास इसकी रिन्यू करवाने का विकल्प भी है।
- 7 यह इकरारनामा भारतीय कानून के तहत व्याखित और शासित समझा जावे।

SunBail
11/6/2018

Bhagdev Singh



8 दोनों पार्टी किसी भी तरह के भेदभाव को आपस की बातचीत से सुलझाने का प्रयास कर सकते हैं। यदि 30 दिन के भीतर भेदभाव नहीं सुलझता है तो कोई भी पार्टी दूसरी पार्टी को Arbitration Notice लिखने की हकदार है, Arbitration & conciliation act 1996 के तहत।

9 नोटिस- इस इकरानामा व दूसरे पत्र व्यवहार की भाषा हिन्दी है। नोटिस या कोई भी दूसरा पत्र-व्यवहार भविष्य में लिखित में ही होवे और भिजवाने के बाद उसकी रसीद प्राप्त होवे या रजिस्टर्ड कोरियर की रसीद होवे।

10 यह कि इस इकरानामा के प्रावधान अलग-अलग हैं और यदि इसका कोई भी हिस्सा कानून के तहत आमान्य हो तो इसका बाकी हिस्सा मान्य होगा। यदि आमान्य का कोई प्रावधान भी होगा तो दोनों पार्टियां बातचीत से इसको बदने का प्रावधान निकाल लें।

11 यह कि इस इकरानामा में आपसी समझ से संशोधन और बदलाव लाया जा सकता है।

12 यह इकरानामा किसी भी पार्टी के उदाहरण से विशेषरूप से निशेधात्मक होगा।

13 इस इकरानामा व दूसरे पत्र व्यवहार का कोई हिस्सा जो लिखित में नहीं है वह मान्य नहीं होगा।

Sunil Singh
11/11/2018

Byebee Singh



साक्षी है कि दोनों पार्टियां उपर लिखित दिनांक व दिन से इस इकरानामा पर सहमत है।

आरबिल भारतीय गौशाला की तरफ से हस्ताक्षित व प्रति

नाम श्री नरेश शर्मा जी

स्पेक्ट्रम रिन्यूबल एनर्जी की तरफ से हस्ताक्षित व प्रति

नाम बिजेंद्र सिंह Bijender Singh

Sunshin
11/06/2018



॥ श्री गणेशाय नमः ॥

(Regd. No. HR/RTK/2014/00634)



श्री कृष्ण गौशाला समिति



गांव मोखरा, जिला रोहतक (हरियाणा)

प्रधान :
जय सिंह

सचिव :
संजय शर्मा
M. : 9416311998

संयोजक :
सुरेश कुमार
M. : 9992371388

कोषाध्यक्ष :
सतबीर सिंह
M. : 7876616162

क्रमांक.....

दिनांक 15/6/18

इकरारनामा

यह इकरारनामा दिनांक 15/6/18 दिन शुक्रवार से निम्न पार्टियों के बीच हुआ है :-

श्री कृष्ण गौशाला समिति, मोखरा

श्रीमान सतबीर सिंह (फर्स्ट पार्टी)

सोनेम रिन्यूएबल एनर्जी प्राइवेट लिमिटेड का

श्रीमान विजय सिंह (सेकेण्ड पार्टी)

फर्स्ट पार्टी की गौशाला में लगभग 5000 गाये हैं और वह इन गायों का गोबर सेकेण्ड पार्टी को निम्न शर्तों पर उनके बायो गैस प्लांट के लिये देने को तैयार है।

- 1 फर्स्ट पार्टी को रोजाना 2-3 ट्रैक्टर ड्राली गोबर सेकेण्ड पार्टी को 1 साल तक देना है। ट्रैक्टर ड्राली और

Signature
15/6/18

Signature
SHRI KRISHAN GOSHALA SAMITI
V.P.O. Mokhra, Distt. Rohtak (Hr.)

ड्राईवर सेकेन्ड पार्टी द्वारा उपलब्ध कराये जायेगे। गोबर को ट्राली में भरने की व्यवस्था फर्स्ट पार्टी द्वारा की जायेगी।

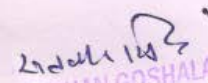
- 2 ~~800~~ रुपये प्रति गोबर की ट्राली सेकेन्ड पार्टी फर्स्ट पार्टी को अदा करेगी।
- 3 दोनों पार्टियां इकरार करती है कि फर्स्ट पार्टी मासिक बिल बनाकर देगा व सेकेन्ड पार्टी बिल मिलने के 10 दिन के भीतर भुगतान करेगा।
- 4 यह कि प्रति ट्राली गोबर का भाव जो कि कमांक नं.2 में उल्लेख है वह 3 साल सप्लाई के बाद 5 प्रतिशत प्रति वर्ष बढ़ के अदा किया जायेगा।
- 5 यह कि इकरारनामा ..!... साल (1 जनवरी 2019 से 31 Dec 2019) के लिए प्रतिबंध और दोनों पार्टी इस इकरारनामा की शर्तों पर सहमति व्यक्त करते हुए पालन करने की जिम्मेवारी लेते है।
- 6 इकरारनामा को ..!.... साल के बाद स्पेक्ट्रम रिन्यूएबल एनेर्जी प्राइवेट लिमिटेड के पास इसकी रिन्यू करवाने का विकल्प भी है।
- 7 यह इकरारनामा भारतीय कानून के तहत व्याखित और शासित समझा जावे।

Bijender Singh

SHRI KRISHAN GOSHALA SAMITI
V.P.O. Mokhra, Distt. Rohtak (Hr.)

- 8 दोनों पार्टी किसी भी तरह के भेदभाव को आपस की बातचीत से सुलझाने का प्रयास कर सकते हैं। यदि 30 दिन के भीतर भेदभाव नहीं सुलझता है तो कोई भी पार्टी दूसरी पार्टी को Arbitration Notice लिखने की हकदार है, Arbitration & conciliation act 1996 के तहत।
- 9 नोटिस- इस इकरानामा व दूसरे पत्र व्यवहार की भाषा हिन्दी है। नोटिस या कोई भी दूसरा पत्र-व्यवहार भविष्य में लिखित में ही होवे और भिजवाने के बाद उसकी रसीद प्राप्त होवे या रजिस्टर्ड कोरियर की रसीद होवे।
- 10 यह कि इस इकरानामा के प्रावधान अलग-अलग हैं और यदि इसका कोई भी हिस्सा कानून के तहत आमान्य हो तो इसका बाकी हिस्सा मान्य होगा। यदि आमान्य का कोई प्रावधान भी होगा तो दोनों पार्टियां बातचीत से इसको बदने का प्रावधान निकाल लें।
- 11 यह कि इस इकरानामा में आपसी समझ से संशोधन और बदलाव लाया जा सकता है।
- 12 यह इकरानामा किसी भी पार्टी के उदाहरण से विशेषरूप से निशेधात्मक होगा।
- 13 इस इकरानामा व दूसरे पत्र व्यवहार का कोई हिस्सा जो लिखित में नहीं है वह मान्य नहीं होगा।




SHRI KRISHAN GOSHALA SAMITI
V.P.O. Mokhra, Distt. Rohtak (Hr.)

साक्षी है कि दोनों पार्टियां उपर लिखित दिनांक व दिन से इस
इकरानामा पर सहमत है।

Spectrum Renewable Energy (P) Ltd. की तरफ से हस्ताक्षित व प्रति

नाम खेजूराल सिंह → Rajender Singh
17/6/17

श्री कृष्ण गोशाला समिति की तरफ से हस्ताक्षित व प्रति:-

नाम सतवीर सिंह
SHRI KRISHAN GOSHALA SAMITI
V.P.O. Mokhra, Distt. Rohtak (Hr.)

रजि० नं 628

॥ ॐ नमो नारायण ॥

दूरभाष : 8930537797
0130-2120444



धर्मार्थ गऊशाला सिसाना (रजि०)

जिला सोनीपत (हरियाणा)

A.W.B.I. Code No. : HR/046/1999

क्रमांक.....

दिनांक 18/6/18

इकरारनामा

यह इकरारनामा दिनांक 18/6/18 दिन सोमवार से निम्न
पार्टियों के बीच हुआ है :-

धर्मार्थ गऊशाला सिसाना (सोनीपत)

श्रीमान महवीर सिंह (फर्स्ट पार्टी)

सिनेट्रीम रिन्यूएबल एनर्जी प्राइवेट लि० क०

श्रीमान निजु-ए-हिंद (सेकेण्ड पार्टी)

फर्स्ट पार्टी की गौशाला में लगभग 500 गायें हैं और वह इन
गायों का गोबर सेकेण्ड पार्टी को निम्न शर्तों पर उनके बायो गैस
प्लांट के लिये देने को तैयार है।

- 1 फर्स्ट पार्टी को रोजाना 6..... ट्रैक्टर ट्राली गोबर सेकेण्ड
पार्टी को ...1... साल तक देना है। ट्रैक्टर ट्राली और

Bhagdev Singh
18/6/18

Dharmarth
धर्मार्थ गऊशाला सिसाना
जिला-सोनीपत, (हरियाणा)

- डाईवर सेकेन्ड पार्टी द्वारा उपलब्ध कराये जायेगे। गोबर को ट्राली में भरने की व्यवस्था ~~सेकेन्ड~~ ^{फर्स्ट} पार्टी द्वारा की जायेगी।
- 2 ~~6 mo/Square Feet~~ रुपये प्रति गोबर की ट्राली सेकेन्ड पार्टी फर्स्ट पार्टी को अदा करेगी।
- 3 दोनों पार्टिया इकरार करती है कि फर्स्ट पार्टी मासिक बिल बनाकर देगा व सेकेन्ड पार्टी बिल मिलने के 10 दिन के भीतर भुगतान करेगा।
- 4 यह कि प्रति ट्राली गोबर का भाव जो कि कमांक नं.2 में उल्लेख है वह 3 साल सप्लाय के बाद 5 प्रतिशत प्रति वर्ष बढ़ के अदा किया जायेगा।
- 5 यह कि इकरारनामा ...।... साल (16 नवंबर 2019 से Dec-2019) के लिए प्रतिबंध और दोनों पार्टी इस इकरारनामा की शर्तों पर सहमति व्यक्त करते हुए पालन करने की जिम्मेवारी लेते हैं।
- 6 इकरारनामा को ...।... साल के बाद स्पेक्ट्रम रिन्यूवेबल एनेर्जी प्राइवेट लिमिटेड के पास इसकी रिन्यू करवाने का विकल्प भी है।
- 7 यह इकरारनामा भारतीय कानून के तहत व्याखित और शासित समझा जावे।


धर्मार्थ गऊशाला, सिरसा
जिला-सोनीपत, (हरियाणा)

- 8 दोनों पार्टी किसी भी तरह के भेदभाव को आपस की बातचीत से सुलझाने का प्रयास कर सकते हैं। यदि 30 दिन के भीतर भेदभाव नहीं सुलझता है तो कोई भी पार्टी दूसरी पार्टी को Arbitration Notice लिखने की हकदार है, Arbitration & conciliation act 1996 के तहत।
- 9 नोटिस- इस इकरानामा व दूसरे पत्र व्यवहार की भाषा हिन्दी है। नोटिस या कोई भी दूसरा पत्र-व्यवहार भविष्य में लिखित में ही होवे और भिजवाने के बाद उसकी रसीद प्राप्त होवे या रजिस्टर्ड कोरियर की रसीद होवे।
- 10 यह कि इस इकरानामा के प्रावधान अलग-अलग हैं और यदि इसका कोई भी हिस्सा कानून के तहत आमान्य हो तो इसका बाकी हिस्सा मान्य होगा। यदि आमान्य का कोई प्रावधान भी होगा तो दोनों पार्टियां बातचीत से इसको बदने का प्रावधान निकाल लें।
- 11 यह कि इस इकरानामा में आपसी समझ से संशोधन और बदलाव लाया जा सकता है।
- 12 यह इकरानामा किसी भी पार्टी के उदाहरण से विशेषरूप से निशेधात्मक होगा।
- 13 इस इकरानामा व दूसरे पत्र व्यवहार का कोई हिस्सा जो लिखित में नहीं है वह मान्य नहीं होगा।


महिषी - 
अध्यक्ष, 

साक्षी है कि दोनों पार्टियां उपर लिखित दिनांक व दिन से इस इकरानामा पर सहमत हैं।

धर्मार्थ गऊशाला सिमाना की तरफ से हस्ताक्षित व प्रति

नाम- महावीर सिंह दाहिया


धर्मार्थ गऊशाला, सिमाना
जिला-सोनीपत, (हरियाणा)

स्पेक्ट्रम रिन्यूएबल एनर्जी की तरफ से हस्ताक्षित व प्रति:-

नाम- बिजेंद्र सिंह





GRASSI, B. G. V. R.
E-mail: rohitak.sugar.0@gmail.com
Web: rohitak.sugar.com

Ph: 01294-250641
-250642
Fax: 01294-250644

THE HARYANA COOPERATIVE SUGAR MILLS LTD.,
BHALLANANDPUR, ROHTAK

(Certified with ISO - 9001:2008, 14001:2004 & OHSAS-18001:2007)

No. HM-3091


Dated: 25/9/17

M/s Spectrum Renewable Energy Pvt. Ltd.,
J-1/160, Ground Floor Rajouri Garden,
New Delhi- 110027

Subject : Letter of intent of allotment for press-mud for the season 2017-18.

Please refer to negotiation held with you in the meeting of Board of Directors of the mills on dated 18.09.2017 for sale of Press-Mud. The Board of Director has decided to allot Press-Mud (season 2017-18) @ Rs.30500/- for 100000 qtls cane crush, (excluding all taxes and duties) on terms and conditions of the tender form accepted by your firm.

It is, therefore, requested to deposit the required security within 2 days.


MANAGING DIRECTOR

RANGE - ROHTAK
CIRCLE - ROHTAK

FORM R.T-B (C)
(FOR CENTRAL SUGAR FACTORIES)
FINAL MANUFACTURING REPORT FOR SEASON (RULE 83) 2017-18

Name & Address of factory: **THE HARYANA COOPERATIVE SUGAR MILLS LTD., BHALL ANANDPUR, ROHTAK (HARYANA)**

Registration No. of Factory: **AR/KTK/92**

Clarification Process used: **DOUBLE SULPHITATION**

S.NO.	PARTICULARS	THIS SEASON 2017-2018	LAST SEASON 2016-2017
1	TIME ACCOUNT : - Date of start - Date of finish - Gross Season (Days) - Duration of Season (Days) as on 22Hrs day - Total No. of Hours in duration of run - Total Hours Actual Crushing TOTAL HOURS LOST (i) Cane shortage (ii) Mechanical (iii) Process (iv) Miscellaneous (v) General Cleaning (vi) Grid failed Total Hrs.	*31-10-2017 at 2:00 A.M. *20-05-2018 at 4:35 P.M. 202 195 4814:35 4299:50 514:45 48:25 292:10 0:00 10:00 106:45 56:25 514:45	*29-11-2016 at 05:00 P.M. *15-05-2017 at 08:40 P.M. 168 174 4010:40 3834:45 175:55 17:35 76:15 0:00 0:00 60:00 22:05 175:55
2	CANE CRUSHED : (i) Own Estate cane (Qtls.) (ii) Gate Cane (Qtls.) (iii) Out station cane (Qtls.) a- Rail Cane (Qtls.) b- Other than Rail cane (Qtls.) Total (Qtls.)	6351817.93 790.14 5450194.65 - 900833.13 6351817.93	25408 Tonne 4802758.65 437.33 4014515.86 - 787805.46 4802758.65
3	JUICE AND ADDED WATER Av. Gross mixed juice % cane Correction % Mixed Juice Av. Net mixed juice % cane Total Net mixed juice obtained. (Qtls.) Av. Added water % cane	108.46 0.30 108.14 6869067.00 40.52	101.91 0.29 101.61 4880047.00 32.20
4	SUGARS : Total sugar bagged (i) No. of bags (50 Kg.) White Sugar (Nos.) (ii) White Sugar (Qtls.) Sugar in process if any total sugar made Sugar recovered from previous season's (a) Process (Qtls.) (b) Remeited sugar or other sources (Qtls.) Total Net sugar made (Qtls.)	**619070 413 619483 (-) 130 619353 **	***445540 441 446381 (-) 240 (-) 916 445225 ***

* Calendar Date
 ** This includes (4500 Qtls.) of Brown sugar & 3000 Qtls. of BISS
 *** This includes (2100 Qtls.) of Brown sugar & (200Qtls.) Reri sugar of above 90 Pol.

Contd.....

CENTRAL EXCISE SERIES NO. 76

 FORM R.T.8 (C)
 (For Central Sugar Factories)

CIRCLE : ROHTAK

FINAL MANUFACTURING REPORT

FOR SEASON 2017-2018 (RULE 83)

The Meham Cooperative Sugar Mills Ltd., Meham, Distt. Rohtak (Haryana)

Registration No. of factory : LI-170

Clarification process used : DOUBLE SULPHITATION

Sr. No.	PARTICULARS	THIS SEASON 2017-2018	LAST SEASON 2016-17
1.	TIME ACCOUNT :		
	Date of start	07-11-2017 at 11.00 p.m.	12-11-2016 at 10.00 p.m.
	Date of finish	25-5-2018 at 6.00 p.m.	15-05-2017 at 1.00 a.m.
	Gross season days(f)	200	184
	Duration of season days (g)	202.14	186.77
	Total hours actual crushing	4447=0	4109=0
	Total hours lost	324=0	286=0
	a) Cane shortage	9=0	25=0
	b) Mechanical	262=0	133=0
	c) Process	3=0	4=0
	d) Electrical	3=0	17=0
	e) General cleaning	34=0	89=0
	f) Miscellaneous	1=0	18=0
	g) Bad weather	12=0	Nil
	CANE CRUSHED :		
	a) Own estate cane (qtls)	633.00	183.05
	b) Gate cane	3870352.85	35331453.85
	c) Outstation cane (qtls)	524249.45	506935.20
	d) Total cane (qtls)	4395235.30	4040272.10
	JUICE AND ADDED WATER :		
	Average gross mixed juice percent cane	103.66	106.06
	Correction percent mixed juice	0.28	0.26
	Average net mixed juice percent cane	103.38	105.80
	Total net mixed juice obtained (qtls.)	4543794.25	4274703.98
	Average added water percent cane	35.74	36.42
	SUGAR :		
	Total sugar bagged (No. of bags)	861074	742430
	Quantity of sugar bagged (qtls) (430537+2160) BISS)	*432697	**373220
	Quantity of sugar in process (qtls.)	300	250

 Includes 6575 bags containing 3400 qtls of BISS.
 Includes 2900 bags containing 1320 qtls of BISS.

Agreement to sell Bio-CNG.**MEMORANDUM OF UNDERSTANDING****FOR****MARKETING OF COMPRESSED BIOGAS (BIO CNG) THROUGH INDIANOIL'S
CHANNEL NETWORK****BETWEEN****Indian Oil Corporation Ltd.****And****Spectrum Renewable Energy Pvt Ltd.**

This Memorandum of Understanding (hereinafter referred to as "MOU") executed at New Delhi on this 5th of January 2017 (the Effective Date), by and between:

INDIAN OIL CORPORATION LIMITED, a company incorporated under the Companies Act, 1956 and having its registered office at G-9, Ali Yavar Jung Marg, Bandra (East), Mumbai-400051 (hereinafter referred to as "**IndianOil**" which expression shall, unless repugnant to the context or meaning thereof, be deemed to include its successors and permitted assigns) of the **First Part**.

AND

Spectrum Renewable Energy Pvt. Ltd., a Company incorporated under the Companies Act 1956 having its Registered Office at Gat No.1165, Village Kodoli, Warananagar, Panhala, Kolhapur, Maharashtra - 416113 (hereinafter referred to as '**SREL**' which expression shall unless repugnant to the context or meaning thereof be deemed to mean and include its successors and assigns) of the **Second PART**.

IndianOil and SREL are individually referred to as "Party" and collectively as "Parties".

ARTICLE I - RECITALS

- 1.1 **Whereas** IndianOil, a Maharatna Central Public Sector Undertaking under the administrative control of Ministry of Petroleum and Natural Gas, Government of India, is a flagship national oil company with business interests across the entire energy value chain in Oil, Natural Gas as well as non-conventional sources such as Solar, Wind, Nuclear, Bio-Fuels and is in a position to support various entities engaged in bio-gas production by marketing the compressed bio-gas (Bio CNG) through its sales channels including retail outlets across the country.
- 1.2 **Whereas** SREL is engaged in production of bio-gas (Bio CNG) at its plant/ facility in Warana, Kolhapur and has plans to set up similar plants/ facilities in other parts of the country (both on its own and through its JVs and associates) and is desirous of selling bio gas (Bio CNG) from all such present and future plants/ facilities.
- 1.3 SREL shall undertake to make available a defined quantity of bio-gas (Bio CNG) on a daily basis through the year to IndianOil from such plants/ facilities at various present and future locations, along with a time frame of ramping up the quantities in future for IndianOil to account for in its plans of marketing bio-gas (Bio CNG) in each catchment area (Purpose of this MOU). The catchment area would mean the area, where bio-gas (Bio CNG) supplied from the present and future producing plants/ facilities of SREL including its JVs and associates) can be marketed on a techno-commercially viable basis.

- 1.4 Whereas the Parties wish to explore opportunities for cooperation whereby Bio Gas (Bio CNG) could be successfully marketed to various customers in catchment area of each such producing plant/ facility of SREL

NOW THEREFORE, the Parties understand as follows:

ARTICLE II - SCOPE OF COOPERATION

- 2.1 The Parties have agreed to explore possible cooperation in the areas of:
- a) Jointly studying the investments required for enabling successful marketing of bio-gas (Bio CNG) through IndianOil's sales channels. Both Parties shall share information and data required for studying the viability of ventures under this MOU.
 - b) Jointly analyzing the various models of supply and marketing of bio-gas including:
 - i. Supply of bio-gas (Bio CNG) from the present & future plants/ facilities of SREL (including those of their JVs and associates) to retail outlets of IndianOil through pipeline owned by either party.
 - ii. Supply of compressed bio-gas (Bio CNG) through cascades owned and operated by either party/ their associates
 - iii. Supply, installation and maintenance of compressors, other equipments and dispensing facilities at IndianOil's retail outlets by either party/ their associates
 - iv. Any other model suggested by either party.
- 2.2 SREL would ensure that bio-gas (Bio CNG) supplied to IndianOil meets the requirement of automotive application as per IS 16087:2013 and other related BIS specifications. A laboratory equipped with necessary testing facility would be set up by SREL in all such plants to ensure strict quality control and certify the quality for each batch of supply.
- 2.3 IndianOil shall use its commercial expertise to create and expand market for bio-gas in the catchment area through promotional activities and also provide technical support to the customers, wherever required. SREL (including their associates) would support IndianOil in such activities whenever so required.
- 2.4 SREL shall provide a Right of first refusal to IndianOil for purchase of bio-gas (Bio CNG) beyond the contracted quantity by IndianOil. In the event IndianOil declines to purchase such additional quantities beyond the contracted quantity, then SREL shall have the right to market the same under its brand name to any customer of its choice. The compressed bio-gas (Bio CNG) marketed by IndianOil through its retail outlets would be sold under IndianOil's brand name.
- 2.5 In case any other entity begins marketing CNG/ Bio CNG in the catchment area, both Parties agree to examine the end pricing of compressed bio-gas

(Bio CNG) jointly with a view to review and reduce their individual margins to meet the competition's fuel pricing.

- 2.6 On establishing commercial viability of ventures under this MOU, the Parties would like to enter into a binding commercial agreement which would subsume this MOU.
- 2.7 Both Parties shall support each other and engage in activities in developing the market for bio-gas (Bio CNG) in the catchment area.
- 2.8 In addition to above, the Parties will also explore marketing of bio-compost produced if any, by SREL through IndianOil channel network under either party's brand name.
- 2.9 Any other activities considered necessary for development of such projects/ setting up of such distribution & marketing entities and which are not specifically set out herein but which may be identified at a later date, may be included by mutual discussion and consent of both Parties within the scope of work of the Parties.

ARTICLE III - SHARING OF EXPENSES

All expenses incurred by each Party, on its own employee's cost and travel or incidental expenses, in relation to development of the ventures envisaged under this MOU, shall be borne by that respective Party only, and neither Party shall be responsible for nor have the authority to incur any monetary or other obligation on behalf of the other Party unless otherwise expressly agreed in writing by such other Party in advance.

ARTICLE IV-CONFIDENTIALITY

- 4.1 The Parties shall conduct discussions and negotiations in good faith while exploring the techno-commercial feasibility for marketing of bio gas (Bio CNG). In this endeavour, the Parties shall provide to each other data, material and information as may be necessary to examine various issues for which the Parties undertake to keep such information & data confidential. Neither Party shall communicate to any third Party the confidential information or document(s) that may come into the possession of other Party in connection with activities undertaken following this MOU unless it has obtained the prior written consent of the Party providing such information or document or if required by law or regulation.
- 4.2 In case of termination of this MOU, both Parties shall stop making use of the Confidential Information that they have received from other party. The obligations of confidentiality of each party under this MOU shall survive and continue for a period of one (1) year from the date of termination/ expiry of this MoU, whichever is earlier.

ARTICLE V - TERM AND VALIDITY

- 5.1 This MoU shall come into force, from the Effective Date and shall be valid for three (3) years or such extended period as the Parties may mutually agree. This MoU may be terminated earlier by a Party, by serving written notice of not less than 30 (thirty) days on the other Party, such termination to be effective immediately upon receipt of such notice, or by the execution of any other agreement superseding this MoU.
- 5.2 This MoU expresses non-binding obligations of the Parties. However, Article IV ("Confidentiality"), Article VI ("Governing Law & Dispute Resolution"), Article VIII ("Notice") and Article III ("Sharing of Costs") and obligations arising therefrom are binding and shall also survive any termination or expiry of the MoU.

ARTICLE VI –GOVERNING LAW & DISPUTE RESOLUTION

- 6.1 This MOU shall be construed and governed by the laws of India.
- 6.2 Any dispute arising out of this MOU shall be resolved amicably through discussions in good faith with a view to expeditiously resolve such dispute. In the event the dispute persists, the Parties agree to submit to the exclusive jurisdiction of the courts at New Delhi.

ARTICLE VII - AMENDMENT/ WAIVER

No amendment, modification or waiver of any provision of this MoU shall in any event be effective unless the same has been made in writing and signed by a duly authorized officer of each of the Parties, and any waiver or consent shall be effective only in the specific instance and for the specific purpose for which it is given

ARTICLE VIII – NOTICES

All notices authorized or required between the Parties are to be made in written English, addressed to the Parties as shown below, and shall be delivered in person, by registered mail, courier, or by fax (with a confirmation copy sent by registered email). Oral communication and e-mails do not constitute notice for purposes of this MOU. "Received" means actual delivery of the notice to the address or facsimile address of the Party shown below:


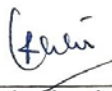
Indian Oil Corporation Limited	Spectrum Renewable Energy Pvt. Ltd.
Kind Attention: Sh R. K. Tikur, ED I/c Gas)	Kind Attention: Dr. A V Mohan Rao, Chairman
Address: Core 2, SCOPE Complex, Lodi Road Institutional Area, Lodi Road, New Delhi – 110003	Address: Gat No.1165, Village Kodoli, Warananagar, Panhala, Kolhapur, Maharashtra - 416113
Email : tikurk@indianoil.in	Email : drrao@srel.in

ARTICLE IX - MISCELLANEOUS


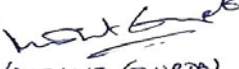
9.1 This MOU supersedes any and all Agreements, oral and written between IndianOil and SREL no other Agreement or statement of promise or representation not expressly set forth in this MOU shall be valid or binding.

9.2 However, SREL shall not enter into any form of co-operation or any agreement with a competitor of IndianOil for a specific project for which both Parties have entered into or are endeavoring to enter into a definitive agreement. It is clarified that if no such definitive agreement for the project/purpose is executed with the Party within a period of two years from the Effective Date, the aforesaid restriction shall not apply.


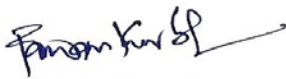
IN WITNESS WHEREOF, the Parties by their duly authorized representatives have caused this MoU to be executed as of the day and year first above written.

Spectrum Renewable Energy Pvt. Ltd. Gat No.1165, Village Kodoli, Warananagar, Panhala, Kolhapur, Maharashtra - 416113	Indian Oil Corporation Limited Core-2, SCOPE Complex, 7, Institutional Area, Lodhi Road New Delhi - 110 003
	
(Authorized Signatory)	(Authorized Signatory)
Name : Dr A V Mohan Rao	Name : R.K. Tiku
Designation : Chairman	Designation : E.D. I/c (Gas)
Date : 5 th January, 2017	Date : 5 th January, 2017
Place: New Delhi	Place: New Delhi

Witnesses :

- 
(Daler Singh)
Advisor, Spectrum Renewable
Energy Pvt Ltd.
- 
(MOHIT GUPTA)
GENERAL MANAGER
SPECTRUM RENEWABLE ENERGY
PVT. LTD.

Witnesses:

- 
R.K. ZUTSHI,
DGM (Gas Supr), IndianOil.
- 
P K SHARMA
Manager (Gas) - IndianOil.

Page 6 of 6

Annexure 15:**Dry Ice Market**

In a biogas plant during purification of biogas to make bio-CNG an equal quantity of CO₂ escapes in the atmosphere. It is for the first time in India that we are experimenting with the capture of CO₂ and turn it into liquid CO₂/dry ice .Preliminary enquiry has revealed that demands for the two item is increasing at a fast rate. The demand in NCR,Delhi region is primarily met by the dry ice plants in Punjab where most of the plants are located. During summer the retail price of Dry Ice goes upto Rs 45 + transportation. So we have taken a very pessimistic rate of Rs 15/kg has been taken.

Annexure 16: Agreement to sell organic solid /liquid fertilizer.

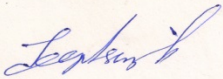
SINDHU FARM PVT. LTD.
96-A, SUBHASH NAGAR, ROHTAK-124001

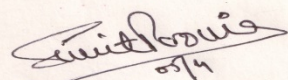
Ref. No. _____ Dated 05-04-2018

To whomsoever it May Concern

We own and manage large tract of agriculture land and are engaged in the business of carrying agriculture activities in Haryana. . We are pleased to inform that we can buy about 45 tons/ day of solid manure that Spectrum Renewable Energy Pvt Ltd proposes to make from the slurry fromits upcoming biogas plant at Madhodi Jattan village in Rohtak Disttat the price of INR 2000/- per ton plus taxes if applicablefor next 10 years with escalation of 7% annually. The price will be on ex-factory basis at Rohtak plant site.

Considering expansion of poly houses in Haryana we could also buy raw slurry upto200 tons/day at Rs 200/- per ton.However Spectrum Renewable Energy Pvt Ltd needs to create storage of about 5000 M3 as the demand for the liquid and solid components of manures shall be seasonal and not round the year. .


For Sindhu Farm Pvt. Ltd.


for Spectrum Renewable Energy Pvt. Ltd.