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**Client: M/s. SHREE JEE BIO ENERGY (GSTIN: 05AEYFS0945L1ZB)**

**Co Person: Mr.Arpit ji & Mr. Vivek Ji**

Techno-Commercial Proposal For

5000 Kg & 30 Ton Fermented Organic Manure (Fertilizer)

BioCNG Project

PREPARED BY

**JOG WASTE TO ENERGY PVT. LTD**

* Solar MW Scale Project
* ON/OFF Grid Solar Power Plant
* On Grid Solar Projects with Net Metering
* Biogas Upgrading Plant
* Biogas Scrubber
* Biogas Project Equipments
* Air dryer
* Biogas to Bio-CNG turn-key Projects
* PSA N2 and O2 plant
* Biogas to Power turn-key Projects

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# Executive Summary

**Shree Jee Bio Energy is looking to develop a Biogas to BioCNG project to provide Bio- CNG for fuel and vehicle use\*\*. A proven, reliable and efficient biogas to BioCNG Project solution is required for the project. The raw biogas generated from the organic waste is to be upgraded to meet the BIS standard for Bio-CNG. The proposal is based on our standard supply and price.**

**Selecting a proven system with high availability and low methane loss will maximize the quantity of biomethane sales. Utilising efficient Biogas Generation & upgrading technology minimizes OPEX costs while maximizing overall project returns.**

**By providing our JOG Biogas to BioCNG plant to the Project, you will be harnessing the most proven and popular biogas to BioCNG Project:**

* + The Biogas Generation & upgrading plant includes latest ‘field’ feedback with all design enhancements, ensuring the solution will provide the most reliable and efficient operation to you.
  + **JOG** Biogas plants set the benchmark in low specific power consumption and high methane capture rates.
  + Factory assembled modular systems, facilitating easy site assembly and quick installation.

**Good Site Operations is the Key to success!**

The site operations team will also be trained extensively both during and following completion of our plant commissioning services. This will ensure they understand:

* + The basic theory of Biogas Generation based on CSTR technologies & upgrading based on PSA/VPSA technologies
  + Practical aspects of the plant and its operation, the different parts of the plant, tuning and daily / weekly / monthly checks and activities
  + The operation manuals and where to find specific product information when needed

We take delight and satisfaction in seeing our clients succeed. Working together we can provide the highest quality of maintenance, spare parts and logistics, project management and Online monitoring with full diagnostics.

JOG is very willing to work with **Shree Jee Bio Energy,** to develop a first-class solution for this CSTR Technologies based biogas Generation & upgrading project based On VPSA Technology. We welcome the opportunity to discuss developing a long-term relationship.

The JOG plant offered here is the most proven and advanced upgrading product on the market today, ensuring you the best project returns and most environmentally friendly solution available.

Based on the information provided by **Shree Jee Bio Energy,** our offer presents our JOG Biogas Generation & upgrading solution for your consideration. We have provided ‘Performance and Utility’ information, a Process Flow Diagram (Mass balance) based on the 12,762 m3/Day raw biogas flow requested. The Process & Function Description helps to describe the plant and its basic operation.

The proposal includes standard options and we have also included a Responsibility Matrix to help define the scope inclusions within our commercial offer.

Should your requirements change, or you need any additional information we welcome the opportunity to discuss our offering to your further needs.

Kind regards,

**Sachin Patel, Director**

**JOG waste to Energy Pvt Ltd**

# Resume



**Biogas plant as main feedstock will use:**

* + - **Total Feeding** -120 + 10 tons/day
    - (**Feedstock-** Cattle Dung, Press Mud (Mix Waste), Total - 130 Ton /Day\*\*\*\* VS & TS % as per your Data

Biogas plant Design Capacity will produce biogas in amount of **12762 m3 per day** (Feedstock- Cattle Dung, Press Mud) with methane content 55 – 60 %. Produced biogas will be used to generate as Fuel and valuable Fermented organic bio fertilizer (solid and liquid).

**The produced BioCNG and Fermented Organic fertilizer are following :( 365 days)**

|  |  |  |  |
| --- | --- | --- | --- |
| **S No.** | **Product** | **Per Day Generation** | **Per Annum Generation** |
| **1** | Biogas | **12,762 m3 per Day** | **46,58,130 M3** |
| **2** | BioCNG | **5,000 Kg per Day** | **18,25,000 Kg** |
| **3** | Solid bio-fertilizer | **30 Ton per Day** | **10,950 tons** |
| **4** | Liquid bio-fertilizer | **100 KL per Day** | **36,500 KL** |

Biogas can be upgraded to produce Bio-CNG so as to make it usable as vehicular fuel in transportation sector to replace the Mineral CNG. Electricity can be sold to national electricity grid. Heat power will be utilized for biogas plant. Organic bio fertilizers after biogas plant are ready for use without the necessity for any storage or additional treatment. Fertilizers can be sold to local farmers as valuable commodity that replaces chemical fertilizers in more effective and ecological friendly way. As an option solid organic fertilizer can be granulated, packed and sold for export.



**Biogas Generation Estimation**

## Biogas plant operational period: Production period:

**Bio CNG**

**\*\*Working days per year- 365 days**

**(7 days a week, 24 hours a day)**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Material**  **/Substrate** | **Quantity per day (t)** | **Quantity per year (t)** | **DM**  **(Dry matter) (%)** | **DM**  **(kg/day)** | **ODM**  **(organic dry matter) (%)** | **ODM**  **(kg/day)** | **Biogas yield (m3/kg ODM)** | **Biogas yield (m³/day)** | **Biogas yield (m³/year)** |
| Píess Mud | 120 | 43,800 | 23 | 27,600 | 80 | 22,080 | 0.55 | 12,144 | 44,32,560 |
| Cattle Dung | 10 | 3,650 | 15 | 1,500 | 75 | 1,125 | 0.55 | 618 | 2,25,570 |
| **ľotal** | **130** | **47,450** | **-** | **29,100** | **-** | **-** | **-** | **12,762** | **46,58,130** |

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|  |  |  |  |
| --- | --- | --- | --- |
| **Characteristics** | | **Values** | **Figures** |
| 1 | Quantity of feedstock | Tons / day | 125 to 130 |
| 2 | TS% & VS% | % | As Per Given  Data |
| 3 | Biogas Plant Design Capacity | M3/ day | 14,000 |
| 4 | Biogas yield(Generation) | M3/ day | 12,762 |
| 5 | Methane content СН4 | % | 55-60 |
| 6 | Calorific value | Cal | 4500-4708 |
| 7 | Number of digesters | Pcs. | 2 |
| 8 | Digester volume (overall) | M3 | 7234 |
| 9 | Number of gasholders | Pcs. | 2 |
| 10 | Temperature in the digester | 0С | 36 - 38 |
| 11 | Pressure in the digester | KPа | 0.5 |
| 12 | Overall dimensions of the digester (diameter / height) Approx. | Mtr | 32/9 |
| 13 | Solid fertilizers yield (70-80% wet) | T/day | 30 |
| 14 | Liquid fertilizers (99% wet) | KL/day | 100 |
| **Biogas To BioCNG plant characteristics** | | | |
| 15 | Biogas Upgrading Capacity | M3/hr | 700 |
| 16 | Methane | % | >95-96 |
| 17 | Booster Compressor | M3/hr | 350-400 |
| 18 | Electrical power Connected Load (Biogas Project) | KW | 440 |
| 19 | Total Electrical power Running Load | kW | 345 |

# Working principal

## Biogas plant working principle

The technology of organic materials conversion is made by means of biochemical decomposition (hydrolysis) of high-molecular compounds into low-molecular organic compounds (organic acids, salts, and alcohols).

**Organic compounds + Н2О→ С5Н7NО2+HCO3**

Further conversion of obtained dissolved compounds like organic acids and alcohols (С5Н7NО2, HCO3) into gases - СН4, СО2.С5Н7NО2 + HCO3 + Н2О → СН4+СО2+NH4

Biological process of consecutive (phasic) conversion of organic compounds can take place in anaerobic environment i.e., in oxygen-free tank (biological reactor- anaerobic digester). At the first stage of fermentation substrate hydrolysis take place under acidogenic bacteria influence. At second stage elementary organic compounds come through hydrolysis oxidation by means of heteroacidogenic bacteria with production of acetate, carbon dioxide and free hydrogen the other part of organic compounds including acetate forms C1 compounds (elementary organic acids). Produced substances are the feed stock for methanogenic bacteria of third type. This stage flows in two processes of A and B type the character o which depends on caused by different bacteria type. These two types of bacteria convert the compound obtained during the first and second stages into methane CH4, water H2O and carbon dioxide CO2.

Methanogenic bacteria are more particular to living environment to be compared to acidogenic bacteria. They require complete anaerobic environment and need longer reproduction period. The speed and scale of anaerobic fermentation depend on bacteria metabolic activity.

That is why the biogas plant chemical process includes hydrolysis stage, oxidation, and mechanization stage. For that kind of substrate these processes take place in the same reactor.

## Technological process of biogas production

Feed stock in quantity of 125-130 tons per day and every day transported to biogas plant area and discharged to preliminary/ Feed Mixer tank. Substrates are loaded to preliminary/ Feed Mixer tank by portions of 25-35 tons with interval 4-6 hours. In preliminary tank substrate humidity is increased up to 90%.

Substrate pipelines are equipped with valves “M” that switch substrate flow and directs to each digester. All valves are controlled by Manual Or automatic system. In digesters substrate is heated up to temperature 36-38 0C. Heating system is installed on the walls of the digesters; thus, constant temperature sustains on whole digesting period. Digester operating regime is mesophilic. Heated substrate in digester is mixed periodically (10-15 minutes in hour) by Side Entry/ submersible agitators. Average time of digestion is 28-30 days. Biogas goes up and gathers in gasholder. Gas holder UV protective film protects gasholder from precipitation and damage by foreign objects. Weather protective film is fixed firmly by special system under air pressure from air blower. To protect gasholder from overpressure digesters are equipped by safety valves, which starts working at pressure 5mbar and bleeds biogas to atmosphere. Sulphur is removed from biogas by addition of a special component.

Biogas then goes through gas pipeline to Roots Blower, where the pressure is raised up to 0.8 bar to meet Upgradation Plant requirements. Biogas is supplied to Biogas Upgradation plant, where it is used as fuel for vehicles and Industries Purpose.

The digested substrate from each digester goes to digested substrate tank and then by pump is pumped to separator where it is separated to solid and liquid bio-fertilizer. Solid bio-fertilizer discharged to the separation area and transported for storage; liquid filtrate is directed to filtrate tank from where is pumped to lagoon by pump.

# Biogas plant Main equipment scope

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sr**  **No** | **Equipment** | | **Descriptions** | **Qty** |
| **1** | **Weighbridge - 40 Ton** | | | |
|  | * Design, fabrication, supply, installation, testing & commissioning of Fully Welded Modular Type Weighbridge of 40 tons, Indicator, Load Cells, Platform, LED display, suitable software. * The job shall be undertaken on turnkey basis covering mechanical, Electrical & electronic works including supply of all required material for electrical works including earthing. * Making of approach ramps to weighbridge shall also be included in the   Scope. | | | |
|  | **TECHNICAL SPECIFICATION OF WEIGHBRIDGE STRUCTURE**  The platform of the Weighbridge is of robust construction and is designed to withstand dynamic loads and side loads. The structure will be constructed of rolled steel sections & plates and strong enough to withstand full load without undue deflection. Longitudinal and lateral stoppers are provided to restrain the movement of the platform in the horizontal plane. The top of the platform is covered with anti-skid strips of adequate strength, rigidity and sufficiently strong to carry the maximum load. The structure is designed for an overload capacity of 150% and the  deflection is <span 450 at its full load. | | | |
| **WEIGHBRIDGE STRUCTURE DETAILS** | | | | |
| Type of Platform | | Fully Welded Modular Type Weighbridge | | |
| Platform Size | | **7.5 X 3.0 Meter** | | |
| Main U-Beam | | 300 mm X 140 mm - U Beam – 04 NOS | | |
| Cross Support | | 16 mm Thick Plate Between Two Main Long Beam | | |
| Top Plate | | 08 mm Top Plate with anti-skid strips | | |
| Foundation Frame | | 100 mm X 50 mm Long Frame with Fully Welded 350 mm X  350 mm X 16 mm Plane Plate | | |
| Border Frame | | 100 mm X 50 mm - Both Side Heavy Duty Frame with Side Wall  Mounting | | |
| Load Cells MS Plates | | 150 mm X 150 mm X 16 mm - Load Cell Top & Bottom Plate | | |
| Guide Rail | | Round Pipe Based Side Frame - Ø 100 mm - Both Side | | |
| Fasteners | | As per Required & IS Standard | | |
| Paint | | 2 coat of ant-corrosive primer and 2 Coat Enamel Paint | | |
| Material | | All Material will be IS 2062 Standard | | |
| Computer with printer | | 1 Nos. | | |
| Civil Work | | Foundation with weighbridge Room | | |
| **We Make U Beam Type Weighbridge From HT-350 Grade Steel** | | | | |
| **Approved By Weights & Measure Department** | | | | |

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **No. Equipment** | | | | **Descriptions** | | **Qty** |
| **2** | **Pumping Equipment and Grinder with Motor** | | | | | |
| **2.1** | **Substrate supply pumps (2 No.) (1W+1S)-50 m3/hr Separator Supply Pump (1 No.)-40 m3/hr**  Progressing cavity screw pumps capacity approx.**50 m3/h**  Corresponding to dynamic viscosity of media **500-1000 cps**), Differential Pressure -**2-4 bar,**  Rotational Speed -**158 rpm**  Power -**10 HP** | | | | | **3**  **Nos.** |
| **2.2** | **Grinder with strainer -50 m3/hr**  Grinder is used for Pump protection from solid foreign objects. It designed specifically for the efficient maceration; it is very effective in capturing irregular shaped objects. The layback cutter shafts are set at an angle to the incoming flow. | | **Material of Construction :-**  Routing Parts:SS304  Shaft Sealing :mech. seal (Cast Iron) Arrangement: Mechanical seal Housing / End Cover: - Cast Iron, All Rotating Inlet and Outlet Size: DN 150 PN 16 | | | **1**  **No.** |
| **MATERIAL** | | | **PUMP CONSTRUCTION** | | | |
| Pump Housing | | Cast Iron | Suction Flange | | DN150, PN16 | |
| Rotating Parts | | SS304 | Discharge Flange | | DN150, PN16 | |
| Rotor | | SS 304 | Suction Orientation | | Vertical | |
| Stator | | S62L | Discharge  Orientation | | Horizontal | |
| Shaft Seal | | Gland Packing (w)  Flushing.Prov | Joint Type | | B Joint | |
| Seal Plan | | 02 | CIP Size/Orientation | | No/No | |
| SM Pin Joint Seal | | S65L | Counter Piece-  SMS/TCL | | No | |
| O " Rings | | S65L | Inspection Port | | NO | |
| Lantern | | Cast Iron | Specific Standards | | Not applicable | |
| Base Plate | | Mild steel |  | | Not applicable | |







**No**

**Equipment**

**Descriptions**

**Qty**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **3** | **Mixing Equipment** | | | |
| **3.1** | **Agitator for Mixing Pit (Feed Mixing Tank)** | | | **2 Nos.** |
|  | **Mixing Pit Dimension** | **10.0 Mtr x 4.0 Mtr** | |  |
|  | **Rating - 15 HP**/VARIABLE RPM Max 30rpm/**TOP mounted type (1 No.)**  Motor 15HP 1450rpm, SC Ind, 3PH, 50 Hz., 415v, IP55, Cl F, V1,Make:CGL/BBL,  Gearbox: Inline helical Gear Box Bonfiglioli/helicon, Couplings Flexible, Impeller Type :Wide Hydrofoil  Lantern support CS Epoxy coated. | Mounting flange to suitable support MS structure epoxy painted, Shaft sealing gland packing  Shaft AISI304, Impeller AISI304, mixed flow axial and radial, bolted, dynamically balanced. | |  |
| **4** | **Digester Electrical and Mechanical Package**  **Side Entry Type Agitator in CSTR Based Digester for Stirring** | | | **2 x 6 Nos.** |
|  | **Digester Dimension** | | **32 Mtr x 9 Mtr** | **2**  **Digester** |
|  | * Digester Tank-RCC with MS railing * Centre column-RCC, inspection platforms, man hole, heating * pipes, inspection windows * Side entry Mixers with 3-phase-motor 415 V, 50 Hz, Insulation class F individual weather-proof enclosures with soft starter, * main switch, manual-/ automatic-selection switch, ON/OFF- switch * Heating Setup for heat distribution inside digester at mesophilic range, for connection with external heat source * Double-Membrane Gas-Storage Roof system with air blower (1W + 1S), deflation flap, over-/under pressure valve, gas level indicator * All connection nozzle for gas and slurry inlet and outlet, Agitator openings * All design and structural engineering for Digester tank | | | |

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| --- | --- | --- | --- | --- |
|  | **Rating - 20 HP/380 RPM/AISI304**  **03 Nos. &**  **15 HP/380 RPM/AISI304 3 Nos.**  Over load protection, Motor 1450rpm, SC Ind, 3PH, 50 Hz., 415v, IP55, Cl F, V1, Make:CGL/BBL  protection class IP55/Insulation class F with Gear Box or Belt Pully Arrangement , Couplings Flexible, Lantern support CS Epoxy coated. Shaft & Impeller :SS 304 (Graphite Teflon ring)  Bearing : Spherical Roller SKF Impeller :Axial Flow  Blade: Hydrofoil Nozzle : 600 NB  Shaft length 1.5 to 2 meter | Mounting flange to suit tank flange, Shaft AISI304, Shaft sealing Stuffing box with gland packing, Impeller AISI304, Axial flow type, bolted, Balancing Dynamic.  **HRTTime**:28-30 Days  **Temperature**:36-38 0C | | |
| **4.1** | **Heating Arrangement For Digester** | | **For**  **2Digester** | |
|  | * Circulation pump * Three-way electric valve for temperature regulation with electric drive * Thermometer * Heat Exchanger Temperature controlled by a circulating Hot water Piping Network, connect the heater to the   heating jacket using Piping Network. Set the heater to the appropriate temperature for mesophilic (36-40 0C) digestion.  Piping has to be made SS or HDPE, rust proof structure, of appropriate Diameter, conforming the relevant BIS Standards. | **Heater Range: 4 x 36 KW Circulation Pump**  **Q =10 m3/hr (2 No)**  Piping Network Arrangement with Clamp and Related Other Accessories | |  |



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| **5** | **Equipment /Machinery For Fertilizer Tank** | **1 Set** |
|  | Civil Work (10 Mtr x 5 Mtr) with Below listed equipment for fertiliser tank   * Top Entry Agitator * Pump for slurry Transfer * Auto Valves * Manual Valves * Flanges * Wall Mounting Flanges * Fitting Material of Flanges |  |



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| **6** | **Double membrane Balloon** | | **2 Set** |
|  | Double membrane Balloon and its accessories,  Imported Membrane fabric for inner and outer balloon,  Pressure Safety valve for air.  Pressure and vacuum Safety valve for biogas.  Air blower with hose pipe.  All accessories. Like pressure gauge, nrv, fittings, and mounting hose.  All companion flanges. Gas level indicator. | **TYPE: Double membrane**   * Dimension: As per Digester * Diameter 32 Mtr. * shape conical * PVC Coated Fabric * Fire Retardant, temperature resistant up to 50 deg c. * UV protected * 1100 gsm +/- 50 gsm * Fabric: Fire Behavior B1 Grade |  |

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| --- | --- | --- | --- |
| **7** | **Horizontal Solid liquid separator** | | **2 set** |
|  | Our Horizontal solids-liquid separating machine based on screw conveyor technology. Separation Performing by both mechanical compression and gravity, the Separator is designed to separate the liquid portion from the solid portion of a wide range of materials. The separated solid portion and liquid portion can both be simply and economically handled.   * Slide Valve and levers system for separation level adjustment * Set of hoses for connection to pipeline of Subtract supply and   Filtrate discharge | **Make:** Italy,  **Model:** Q=65  5.5 KW  Simple in operation and cost- saving in spare parts Durable, high performance self-cleaning screen basket  Suitable for continuous duty Modular screw design and manufacturing Various types of diaphragm outlet, Polymer screws, basket sizes | |
|  | **INCLUDING**   * Loading hopper in SS304 * Body in SS304 * Techno polymer Diaphragm Pressor * Support frame in hot dip galvanized steel * Solid Plug shelf support * Modular Screw in techno polymer SINT EC 90 & SS304 Screen in SS304 0.5mm * Round Filter Element | | |



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| **8** | **700 m3/hr Catalyst Tower Based H2S removal System** | **1 Set** |
|  | A bio Catalyst scrubber consists of a Tower Based gas scrubber. In the gas scrubber, to be removed components are absorbed from the gas stream by the Activated Carbon.  Shape : Cylindrical Desiccant Activated Carbon MOC Internal parts :S.S 316  MOC shell :C.S./HDPE | |

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| --- | --- | --- | --- |
| **9** | **700 m3/hr biogas Upgradation systems with 350 m3**  **hr** | | **1** |
|  | Upgradation of Biogas by Low pressure swing adsorption, using energizer for better separation rate was evaluated to produce fuel grade methane. Three different adsorbents were employed to evaluate the process performance with equilibrium- and kinetic-based adsorbents. | **Capacity :** 700 m3/hr **Pressure:** 150 mmWC to 0.8 Bar  **CH4 Purity :** >95% **H2S:** <10 ppm **Other:** Balance **Output Pressure:**  0.3-0.4 Bar | |
| * Sand Filter * Roots Blower with FLP Motor(1W +1S) * Vacuum Pump with FLP Motor(1W   +1S)   * Double effective Heat exchanger with moisture separator * Biogas Dryer * Cooling tower * 30 m3 surge tank * Four Towers system, inter connected piping and valves & Actuated change over valves * Mol sieve and Activated alumina and ceramic ball * 40 m3 surge Tank * Instrumentation package * Control panel PLC base with RS 485 |  | |



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| --- | --- | --- | --- |
| **10** | **350 m3 hr Recovery Unit & Accessories**  **(2 tower System)(Methane Loss < 2 %)** | | **1** |
|  | Methane recovery means the exhaust | **Capacity :** 350 m3/hr | |
| gas which evacuated from the | **CH4 Purity :** >55-60% | |
| adsorption vessels having 10 to 15% | **H2S:** Nil | |
| methane on average its 12% methane in | **Other:** Balance | |
| the exhaust stream that is too much so, | **Output Pressure:** | |
| we collect this gas in a gas tank and | 0.2-0.3 Bar | |
| passing through the methane recovery |  | |
| system and maintain the out let same |  | |
| or better than biogas and recycled to |  | |
| blower suction. Connecting equipment |  | |
| as per below. |  | |

|  |  |  |
| --- | --- | --- |
|  | * Roots Blower with FLP Motor * Vacuum Roots Blower with FLP Motor * Heat exchanger with moisture separator * Biogas Dryer * Two Towers system, inter connected piping and valves & Actuated change over valves * 15 m3 surge Tank, * Instrumentation package * Control panel PLC base with RS 485 |  |



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| **11** | **Booster compressor (400 m3/hr)** | | **1** |
|  | Capacity: **400 m3/hr Make:** Imported Make  Number of stages:5 Drive: V Belt  Oil lubricated, Air Cooled cylinder with fins on surface  Inter connecting piping from first stage to outlet separator last stage Crankcase with mechanical seal All others specification as per  company std | **Inlet Condition**  Gas condition at inlet\*\*: BIO METHANE Capacity:400 m3/hr  Suction Pressure :1.05 to 1.3 Bar Suction Temperature:40°C  **Discharge Condition**  Discharge temperature: Ambient + 15°C  Discharge Pressure: 250 Bara | |
| **12** | **B-CNG Filling station For Cylinder Filling** | | **1 set** |
|  | **Filling station SS material of 2 Nos. Cylinders cascade each**   * Pressure gauge * safety valve * isolation valve * NRV * Header stand * High Pressure Flow meter with * ESD system   Gas leak and fire detection system, High Pressure filling Hose WP 5000 Psi, and quick-release hose coupling with top-hat sealing, for 345 Bar  (5000 Psi) max working pressure, incl. Mass Flow Meter | | |

|  |  |  |
| --- | --- | --- |
| **13** | **Automation Elements** | **Package** |
|  | * Ph Online sensor * Pressure sensor * Thermo Sensor for temperature monitoring inside digester, incl. signal * transmitter & cable connection clamp for 4- 20 mAmp signal * Level sensor * Isolation valves * On/Off Valves * sensor cables from filed instrument to control room * Feedback signal (Audio visible alarm) for   balloon air blower and on/off valve | **Qty as per requirement** |



|  |  |
| --- | --- |
| **14** | **Electrical , Instrumentation and control system** |
|  | * All internal electrical and instrument cable and cable tray, Junction box, Whole project distribution panel and panel, field start stop switch boards. OR as per site requirement. * Cabling & wiring for biogas generation, Purification and compressor plant, incl. sensor cables, from PLC Building onwards, for the biogas generation plant. * Programmable Logic Controller (PLC) for The biogas generation plant, standardized & modularized design, integrating Consumers / actuators / sensors / auto-switches as per requirement, installed inside control panel room (which is not included, and to be constructed in clients responsibility) * Ensure pump switch-on/switch-off in tolerable liquid level range with connection cable * Thermometer for temperature monitoring inside digester * Substrate Flow meter for online and continuous measurement of the volumetric flow rate of biogas substrate flow, flange connection |

|  |  |  |
| --- | --- | --- |
| **15** | **Electrical & Electronics Requirements** | **1 Set** |
|  | * Electrical distribution panel * Grid Transformer/LBS/HTMC for Plant * All Cables, UPS /DG Set FOR Backup Power 10 kVA * All Earthing | |



|  |  |  |  |
| --- | --- | --- | --- |
| **16** | **BioCNG Cascade** | | |
|  | **40 Cylinder Cascade**  **@ 260 Kgf/cm²**  Cylinder Cascade Assembling, Testing & Inspection of Cylinder Bank, Fabrication of Structure in  M.S of CNG Cascade of 3000 Ltrs W.C. having 40 Cylinders   * Tubing & Fittings: SS 316 * Bank: Single Bank * Pressure Gauge: 0-400 bar 4" dial   (1 pressure gauge)   * Manifold: Brass * Bull Nose : Brass * Filling arrangement : NZS probe suitable * Frame : Square pipe | **Specification :-**  Water Capacity-**75.0 Ltrs per Cylinder**  Cascade Water Capacity-  **3000.0 Ltrs**   * Working pressure of **250 Kgf/cm²** * OD- **267 mm** * Dim-3.2 x1.85 x1.90Mtr * Cascade Weight**-5.0 Ton Approx.**   **Note: All cylinders are Hydro static Tested** | **5**  **Nos.** |

|  |  |  |  |
| --- | --- | --- | --- |
| **17** | **Waste Shredder** | | **1 set** |
|  | Output Capacity/ Throughput:  **5 Tons Shredding**  Application: Shredding of MSW (Organic waste)  Raw Material: Input MSW (Mix waste) | Country of Origin: India Model: **1 TPH**  Type: Horizontal Twin  Shafts Shredder Machine |  |



|  |  |  |
| --- | --- | --- |
| **18** | **Solid Fertilizer Packaging and bagging System** | **1 set** |
|  | **Here are some of the major features of packaging plant are Enlisted below:**   * Speedy weighing and filling of bags * Bag counter facility * One operator can handle a machine with two of three spouts * Lower power consumption * Proper in-built device for fine weight adjustment. * Bag Filling Machine Cap 100 kg * Weight set on digital display * Material-compost organic manure * Moisture -30-40 % * Machines Size –2500 x 1200 mm * Machines height -2.5 meter * Machines pack -50 bag / hour * Top of machines our hopper cap. 90-100 kg * All fabricated Parts M.S. & Contact parts MS * One labor for bag clamp & same for stitching * Inclined compost loading conveyor with hopper * Use to drop compost in machines height * Stitching machines stand * To fit REVO make handy stitching machines * Height adjustable by mechanical screw jack * Air compressor | |

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| **19** | **Product gas Biogas analyzer -**Combined stationary  measuring device | | | | **1 set** |
|  | Type | | Combined stationary | | |
| Make | | Imported | | |
| Measuring port | | 4 ports | | |
|  | **Measuring ranges and sensors** | | | | |
| Methane | 0.0 – 100 % vol. | | Infrared sensor | |
| Oxygen | 0.0 – 25 % vol. | | Electro-chemical sensor | |
| Hydrogen sulphide | 0 – 5000 ppm | | Electro-chemical sensor | |
| Carbon dioxide | 0.0 – 50 or 100 % vol. | | Electro-chemical sensor | |
|  | **Moisture Analyzer (Dew Point meter)** | | | | |
| Range | | + 20 to – 110 deg C | | |
| With resolution 1 deg C,  Make of analyzer with sensor: - GE Sensing Germany | | | | |



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| **20** | **Lab equipments for testing slurry and gas chemical**  **parameter** | **1 set** |
|  | * Hot air oven (up to 200 Deg C) * Digital Ph meter * Desiccator * Soil testing kit * Weight Balance * Muffle Furnace up to 1100 Deg C * Analyzer calibration kit * Ch4 and co2 cylinder * Biogas sample collection kit | |

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| **21** | **Annual operational spare for smooth operation of the**  **plant** | **1 set** |
|  | * Mol sieve for top-up (125 Kg) * Activated alumina and ceramic ball * Ball valve (2 set) * Control valve (2 set) * Gasket set * Pump stator (1 set) * Safety valve * Solenoid valve (2 set) * Oil for side entry agitator * Gate valve (1 set) * Electrical items * Nut and bolts * Pressure gauge * Activated carbon (1000 kg) | |





* Balloon Fabric repair kit
* Belt for Blower, vacuum pump, agitator etc.
* RTD etc.

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| **22** | **Single Girder EOT crane (Flame Proof)** | |
| Sr. No | Parameter | **10 MT X 12 Meter Span** |
|  | Type of Crane | Single Girder E.O.T Crane (7.5 Ton) |
| 1. | Qty | 1 No. |
| 2. | Control | Pendent Operated |
| 3. | Indoor/Outdoor | Indoor |
| 4. | Height Of Lift | 7 Meter. |
| 5. | Class of Duty | II as per IS:3177/1999 |
| 6. | Lifting Capacity MT |  |
| 7. | MH | 10 |
| 8. | AH | NA |
| 9. | Span in M | 12 Meter approx. |
| 10. | **Speed (MPM)** MH | 2.0-3.0 |
| 11. | CT | 10-12 |
| 12. | LT | 12-15 |
| 13. | Power Supply | 415V, 3Ph, 50Hz+-3% |
| 14. | Control Voltage | 110V |
| 15. | **MH Motor** |  |
| 16. | Type | Sq. Cage Crane duty motor |
| 17. | HP | 10 HP |
| 18. | No Off | 1 |
| 19. | **CT Motor** |  |
| 20. | Type | Sq. Cage Crane duty motor |
| 21. | HP | 1.0 HP with VFD |
| 22. | No Off | 1 |
| 23. | **LT Motor** |  |
| 24. | Type | Sq. Cage Crane duty motor |
| 25. | HP | 1.0 HP with VFD |

|  |  |  |
| --- | --- | --- |
| 26. | No Off | 2 |
| **Limit Switches** | |  |
| Hoist- MH | | 1 No. Rotary type to prevent over  hoisting & over lowering |
| CT | | Optional at extra cost, Mechanical stopper  provided |
| LT | | Optional at extra cost |
| **Brake Type** | |  |
| MH | | AC Electromagnetic Disc/ Hydraulic Thrustor  brake |
| AH | | NA |
| CT | | Optional at extra cost |
| LT | | Optional at extra cost |
| Gear Boxes | | PBL/ STD |
| **MH Wire Rope** | |  |
| Size & No. of falls | | Dia. 14 mm / 4 Falls |
| Type | | Fiber Core |
| Construction | | 6X36 |
| Rope Drum | | M.S Fabricated and Stress Relieved |
| Wheels | | Machined from forged steel and duly hardened, supported on self-aligning roller  bearing, enclosed in L Type housing |
| Ambient Temperature  (In deg C) | | 45 |
| Special Features | | NA |
| Couplings | | Gear Couplings |
| Bridge Construction | | Standard joist/ Plate Box Girder having anti vibration design, robust in  construction |
| Buffers | | Rubber buffers |
| CT Cable Festooning | | Festoon type trailing cable with festoon trolley  & track |
| Hooks | | Only forged hooks, duly proof load, Ultrasonically and chemically tested shall  be used. |





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| **Liquid, Gas piping system for conveying substrates and Liquids & gas** | | | **1 set** |
|  | Piping has to be made HDPE, rust proof structure, of appropriate  Diameter, conforming the relevant BIS Standards | |  |
|  | Material of Pipe | HDPE | |
|  | **Our Scope:** Supply and fittings / Jointing / Laying / Installation / Unloading /  Staking charges at site | | |

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| **23** | **Civil Work** | | |
|  | Admin Office | 120 | SQMT |
| Shed for Filling header with cylinder  cascade | 160 | SQMT |
| Way Bridge cum Security Room | 16 | SQMT |
| Gate | 2 | No. |
| Boundary (Total Length 800Mtr.) | 800 | Mtr. |
| Internal Road 8 Mtr Wide)  Length-730 Mtr | 5,840 | SQMT |
| Feed Preparation Platform with  Pump | 350 | SQMT |
| Feed Mixing Tank (2 x300 CUM) | 600 | CUMT |
| Machinery Shed (Purification and  Compressor) | 519 | SQMT |
| Main Digester  (Dia 32 Mtr. Height 9Mtr) | 7,234 | CUMT |
| Main Digester  (Dia 32 Mtr. Height 9Mtr) | 7,234 | CUMT |
| Underground Water/ Slurry Storage | 100 | CUMT |
| Solid Liquid Separator Platform | 36 | SQMT |
| Fertilizer Shed with Packing | 816 | SQMT |
| Digested Slurry Tank | 400 | CUMT |
| Lagoon | 1000 | SQMT |
| Technical room/panel room + Lab  Area + Security Office | 76 | SQMT |
| Staff Room with Kitchen, Bathroom  (3 BHK House) | 144 | SQMT |
| Labours Rooms | 60 | SQMT |
| Toilet Block + parking | 20 | SQMT |
| Other Foundation work as per project civil work requirements | | |
| Other Building services as per project requirement | | |





**Scope of Supply**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sr.No.** | **Scope of Supply E – Party responsible for EXECUTION** | | | |
|  | **JOG** | **Client** | **Comments** |
| 1. | **Substrate supply pump (1W+1S)**(screw pumps),  **Separator Supply Pump**  capacity approx.50 m3/hr@2-4 bar (1W+1S) | E |  |  |
| 2. | **Grinder rota cutter (1 No.)**  Q=50 m3/hr | E |  |  |
| 3. | Agitator for Mixing Pit (Tank) **2 Nos.**  **Rating -** 15 HP/RPM-Variable /AISI304 | E |  |  |
| 4. | Side Entry Type Agitator in CSTR Based Digester for Stirring **(2 Digester x 6 Nos.=Total 12 Nos.)**  **Rating -** 20 HP (3 Nos.) and 15 HP (3 Nos.)/250  RPM/AISI304 | E |  |  |
| 5. | Double membrane Balloon **JOG Type:** JOG Membrane Mounted on Digester Tank-**2 No** | E |  |  |
| 6. | Horizontal Solid liquid separator-**2 Set** | E |  |  |
| 7. | Heating Arrangement For Digester-**2 Set** | E |  |  |
| 8. | Biogas flow transmitter | E |  |  |
| 9. | Laboratory and analytical equipments and testing for different parameters | E |  |  |

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| 10. | Sand Filter | E |  |  |
| 11. | One Catalyst Tower based H2S Removal  system (H2S <= 2500 ppm). | E |  |  |
| 12. | One Filter Separator | E |  | use after H2S Removal System |
| 13. | **700 m3/hr** biogas Upgradation system  with Accessories | E |  |  |
| 14. | **350 m3/Hr** CH4 Recovery System **for Methane Loss <2 %** | E |  |  |
| 15. | **400 m3/hr** Biogas Booster compressors for  Providing **250 Bar** pressure at outlet. | E |  |  |
| 16. | B-CNG Filling station For Cylinder Filling  **(1 Set)** | E |  |  |
| 17. | Liquid, Gas piping system for conveying  substrates and Liquids & gas | E |  |  |
| 18. | Automation Elements | E |  | Any other Automation that may be required are by client or need to be priced as extra's |
| 19. | 40 Nos. Cylinder Cascade -**5 Nos.** | E |  |  |
| 20. | Fertiliser Packing system | E |  |  |
| 21. | Annual operational spare for smooth operation | E |  |  |
| 22. | Clearing, Forwarding, handling and freight cost etc. | E |  |  |





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| 23. | Electrical Equipment & instrumentation |  |  | Supplied loose, to be installed in client control/electrical room (safe zone) |
|  | Control Panel PLC base with RS 485 connectivity option to DCS with SCADA Connectivity. | E |  |  |
| All Type of electrical works as per mentions above like cable ,transformer ,HTMC,LBS etc. | E |  |  |
| Compressor Control Panel | E |  | Supplied loose, to be installed in client control/electrical room (safe zone) |
| Power Supply & External Cabling (off skid) |  | E | JOG to provide cable schedule for the off skid and interconnecting cabling that is your supply and site run |
| 24. | Product Gas Analysers **(1 Set)** | | |  |
|  | Online gas Monitoring system with Analyser for H2S, CO2, CH4, O2. | E |  |  |
| Online dew point meter. | E |  |  |
| Other |  | E | Any other instruments that may be required are by client or need to be priced as extra's |



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| --- | --- | --- | --- | --- |
| 25. | Consultancy | E |  |  |
|  | Consultancy for Design and engineering, civil work, Digester Data; designs& Dreawing,General data ,Layout plan, Summarized plan of pipelines and networks, Equipment Comparison and selection | E |  |  |
|  | Long Term Technical support and Operation service with training | E |  |  |
|  | Consultancy for Detailed Project Report, PESO approval, Training etc. | E |  | We are not liable for delay in work due to Govt. procedural delay, For any Technical Discussion at Petroleum Safety office Will attend client only |
| 26. | Other Most- All civil work for project(Mixing Pit, Digester, Digested Slurry Tank, Solid Liquid separator & shredder Platform, Upgradation , Compressor ,Storage Tank etc) | E |  |  |
|  | Travelling, Lodging and Boarding arrangements for our team ,Equipment Lifting and shifting |  | E |  |



# Exclusion (Client Scope)

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| --- | --- |
| A. | All Electrical and Instrument/power cabling outside the battery limit. |
| B. | Pre- dispatch inspection including costs thereof shall be in the scope of client. |
| C. | Transportation, Unloading, & shifting of all equipment’s to respective foundation. |
| D. | Additional Consultancy services |
| E. | Statutory approvals & operating permits. |
| F. | Any other item not specifically mentioned above. |
| G. | **If Erection & commissioning is Jog Waste to Energy Scope** |
|  | Travelling, Lodging, and Boarding arrangements for engineers are client scope. Skilled and un skilled labour shall also in client scope. |
|  | Lifting and shifting equipment required at the time of erection and commissioning is client scope. |



**Price schedule with commercial Terms & conditions**

**Price schedule: Price schedule corresponding to scope & terms & conditions**

**defined in Details Technical Requirements.**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Sr No.** | **Description** | **Qty** | **Price** | **Total** |
| **1.** | **Weighbridge** | **1 Set** | **11,25,000/-** | **11,25,000/-** |
| **2.** | **Pumping Equipment and Grinder with Piping arrangement for feeding** | **As above Mention** | **65,25,000/-** | **65,25,000/-** |
| **3.** | **Equipment/Machinery for Feed Mixing Tank** | **2**  **Nos.** | **35,14,000/-** | **70,28,000/-** |
| **4.** | **Digester Mechanical & Electrical Equipment Package**   * **All Mixing Equipment**   (Side Entry Type Agitator in CSTR Based Digester for Stirring)   * **Heating Arrangement** for Digester * Liquid, Gas **piping system** for conveying substrates and Liquids & gas from Digester up to 30 Mtr * **Inspection Window** (sight glass) * Other Digester **Accessories** * All digester connection nozzles | **2**  **Digester** | **1,75,25,000/-** | **3,50,50,000/-** |
| **5.** | **Fertilizer tank machinery**   * Top entry agitator * Pump for slurry transfer * All type of piping and valve arrangement * Other fitting accessories | **1 Set** | **20,50,000/-** | **20,50,000/-** |
| **6.** | **Double membrane Balloon** JOG Type: JOG Membrane Mounted on Digester Tank  (Dia - 32 mtr) | **2 set** | **41,40,000/-** | **82,80,000/-** |



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| **7.** | **Horizontal Solid liquid separator** | **2 set** | **35,50,000/-** | **71,00,000/-** |
| **8.** | **Catalyst Tower Based H2S Removal System (700 m3/hr)** | **1 Set** | **29,50,000/-** | **29,50,000/-** |
| **9.** | **700 M3 /hr Biogas Up gradation Plant as per given scope of supply 4 Tower Based systems**  With all electrical, instrumentation,  controls and HMI PLC System. | **1 set** | **2,35,00,000/-** | **2,35,00,000/-** |
| **10.** | **350 M3/hr Recovery System -** (Methane CH4 loss < 2 %) as per given scope of supply  2 Tower Based systems | **1 set** | **85,50,000/-** | **85,50,000/-** |
| **11.** | **400 m3/hr Biogas Booster compressor Up to 250 bars High pressure piping and fitting with accessories, High pressure**  **line up to compressor to cascade.** | **1 set** | **1,50,00,000/-** | **1,50,00,000/-** |
| **12.** | **BIOCNG Filling Station** | **1 set** | **7,50,000/-** | **7,50,000/-** |
| **13.** | **Automation Elements** | **Package** | **55,21,000/-** | **55,21,000/-** |
| **14.** | **Electrical, Instrumentation & Control Panel**  Electrical Equipment- PLC Control  panel, Power panel, Cable for all  these from field to panel room | **1 set** | **70,65,000/-** | **70,65,000/-** |
| **15.** | **Electrical and Electronic Requirement**   * Distribution panel * Transformer * Cables & Earthing * Other Electrical Accessories | **1 set** | **65,20,000/-** | **65,20,000/-** |
| **16.** | **40 Cylinder cascade** | **5**  **Nos.** | **18,50,000/-** | **92,50,000/-** |
| **17.** | **Waste Shredder** | **1 Set** | **6,50,000/-** | **6,50,000/-** |

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| **18.** | **Solid Fertilizer Packaging & Bagging System** | **1 Set** | **32,50,000/-** | **32,50,000/-** |
| **19.** | **Product Gas Analyzers**  Online gas Monitoring system with Analyzer for H2S, CH4, O2, Co2 Online dew point meter | **1 set** | **10,50,000/-** | **10,50,000/-** |
| **20.** | **Laboratory Equipment** | **1 set** | **5,00,000/-** | **5,00,000/-** |
| **21.** | **Annual operational spare for smooth operation of plant** | **Lum Sum** | **10,80,000/-** | **10,80,000/-** |
| **22.** | **EOT single Grider crane flame proof as per PESO for CNG cascade loading and unloading** | **1 Set** | **20,50,000/-** | **20,50,000/-** |
| **23.** | **All Civil Work-Building, Digester, Shed, Road etc.**  (Mixing Pit, Digester, Digested Slurry  Tank Solid Liquid separator and shredder Platform, H2S and Moisture Removal System shed and other plant and machinery shed, all foundation, control room etc)  As per detailed mention in Proposals | **1 set** | **6,74,84,300/-** | **6,74,84,300/-** |
| **24.** | **Clearing, Forwarding, Handling &**  **freight cost etc.** | **Lum**  **Sum** | **20,42,746/-** | **20,42,746/-** |
| **Total (INR)** | | | | **22,43,71,046/-** |
| **GST-12 % (Sr No.1 to 24)** | | | | **2,69,24,526/-** |
| **Sub Total (Total + GST 12%)** | | | | **25,12,95,572/-** |
| **In Word- Twenty-Five Crore Twelve Lakh Ninety-Five Thousand Five**  **Hundred Seventy-Two Rupees and Zero Paisa Only** | | | | |



# Commercial Terms & conditions

## Price basis:

The prices offered are on Ex-works supplier or sub-contractor works basis and packing & forwarding, taxes, duties, levies, freight, insurance etc.

## Packing & forwarding:

GST Tax - Extra (GST-12 %)

## Transit & storage insurance:

Insurance shall be arranged by the JOG, Email intimation from official email address for arranging insurance shall be given by us on dispatch of the consignment from our works.

## Delivery:

8-9 months from date of clear, signed purchase order with advance and drawing approvals.

## Installation and commissioning:

Up to 1-2 Months after receipt of material at site depending on site readiness

## Acceptance:

The Purchase Order will be accepted by us on the basis our valid quotation. However, the delivery time will be subject to confirmation, depending on the shop load at the time of the receipt of the Purchase Order. The delivery time quoted in the offer is not automatically binding on us but the one in our Order Acceptance would be.

## Payment terms:

* 1. 30% - Net Order Value as advance with clear signed purchase order.
  2. 10 % after dawning approval.
  3. 55 % Net Order Value with all taxes, duties & levies upon inspection of goods at our facilities against Performa invoice before dispatch on pro rata basis.
  4. 5 % after installation and commissioning and trail production.

## Cancellation of Contract:

As this system is made to order, in no event, order once placed cannot be cancelled. In the event of cancellation of order from customer, the advance shall be not refunded and customer shall indemnify JOG Waste to Energy against any consequential loss.

## Validity:

This quotation is open for acceptance for a period of 45 days from the date of this quotation. Thereafter, prices are subjected for approval from us. The product prices will remain firm until completion of delivery, if the technically and commercially clear purchase order is received within the validity period together with the advance.

## Warranty:

12 months from date of commissioning or 18 months from date of supply for all proven manufacturing defects related to workmanship, and not related to operational errors. Warranty shall not be applicable if installation and commissioning is not done as per standard procedure prescribed by JOG Waste to Energy Pvt. Ltd. After any warranty repair, the replaced parts shall have a warranty period of the leftover part of the original warranty.

## Force Majeure Conditions:

The delivery indicated is subject to delay that could arise due to our principal/ supplier for reasons beyond their control, covered under the force majeure conditions like strikes, lockouts, fire, accidents to our suppliers works or at site or during transit, war, labour disturbances, natural calamities, acts of Government or law which affects the production schedule of our suppliers or ours.

## Liability:

JOG’s total liability, of whatsoever nature, arising out of its product in the Warranty period, is restricted to Ex-works price of the product only, as paid by the customer. No liability, of whatsoever nature, will lie with us after the Warrantee period.

## Arbitration and Law Applicable:

Any dispute whatsoever arising out of the contract unless amicably settled shall be referred to two arbitrators residing in Ahmedabad, India, each holding a responsible position in a firm or a company which is a Member of the Gujarat Chamber of Commerce and Industry, one to be appointed by each party to the dispute, unless otherwise agreed, the contract shall be governed by Law of Ahmedabad Jurisdiction.