Biogas to Power Generation bundle Project in India

Document prepared by Uniconn Platform Pvt. Ltd

Name of the project	Biogas to Power Generation bundle Project in India.
Project holder	Uniconn Platforms Private Limited
Account holder	Uniconn Platforms Private Limited
Legal representative	Param Mayank Agrawal / Gajanan Rustumrao Pati
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Other project participants	*N/A*
Version	01

Date	08/04/2025
Project type	Biogas- Electricity *generation*
Grouped project	*Yes.*
Applied Methodology (ies)	**AMS-I-D:** Grid-connected renewable electricity generation- Small Scale **AMS-III.D.:** Methane recovery in animal manure management systems--- Version 21.
Project location (City, Region, Country)	**Instance 1**-.Thengoda. Village: Baglan, Dist.: Nashik **Instance 2**- Ampally Village, block dharur and dist. Vikarabad, Telangana, India. **Instance 3**- House No-37/18/24/1, Plot No-28, Defence Colony, Sainikpuri, Secunderabad, Medchal - Malkajgiri, Siddhipet, Telangana, India. **Instance 4**- Morkhi, Jind, Haryana, India. **Instance 5**- Jiregaon, Kurkumbh, Daund, Pune, Maharashtra, India
Starting date	1-01-2021
Quantification period of GHG emissions reduction	01-07-2021 to 1-7-2031
Estimated total and average annual GHG emission reduction/removals amount	Annual: 9,471 ; Total: 94,710

Sustainable Development Goals	SDG 7: Clean and Affordable Energy SDG 13: Climate Action SDG 15: Life of Land.
Special category, related to co-benefits	*N/A*

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1 Project type and eligibility

1.1 Scope in the BCR Standard

The project is eligible under the scope of the BCR Standard by meeting one or more of the following conditions (Mark with an X).

The scope of the BCR Standard is limited to:	
The following greenhouse gases, included in the Kyoto Protocol: Carbon Dioxide (CO_2), Methane (CH_4) and Nitrous Oxide (N_2O).	X
GHG projects using a methodology developed or approved by Biocarbon, applicable to GHG removal activities and REDD+ activities (AFOLU Sector).	N/A
Quantifiable GHG emission reductions and/or removals generated through implementation of GHG removal activities and/or REDD+ activities (AFOLU Sector).	N/A
GHG projects using a methodology developed or approved by BioCarbon, applicable to activities in the energy, transportation and waste sectors.	X
Quantifiable GHG emission reductions generated through implementation of activities in the energy, transportation and waste sectors.	X

1.2 Project type

Activities in the AFOLU sector, other than REDD+	
REDD+ Activities	N/A
Activities in the energy sector	X

Activities in the transportation sector	N/A
Activities related to Handling and disposing of waste	N/A

1.3 Project scale

Project scale is small scale.

2 General description of the project

Uniconn Platforms Pvt. Ltd. is in the process of implementing grouped project based on biogas from cattle waste/ agricultural feed stock at different locations across various States & UTs in India. The primary objective of the project is to effectively demonstrate the use of anaerobic biogas digesters to not only generate biogas-based renewable energy but also achieve an environmentally friendly way of managing waste:

Here it is important to note that even though biogas engines generate both electricity and heat power, the proposed Project cannot be defined as cogeneration. The cogeneration plant is defined as "a heat and power plant in which at least one heat engine simultaneously generates both heat and power". Since there is no heat engine installed within a Project boundary the proposed project activity shall be considered neither as a cogeneration plant nor a project involving co-generation systems. Hence, the heating system is ruled out in this PDD.

This is a grouped project, and the new instances will be added as and when the biogas plants get installed across India in the future.

More project activity instances will be included in this grouped project activity in future. These new instances will also be off-grid biogas renewable energy power plants that will contribute to GHG emission reductions. These new project activity instances will be small-scale project activity.

2.1 GHG project name

Industrial effluent-based biogas to power project.

2.3 Objectives

- The aim of this project is to promote the sustainable production of renewable energy from the biogas obtained from industrial effluent for energy self-sufficiency.
- The objective is to promote sustainable practices and technology, focusing on energy efficiency of biogas production and utilization
- To reduce greenhouse gas emissions due to the consumption of renewable energy sources and to adequate waste management

2.4 Project activities

Instance 1:

The processing plant can divide its main production line into 3 stages

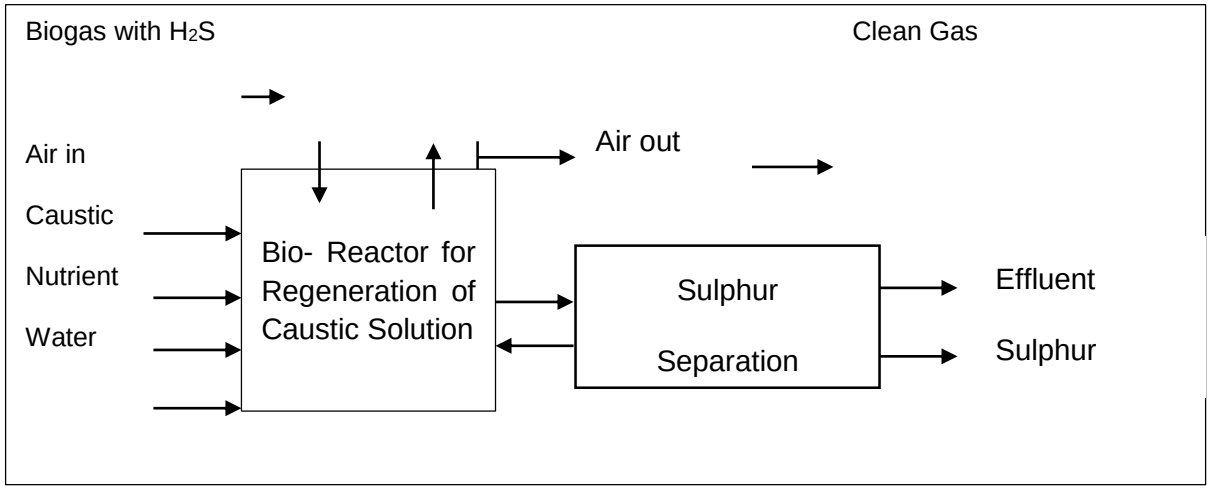
- Effluent Generation
- Biogas Generation
- Purification and power generation

Bio-Methanation Procedure

An anaerobic digestion process is used to convert this high strength wastewater into biogas. The digester, based on fixed film process, provides higher treatment efficiency & is considered best amongst the anaerobic digestion processes. The fixed film system gives consistent and higher biogas production. We are getting around 0.6 to 0.7 m3 of biogas per Kg of COD reduction. In `FIXED FILM' process, which is a high-rate process, anaerobic digestion takes place in the thermophiles range of temperature, i.e. 50° - 55°C. PH in the reactor is maintained around 7.2 while proper ratio of volatile acids and alkalinity is maintained. A general estimate suggests that the cost of an anaerobic biological digester is recovered within 1 year of installation because of substantial saving of fuel. The digester is designed to take 300 m3/day of wastewater with 100000 – 110000 mg/l COD and 31500 kg/day organic load with 2523 m3 media volume. The organic loading for media is around 12.82 Kg COD/m3/day; the surface area provided by media is around 95 – 105 m2/m3. We are getting 70% COD reduction and generating 9000 nm3 biogas per day.

Biogas Scrubbing and Cleaning System

The basic process is based on regeneration principle. The process requires circulation of an aqueous solution to remove H_2S and to regenerate the chemical taking part in the reaction. The raw biogas enters the scrubber in which a clean solvent washes the gas and removes the H_2S from biogas. In addition to this, some CO_2 may also get removed. The clean biogas meeting the requirement of the end application exits the absorber. The solvent, which has now become rich in sulphide due to absorption of H_2S, is transferred to bio reactor. In bio reactor sulphides are oxidized to elemental sulphur by specific bacteria and used chemicals are regenerated. Biological reactions generally involving oxidation by atmospheric air.



In the scrubber, the biogas containing H_2S is intermingling in counter Current mode with a scrubbing liquid. Absorption of H_2S in the scrubber occurs under slightly alkaline conditions (pH 8-9) and a chemical reaction with hydroxide ions takes place.

$$H_2S_{gas} + OH^- \text{------>} HS^-_{liquid} + H_2O \quad \text{..... (1)}$$

The scrubbing liquid containing the sulphide, flows into the Bio-reactor where the sulphide is oxidized by aerobic microorganisms by the group of the Colorless sulphur bacteria and convert into elemental sulphur.

$$HS^- + 1/2\ O_2 \text{------>} S^0 + OH^- \quad \text{..... (2)}$$

From equations 1 & 2 it is seen that the hydroxide used in the scrubber is regenerated in the bio-reactor. The liquid entering into the scrubber at the top is sulphide free, resulting in a high concentration. The difference between the gas and liquid phase ensure very high (up-to 99%) removal efficiency. The Bleed stream consisting of sodium salts is sulphide free and can be easily discharged.

Power Generation System

The project is meant for power generation from the biogas generated from wastewater. A power generation biogas genset is procured from the supplier GE Janbacher. The basis of engine selection is as follows

Gas composition	:	Methane = 64% (vol/vol) Carbon Di-oxide = 34.5% (vol/vol) Hydrogen Sulphide = 1.5% (vol/vol)
NCV of Biogas	:	5000 kcal/Nm3(Assumed)
Gas Pressure (Max./Min)	:	Gas at required pressure to be made available
Biogas	:	9000 Sm3/day

Required characteristics of Biogas for Gas genset and gas quality shall be as per GE's Jenbacher gas engine division Technical Instructions TA 1000 0300 – Fuel Gas and Combustion Air Requirement.

- Temperature of Fuel Gas (T): -10oC < T < 40oC
- Gas pressure at inlet to Gas Train: -120 to 200 mbar
- Total Sulphur: -200 mg/10 kW of energy input

Instance 2:

The process recommended here for the biogas-based electricity generation and organic manure production is three stage anaerobic digestions followed by drying.

I) Feed Preparation Section

The poultry litter is collected through a conveyor and brought to slurry preparation tank. It is then mixed with water with 1:1.5 proportion to prepare feed solution at desired concentration. One no. of mixing chamber is used for slurry preparation. The size of mixing chamber will be ϕ3.0m x 3m depth made in RCC. We have 3 HP mechanical agitator which mixes dung in proper way in 3 m dia tank, suitable mechanical agitator is provided in this mixing chamber. The proper mixing serves the following objectives.

- To prepare feedstock with uniform particle size and of desired concentration
- To prevent settling of solids in the bottom of tank

The mixed slurry will be charged into the biogas digester by pumping.

II) Biogas Digester: Technology: - KVIC Water Jacket Floating Dome Digester Here we have proposed one number of biogas digester having 1205 CUM capacity. Dia of this tank is 16m and height is taken as 6m, so total volume is V=Pi x 16^2 X 6/4 = 1205 m3, as we will be feeding 24.1 m3 slurry per digester, this will give 1205/24.1 = 50 days retention period. It is a two-stage biogas generation process to treat around 12000 kg poultry litter per day with hydraulic retention time (HRT) 50 day. It has size ϕ16m and depth 6 m. Digester work will be in 225mm RCC and is underground so there won't be temperate fluctuation effect in winter on biogas generation. One no's of floating dome is made in MS fabrication work with diameter 15.6 m and height 1.5 m, so total volume per dome is @ 286.5 m3, we are also providing 2 biogas balloons to take care of biogas holding, Digesters has two inlets for feed slurry, one outlet for biogas and one outlet for digested slurry respectively. The feed slurry goes under anaerobic degradation where it gets converts in to biogas and organic manure with the help of anaerobic bacteria. The efficiency of any digester is depends on physical properties like Temperature, consistency of feed, C:N ratio and stirring mechanism. Here we will consider all this while designing the plant and we will make sure that the overall performance of this would be more than 80% in all seasons.

The Bio methanation of poultry litter is takes place in following three distinctive stages in the digester.

- Hydrolysis of organic solids
- Acidification of hydrolyzed products
- Bio methanation of acidified slurry

The biogas produced here is initially collected in to the biogas holder which is made in MS fabrication work and the digested slurry overflows through outlet chamber in to digested slurry tank.

III) Biogas holder/ Dome

It is a cylindrical dome fabricated on the top of the digester to hold produced biogas. Size of dome is 15.6 m Dia and 1.5 m height; total volume per dome is @ 286.5 m3. The dome has got an FRP lining to prevent the corrosion to the dome. It has got four manholes each to break the scum and for maintenance point of view. As we need to have 100 mm WC pressure for biogas to come out and fill in balloon, the design parameters are taken as below.

Pressure P=100 mm WC = 0.01 kg/cm2, F = force or wt in kg to be found, A = Area of CS of dome

- So, A = Pi x D^2 / 4 = 3.14 x 15.6 x 15.6 /4 = 191 m2,
- As Pressure P = F / A,
- So, F = P x A = 0.01 kg/cm2 x 191 m2 x 10^4 cm2 = 19100 kg,

Hence, we need dome must be greater than 19.0 T of wt.

IV) Organic Loading rate –

Volume load or organic loading rate is also an important parameter. It indicates how many kilograms of organic dry solids are loaded per m3 of digester volume and unit of time. The organic loading rate is important for the plant components (esp. mixer/agitator) and for the bacteria. If the organic loading rate is too high (over 4.0 kg DS/m3 d) technical components like mixers or pumps could be damaged or you need an earlier maintenance than calculated due to an overload. The bacteria could also be stressed by too much feeding consequently no biogas production will take place and the digestion process stops completely.

Organic loading rate = Organic dry solids loaded per day (kg.oDS/d) / Digester capacity

= (30,000 lit slurry x 0.08 % (TS in slurry) x 85 % (ODM)) / 1205

= 1.69 kg DS / m3.d (Which is quite less than 4.0), this is acceptable

V) Digested Slurry Chamber:

The digested slurry overflows from the digester into the Digested slurry chamber. Around 30,000 liters/day of slurry comes out of digester per day. This liquid slurry will then be dried out as organic bio-manure in the imported slurry separator. As we are providing one slurry separator, we took slurry holding volume for say 2 days i.e. 50 m3 in worst come worst case. The total volume of the tank is 50 m3.

The Digested slurry tank is made in RCC having a size Dia 4m x 4m depth.

Instance 3

The process recommended here for the biogas based electricity generation and organic manure production is three stage anaerobic digestions followed :

I) Feed Preparation Section:

The poultry litter is collected through a conveyor and brought to a slurry preparation tank. It is then mixed with water with 1:1.5proportion to prepare feed solution at desired concentration. One no. of the mixing chamber is used for slurry preparation. The size of mixing chamber will be ϕ 5.0m x 5m depth made in RCC. We have 3 HP mechanical agitator which mixes litter in proper way in 5 m dia tank, suitable mechanical agitator is provided in this mixing chamber. The proper mixing serves the following objectives.

- To prepare feedstock with uniform particle size and of desired concentration
- To prevent settling of solids in the bottom of tank

The mixed slurry will be charged in to the biogas digester by pumping

II) Biogas Digester: Technology: - KVIC Water Jacket Floating Dome Digester Here we have proposed one number of biogas digester having 2035 CUM capacity. Dia of this tank is 18m and height is taken as 8m, so total volume is V=Pi x 18^2 X 8/4 = 2035 m3, as we will be feeding 50 m3 slurry per digester, this will give 2035/50 = 40 days retention period. It is a two-stage biogas generation process to treat around 16000 kg poultry litter per day with hydraulic retention time (HRT) 40 day. It has size ϕ18m and depth 8 m. Digester work will be in 300mm RCC and is underground so there won't be temperate fluctuation effect in winter on biogas generation. One no floating dome is made in MS fabrication work with diameter 17.6 m and height 1.5 m.

We are also providing 1 biogas balloons to take care of biogas holding, Digesters has two inlets for feed slurry, two outlets for biogas and one outlet for digested slurry respectively. The feed slurry goes under anaerobic degradation where it gets converts into biogas and organic manure with the help of anaerobic bacteria.

The efficiency of any digester depends on physical properties like Temperature, consistency of feed, C: N ratio and stirring mechanism. Here we will consider all this while designing the plant and we will make sure that the overall performance of this would be more than 80% in all seasons.

The Bio methanation of poultry litter is takes place in following three distinctive stages in the digester.

- Hydrolysis of organic solids
- Acidification of hydrolyzed products
- Bio methanation of acidified slurry

The biogas produced here is initially collected in to the biogas holder which is made in MS fabrication work and the digested slurry overflows through outlet chamber in to digested slurry tank.

III) Biogas holder/ Dome

It is a cylindrical dome fabricated on the top of the digester to hold produced biogas. Size of dome is 17.6 m dia and 1.5 m height. The dome has got FRP lining to prevent the corrosion to the dome. It has got four manholes each to break the scum and for maintenance point of view. As we need to have 100 mm WC pressure for biogas to come out and fill in balloon, the design parameters are taken as below.

- Pressure P=100 mm
- WC = 0.01 kg/cm2,
- F = force or wt in kg to be found,
- A = Area of CS of dome,
- SoA = Pi x D^2 / 4 = 3.14 x 17.6 x 17.6 /4.= 243m2,
- As Pressure P = F / A,
- So F = P x A = 0.01 kg/cm2 x 243 m2 x 10^4 cm2 = 24300kg,

Hence, we need dome must be greater than 24 T of wt,

IV) Organic Loading rate –

Volume load or organic loading rate is also an important parameter. It indicates how many kilograms of organic dry solids are loaded per m3 of digester volume and unit of time. The organic loading rate is important for the plant components (esp. mixer/agitator) and for the bacteria. If the organic loading rate is too high (over 4.0 kg DS/m3 d) technical components like mixers or pumps could be damaged or you need an earlier maintenance than calculated due to an overload. The bacteria could also be stressed by too much feeding consequently no biogas production will take place and the digestion process stops completely

Organic loading rate = Organic dry solids loaded per day (kg.oDS/d) / Digester capacity

= (50,000 lit slurry x 0.08 % (TS in slurry) x 85 % (ODM)) /2035

= 1.67 kg DS / m3 day (Which is quite less than 4.0), this is acceptable

V) Digested Slurry Chamber

The digested slurry overflows from the digester in to the Digested slurry chamber. Around 50,000 liters/day of slurry comes out of digesters per day. This liquid slurry will then have dried out as organic bio-manure in imported slurry separator. As we are providing one slurry separator, we took slurry holding volume for say 2 days i.e. 98 m3 in

worst come worst case. Total volume of tank is 98 m3. The Digested slurry tank is made in RCC having size Dia 5m x 5m depth.

V.1 **Composition of Typical Poultry Litter**

Sr. No	Characteristics	Value
1	Poultry litter generates	0.1 m^3 of biogas /kg of litter
2	Nitrogen content	3.1%
3	Moisture content	50 to 53%
4	Total solid content	47 to 50%
5	Volatile organic matter	81 to 84%
6	Ratio of Carbon to Nitrogen	8:1 (25.2: 3.1)
7	Total anaerobic bacteria/ gm of Litter	1.2 x 10^3

- V.2 Composition of the organic manure
- Solids content – 40 to 45%
- Organic content – 35%
- Nitrogen content – 1 to 1.8%
- Phosphorous content – 1.4 to 1.8%
- Potash content – 0.9%

VI) Biogas Utilization and Power Generation Section

VI-1) Biogas compression (Blower):

The raw biogas from the biogas holder will be compressed with the help of a compressor in the gas receiving tank. A-1 Blowers make 53-AC blower will be provided with a capacity of 100 m3/hr and 4000 mmWC pressure. This blower gives gas flow from 90 m3 to 100 m3/hr. It will have all the standard accessories. The gas receiving tank is made in 5 mm thick mild steel with 1.5 mm thick FRP lining. It has a volume of 1m3 with a moisture removal valve, pressure gauge and pressure switch.

VI-2) Biogas Scrubbing Systems:

It is low pressure water scrubbing for removal of partly Carbon Dioxide and Hydrogen Sulphide less than 200 PPM. The biogas contains CO_2 and H_2S gases before the gas is fed to the engine or else it will corrode the internal parts of the gas engine.

The raw biogas from the raw biogas balloon of capacity 150 m3 will be pressurized with the help pressure vessel is then passed through water absorption column at certain pressure, the solubility of gases increases with pressure, based on this principle we are passing pressured biogas through water where we have got media inside this column to increase the surface of gas bubbles for better solubility and good result. Here we are creating small bubbles of biogas of 5mm diameter so partly CO_2 and H_2S also get dissolve in water. The size of the water absorption column will be dia 0.6 m and height – 4 m height

which will scrub around 70 cum biogas per hour. Here we need to replace the water every day. After this water absorption column, we will provide two adsorption columns filled with iron where the remaining H2S will get adsorbed on the iron surface and converts it to FeSO4, we need to replace this iron twice a year. The size of these adsorption columns will be dia 0.5 m and 2 m height.

The biogas scrubbers will be fabricated in MS with internal FRP lining with packing media and adsorption media with proper inlet and out connections.

VI-3) Clean Biogas Storage

The clean biogas after scrubbing is finally stored in PVC rubber made balloon. The capacity of the balloon will be 150m³. It is housed in a brickwork / metal sheet enclosure. Enclosure size will be 15m x 15m length. The enclosure is provided with the requisite ventilators at the top and a door. The balloon is protected from rodents and insects. Absolutely no maintenance is required. The inlet and out let connections are provided at the bottom of the gas holder. Moisture traps and valves are used before and after the balloon to remove the moisture. Total @ 50 % gas is expected to store in both balloons, so accordingly those 2 balloons are taken.

VI-4) Biogas Engine and Alternator:

It is 2 no. of Kirloskar made 100% biogas, 125 KVA / 100kW, three phase engine. It is water cooled, six cylinders' self-start SI engine which develops 156 HP at 1500 RPM and coupled with three phases, 415V alternator with complete standard accessories.

Instance 4:

The process recommended here for the biogas-based electricity generation and organic manure production is three stage anaerobic digestions followed by drying.

I) Feed Preparation Section:

The poultry litter is collected through conveyor and brought to slurry preparation tank. It is then mixed with water with 1:1.5 proportion to prepare feed solution at desired concentration. One no. of mixing chamber is used for slurry preparation. The size of mixing chamber will be ϕ3.0m x 3m depth made in RCC. We have 3 HP mechanical agitator which mixes dung in proper way in 3 m dia tank, suitable mechanical agitator is provided in this mixing chamber. The proper mixing serves the following objectives.

- To prepare feedstock with uniform particle size and of desired concentration
- To prevent settling of solids in the bottom of tank
- The mixed slurry will be charged into the biogas digester by pumping

II) Biogas Digester: Technology: - KVIC Water Jacket Floating Dome Digester Here we have proposed one number of biogas digester having 1060 CUM capacity. Dia of this tank

is 15m and height is taken as 6m, so total volume is V=Pi x 15^2 X 6/4 = 1060 m3, as we will be feeding 24.1 m3 slurry per digester, this will give 1205/21.2 = 50 days retention period. It is a two-stage biogas generation process to treat around 6000 kg poultry litter per day with hydraulic retention time (HRT) 50 day. It has size ϕ15m and depth 6 m. Digester work will be in 225mm RCC and is underground so there won't be temperate fluctuation effect in winter on biogas generation. Two no's of floating dome is made in MS fabrication work with diameter 14.6 m and height 1.5 m , so total volume per dome is @ 250 m3, we are also providing 2 biogas balloons to take care of biogas holding, Digesters has two inlets for feed slurry, one outlet for biogas and one outlet for digested slurry respectively. The feed slurry goes under anaerobic degradation where it gets converted into biogas and organic manure with the help of anaerobic bacteria.

The efficiency of any digester depends on physical properties like Temperature, consistency of feed, C: N ratio and stirring mechanism. Here we will consider all this while designing the plant and we will make sure that the overall performance of this would be more than 80% in all seasons.

The bio-Methanation of poultry litter takes place in following three distinctive stages in the digester

- Hydrolysis of organic solids
- Acidification of hydrolyzed products
- Bio methanation of acidified slurry

The biogas produced here is initially collected into the biogas holder which is made in MS fabrication work and the digested slurry overflows through outlet chamber in to digested slurry tank.

III) Biogas holder/ Dome:

It is a cylindrical dome fabricated on the top of the digester to hold produced biogas. Size of the dome is 14.6 m dia and 1.5 m height; total volume per dome is @ 250 m3. The dome has got FRP lining to prevent the corrosion to the dome. It has got four manholes each to break the scum and for maintenance point of view. As we need to have 100 mm WC pressure for biogas to come out and fill in balloon, the design parameters are taken as below

- Pressure P=100 mm WC = 0.01 kg/cm2,
- F = force or wt in kg to be found,
- A = Area of CS of dome,
- So A = Pi x D^2 / 4 = 3.14 x 14.6 x 14.6 /4 = 167 m2,
- As Pressure P = F / A,
- So F = P x A = 0.01 kg/cm2 x 167 m2 x 10^4 cm2 = 16700 kg,

Hence, we need dome must be greater than 16.7 T of wt; we have taken 17 T weight per dome.

IV) Organic Loading rate –

Volume load or organic loading rate is also an important parameter. It indicates how many kilograms of organic dry solids are loaded per m3 of digester volume and unit of time. The organic loading rate is important for the plant components (esp. mixer/agitator) and for the bacteria. If the organic loading rate is too high (over 4.0 kg DS/m3 d) technical components like mixers or pumps could be damaged or you need an earlier maintenance than calculated due to an overload. The bacteria could also be stressed by too much feeding consequently no biogas production will take place and the digestion process stops completely.

Organic loading rate = Organic dry solids loaded per day (kg.oDS/d) / Digester capacity

= (20,000 lit slurry x 0.08 % (TS in slurry) x 85 % (ODM)) / 1060

= 1.28 kg DS / m3.d (Which is quite less than 4.0), this is acceptable

V) Digested Slurry Chamber

The digested slurry overflows from the digester in to the Digested slurry chamber. Around 16,000 liters/day of slurry comes out from digester per day. This liquid slurry will then dried out as organic bio-manure in imported slurry separator. As we are providing one slurry separator, we took slurry holding volume for say 2 days i.e. 100 m3 in worst come worst case. Total volume of tank is 100 m3. The Digested slurry tank is made in RCC having size Dia 4m x 4m depth.

Instance 5:

I) Feed Preparation Section

The poultry litter is collected through conveyor and brought to slurry preparation tank. It is then mixed with water with 1:1.5 proportions to prepare feed solution at desired concentration. One no. of mixing chamber is used for slurry preparation. The size of mixing chamber will be ϕ3.0m x 3m depth made in RCC. We have 3 HP mechanical agitator which mixes dung in proper way in 3 m dia tank, suitable mechanical agitator is provided in this mixing chamber. The proper mixing serves the following objectives.

- To prepare feedstock with uniform particle size and of desired concentration
- To prevent settling of solids in the bottom of tank

The mixed slurry will be charged in to the biogas digester by pumping

II) Biogas Digester: Technology: - KVIC Water Jacket Floating Dome Digester Here we have proposed one number of biogas digester having 1236 CUM capacity. Dia of this tank is 15m and height is taken as 7m, so total volume is V=Pi x 15^2 X 7/4 = 1236 m3, as we will

be feeding 24.72 m3 slurry per digester, this will give 1236/24.72 = 50 days retention period. It is a two-stage biogas generation process to treat around 12000 kg poultry litter per day with hydraulic retention time (HRT) 50 day. It has size ϕ15m and depth 7 m. Digester work will be in 225mm RCC and is underground so there won't be temperate fluctuation effect in winter on biogas generation. Two no's of floating dome is made in MS fabrication work with diameter 14.6 m and height 1.5 m , so total volume per dome is @ 251 m3, we are also providing 2 biogas balloons to take care of biogas holding, Digesters has two inlets for feed slurry, one outlet for biogas and one outlet for digested slurry respectively. The feed slurry goes under anaerobic degradation where it gets converts in to biogas and organic manure with the help of anaerobic bacteria.

The efficiency of any digester is depends on physical properties like Temperature, consistency of feed, C: N ratio and stirring mechanism. Here we will consider all this while designing the plant and we will make sure that the overall performance of this would be more than 80% in all seasons.

The Bio methanation of poultry litter is takes place in following three distinctive stages in the digester.

- Hydrolysis of organic solids
- Acidification of hydrolyzed products
- Bio methanation of acidified slurry

The biogas produced here is initially collected into the biogas holder which is made in MS fabrication work and the digested slurry overflows through outlet chamber in to digested slurry tank.

III) Biogas holder/ Dome

It is a cylindrical dome fabricated on the top of the digester to hold produced biogas. The size of the dome is 14.6 m dia and 1.5 m height; the total volume per dome is @ 287 m3. The dome has got FRP lining to prevent corrosion to the dome. It has got four manholes each to break the scum and from a maintenance point of view. As we need to have 100 mm WC pressure for biogas to come out and fill in a balloon, the design parameters are taken below.

- Pressure P=100 mm WC = 0.01 kg/cm2,
- F = force or wt in kg to be found,
- A = Area of CS of dome
- So A = Pi x D^2 / 4 = 3.14 x 14.6 x 14.6 /4 = 167m2,
- As Pressure P = F / A,
- So F = P x A = 0.01 kg/cm2 x 167 m2 x 10^4 cm2 = 16700 kg,Hence we need dome must be greater than 16.7 T of wt; we have taken 18 T weight per dome.

IV) Organic Loading rate

Volume load or organic loading rate is also an important parameter. It indicates how many kilograms of organic dry solids are loaded per m3 of digester volume and unit of time. The organic loading rate is important for the plant components (esp. mixer/agitator) and for the bacteria. If the organic loading rate is too high (over 4.0 kg DS/m3 d) technical components like mixers or pumps could be damaged or you need an earlier maintenance than calculated due to an overload. The bacteria could also be stressed by too much feeding consequently no biogas production will take place and the digestion process stops completely.

Organic loading rate = Organic dry solids loaded per day (kg.oDS/d) / Digester capacity

= (36,000 lit slurry x 0.08 % (TS in slurry) x 85 % (ODM)) / 1236

= 1.98 kg DS / m3.d (Which is quite less than 4.0), this is acceptable

V) Digested Slurry Chamber

The digested slurry overflows from the digester into the Digested slurry chamber. Around 36,000 liters/day of slurry comes out of both digesters per day. This liquid slurry will then be dried out as organic bio-manure in imported slurry separator. As we are providing one slurry separator, we took slurry holding volume for say 2 days i.e. 100 m3 in worst come worst case. Total volume of the tank is 100 m3. The Digested slurry tank is made in RCC having size Dia 6m x 4m depth.

2.5 Project location

Instance 1

The S & P Feed private limited is strategically located in *Thengoda. Village: Baglan, Dist.: Nashik*. The coordinates of the plant are the following: 20°32'32.1"N 74°12'44.6"E. The location of the plant can also be seen through the following Google Maps link

https://www.google.com/maps?q=20.5422382,74.2123867

Instance 2

Sri Rajeshwara Hatcheries is located at village ampally, block dharur and dist. Vikarabad. The location of the plant can also be seen through the following Google Maps link.

https://goo.gl/maps/RsWMBb9EBHiptJ8UA

Instance 3

Sunmax hatcheries is located at village HOUSE NO-37/18/24/1, PLOT NO-28, DEFENCE COLONY, SAINIKPURI, SECUNDERABAD, Medchal -Malkajgiri, Siddhipet , Telangana 502279. The location of the plant can also be seen through the following Google Maps link.

https://goo.gl/maps/2MRCdhRErbacL6MAA

Instance 4

Kissan Hatcheries is located at village Morkhi, Jind Haryana. The location of the plant can also be seen through the following Google Maps link

https://goo.gl/maps/yJn3H3mNZzvP3NJc9

Instance 5

Siddhivinayak Breeding Farm and Hatcheries Ltd, Jiregaon, Kurkumbh, Daund Pune. The location of the plant can also be seen through the following Google Maps link

https://goo.gl/maps/7w8MQU7YUVAEvWhM6

Name	Latitude	longitude
Sri Rajeshwara Hatcheries	17° 15' 23.4'' N	78° 34' 28.1064'' E
Sunmax hatcheries	17° 47' 40.57'' N	78° 42' 54.1584'' E
Kissan Hatcheries	29° 24' 23.50'' N	76° 39' 42.86'' E
Siddhivinayak Breeding Farm and Hatcheries Ltd	18° 20' 55.8024'' N	74° 31' 22.1448'' E
S&P FEEDS PVT. LTD	20° 32' 32.9424'' N	74° 12' 39.3408'' E

2.6 Additional information about the GHG Project

The project activity meets the eligibility criteria to use simplified modalities and procedure for small- scale CDM project activities as set out in paragraph 6(c) of decision 17/CP.7. As per the decision 17/CP.7 Para 43, a CDM project activity is additional if anthropogenic

emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity. Further referring to Annex 14, EB 83 document of indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories, project participants have demonstrated the additionally of the project activity by carrying out investment analysis.

National Policies relevant to the project activity

The Government of India enacted the Electricity Act in the year 2003 to harmonize and rationalize the provisions in the then existing laws in India. The Act consolidated the laws relating to generation, transmission, distribution, trading and use of electricity. Section 3 of the said act requires the Central Government to prepare the national electricity policy and tariff policy, in consultation with the State Governments and the Authority for development of the power system based on optimal utilization of resources such as coal, natural gas, nuclear substances or materials, hydro and renewable sources of energy. In accordance with the section 3 of the Electricity Act 2003, the Central Government notified the National Electricity Policy on 12. February 2005 which was in force at the time of completion of the baseline study as stated in the PDD of the project activity

The Electricity Act and the National Electricity Policy lay emphasis on captive power generation to not only secure reliable, quality and cost-effective power but also to facilitate creation of employment opportunities through speedy and efficient growth of industry. The National Electricity Policy also emphasizes the need to promote the use of non-conventional energy sources to meet the power deficit in the country.

Option (a) of "Tool for Demonstration of Additionally of Small-Scale Project Activities" (EB 83, Annex 14, Version 10.0), i.e., Investment barrier has been selected to demonstrate additionally. Since the project uses the approved methodology AMS I.D. which defines the baseline of the projects, hence for this project discussion on alternatives is not necessary. To demonstrate the Investment barrier for the proposed small scale CDM project PP has carried out Investment analysis as follows.

Financial Additionally

The project activity involves the implementation of a biogas based power project while the identified baseline scenario for the project is the import of power from the grid. As per paragraph 19 of the "Guidelines on the Assessment of Investment Analysis (version 03), "If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment and a benchmark approach is considered appropriate." Accordingly, benchmark analysis has been selected and project NPV has been chosen as financial indicator. Project NPV and IRR are normally the financial indicators used by

lending agencies and investors alike to ascertain the investment worthiness of the project. Moreover, Additionally Tool permits the use of NPV as financial indicator for additionally demonstration. Further as the project is financed 100% by equity, the project NPV and equity NPV are one and the same.

Guidance 12 of the "Guidelines on the assessment of Investment analysis (Version 5.0)" states that "Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR". Though the project is 100% funded by equity and hence the resultant NPV is equity NPV, as explained above, there is no difference between equity NPV and project NPV in this case. Guidance on Investment Analysis does not restrict the use of commercial lending rate as the benchmark/discount rate for equity NPV. Accordingly, the commercial lending rate (Prime Lending Rate - PLR) published by the Reserve Bank of India for the period July-August 2007, which was the period preceding the decision making, has been selected as discount factor. Therefore the discount factor conforms to para 11 of Annex 12, EB 85. The PLR at the time of decision making (12.09.2007) was ranging between 12.75% and 13.25%9. The lower end of the range 12.75% has been chosen as the discount factor, which is conservative.

The project activity involves setting up of a 0.5MW bio-Methanation-cum-captive power plant in Maharashtra. The project involves bio digester and gas engine. Though bio digesters fall within the project boundary, project developer does not intend to claim any credit for the methane abatement. Therefore, though investment and operating costs of bio digester have been reckoned in the investment and revenue costs, no CERs have been claimed for the methane abatement, which the bio digester contributes to. The financial indicator - Net Present Value - has been calculated in the additional sheet provided.

3 Quantification of GHG emissions reduction

3.1 Quantification methodology

The methodologies used to quantify emission reductions from project activities are as follows.

- Sectoral Scope 1: Energy industries (renewable - / non-renewable sources)
- Sectoral Scope 13: Waste handling and disposal

- AMS-I.D. Grid-connected renewable electricity generation- Small Scale version 18[1]
- **AMS-III.D.:** Methane recovery in animal manure management systems --- Version 21[2]
- **Tool 02:** Combined tool to identify the baseline scenario and demonstrate additionally version 7[3]
- **Tool 05 :** Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation version 3[4]
- **Tool 04**: Emissions from solid waste disposal sites version 8.1 [5]
- **Tool 14**: Project and leakage emissions from anaerobic digesters version 2 [6]
- **Tool 08**: Tool to determine the mass flow of a greenhouse gas in a gaseous stream version 3 [7]

3.1.1 Applicability conditions of the methodology

AMS-I. D Applicability conditions.

SL.no	Applicability conditions	Application status
1	This methodology is applicable to project activities that a. Install a Greenfield plant b. Involve a capacity addition in (an) existing plant(s) c. Involve a retrofit of (an) existing plant(s) d. Involve a rehabilitation of (an) existing plant(s)/unit(s) e. Involve a replacement of (an) existing plant(s)	The project involves the establishment of greenfield plants in locations where no plants had been previously established

[1] https://cdm.unfccc.int/methodologies/DB/W3TINZ7KKWCK7L8WTXFQQOFQQH4SBK
[2] https://cdm.unfccc.int/methodologies/DB/H9DVSB24O7GEZQYLYNWUX23YS6G4RC
[3] https://cdm.unfccc.int/Reference/tools/index.html
[4] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-05-v3.0.pdf
[5] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-04-v8.1.pdf
[6] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-14-v3.pdf
[7] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-08-v3.0.pdf

2	Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology a. The project activity is implemented in an existing reservoir with no change in the volume of reservoir b. The project activity is implemented in an existing reservoir, where the volume of reservoir is increased and the power density of the project activity, as per definitions given in the project emissions section, is greater than 4 W/m c. The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m	The project activity is not a hydro power plant
3	If the new unit has both renewable and non-renewable components (e.g. a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW	The project generates renewable energy using generated biogas. It does not involve non-renewable component
4	In the case of project activities that involve the capacity addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct1 from the existing units	The project activity does not exceed the limit has been mentioned by applied methodology
5	Combined heat and power (co-generation) systems are not eligible under this category	The project activity does not have heat engine installed within its boundaries.

		Therefore, the projects are not Co-generation. Hence not applicable
6	In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW	The project activity does not exceed the limit has been mentioned by applied methodology.
7	In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as "AMS-I.C.: Thermal energy production with or without electricity" shall be explored	The project activity does not use the use the landfill gas, wastewater treatment, the electricity is generated by poultry form waste.
8	In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply	The project activity does not use the biomass for the generation of electricity

AMS-III.D Applicability conditions

SL.no	**Applicability conditions**	**Application status**
1.a	The livestock population in the farm is managed under confined conditions	All the animals in the poultry farm are limited to a confined space. This ensures proper monitoring

		and temperature control. Hence this meth is applicable
1.b	Manure or the streams obtained after treatment are not discharged into natural water resources (e.g. river or estuaries), otherwise "AMS-III.H Methane recovery in wastewater treatment" shall be applied	Manure obtained in the project activity are being used for agricultural purposes, they are not being discharged into natural water resources
1.c	The annual average temperature of baseline site where anaerobic manure treatment facility is located is higher than 5°C	The ambient temperature of all the sites is well above 25°C
1.d	In the baseline scenario the retention time of manure waste in the anaerobic treatment system is greater than one month, and if anaerobic lagoons are used in the baseline, their depths are at least 1 m	In the baseline the waste is being duped in lagoons where the remain until full anaerobic decomposition. Thus, the waste remains there for over a month
1.e	No methane recovery and destruction by flaring or combustion for gainful use takes place in the baseline scenario	There is no method of methane destruction in the baseline scenario
2.a	The residual waste from the animal manure management system shall be handled aerobically, otherwise the related emissions shall be taken into account as per relevant procedures of "AMS-III.AO Methane recovery through controlled anaerobic digestion". In the case of soil application, proper conditions and procedures (not resulting in methane emissions) must be ensured	There is no residual waste produced in the system. All the waste is being used to generate biogas. The project ensures no methane emission are being
2.b	Technical measures shall be used (including a flare for exigencies) to ensure	There is no flaring mechanism in any of the 5 sites in this project

	that all biogas produced by the digester is used or flared	activity. The auxiliary consumption exceeds the power generated by the biogas generators
2.c	The storage time of the manure after removal from the animal barns, including transportation, should not exceed 45 days before being fed into the anaerobic digester. If the project proponent can demonstrate that the dry matter content of the manure when removed from the animal barns is larger than 20%, this time constraint will not apply	The waste is located at the site itself. As per requirement the slurry is pumped directly to the digester every week. Hence the storage time of the manure after removal from the animal barns does not exceed 45 days
3	Projects that recover methane from landfills shall use "AMS-III.G Landfill methane recovery" and projects for wastewater treatment shall use AMS-III.H. Projects for composting of animal manure shall use "AMS-III.F Avoidance of methane emissions through composting". Project activities involving co-digestion of animal manure and other organic matters shall use the methodology "AMS-III.AO Methane recovery through controlled anaerobic digestion	The project activity does not recover the methane from the land fill, wastewater treatment will not be happening, composting activity also not happing in the project activity
4	Utilization of the recovered biogas in one of the options detailed in AMS-III.H is also eligible under this methodology. The respective procedures in AMS-III.H shall be followed in this regard. If the recovered biogas is used to power auxiliary equipment of the project activity, it should be taken into account accordingly, using zero as its emission factor; however, energy used for such	This condition is not applicable

	purposes is not eligible as an SSC CDM Type I project component	
5	New facilities (Greenfield projects) and project activities involving capacity additions compared to the baseline scenario are only eligible if they comply with the related and relevant requirements in the "General guidelines for SSC CDM methodologies	The project follows "General guidelines for SSC CDM methodologies". The detailed analysis has been given in section additionally
5	The requirements concerning demonstration of the remaining lifetime of the replaced equipment shall be met as described in the "General guidelines for SSC CDM methodologies	*The remaining lifetime of the project will be demonstrated based on "General guidelines for SSC CDM methodologies".*
6	Measures are limited to those that result in aggregate emission reductions of less than or equal to 60 kt CO_2 equivalent annually from all Type III components of the project activity	*The project generated less than 60 kt CO_2 equivalent annually*

3.1.2 Methodology deviations (if applicable)

Methodology deviation is not applicable.

3.2 Project boundaries, sources and GHGs

As per the applied methodology Project boundary defines All the power plants physically connected to the electricity and the physical and geographical site of livestock, Animal manure management systems.

The project Boundary includes all the power plants physically injected into the national grid system Therefore, the entire national grid and all connected power plants have been considered in the project boundary for the project activity.

The project boundary for the Physical and geographical stie of livestock and animal manure management system details has been provided in Section 3.2.1

3.2.1 Spatial limits of the project

The project activity involved physical and geographical site all the information has been elaborated below.


HARYANA
DISTRICT MAP
HIMACHAL PRADESH
N
CHANDIGARH
Panchkula
PANCHKULA
PUNJAB
Ambala
AMBALA
YAMUNANAGAR
Yamunanagar
Thanesar
KURUKSHETRA
Kaithal
KAITHAL
Karnal
KARNAL
UTTAR PRADESH
SIRSA
Sirsa
FATEHABAD
Fatehabad
JIND
Jind
Panipat
PANIPAT
HISAR
Hisar
SONIPAT
Sonipat
ROHTAK
Rohtak
RAJASTHAN
Bhiwani
BHIWANI
Charkhi Dadri
DADRI
Jhajjar
JHAJJAR
DELHI
Gurgaon
Faridabad
FARIDABAD
Rewari
Gurugram
REWARI
Nuh
Palwal
PALWAL
Narnaul
MAHENDRAGARH
MEWAT
LEGEND
State Boundary
District Boundary
State Capital
District HQ
Map not to Scale
Copyright © www.mapsofworld.com

	
Siddhivinayak Breeding Farm and Hatcheries Ltd	S&P FEEDS PVT. LTD

	
Sunmax hatcheries	*Sri Rajeshwara Hatcheries*

3.2.2 Carbon reservoirs and GHG sources

Source or reservoir	GHG	Included (Yes/No/Optional)	Justification
Electricity Generation	CO_2	Yes	Main emission source
	CH_4	No	This is conservative. Excluded for simplication
	N_2O	No	Not included
Industrial Effluent-based Project	CO_2	No	It is assumed that CO2 emission from surplus biomass do not lead to changes of carbon pools
	CH_4	Yes	This emission source shall be included in cases where the waste is treated(partly) under anaerobic conditions
	N_2O	No	Excluded for simplication. This emission source is assumed to be small

3.2.3 Time limits and analysis periods

Project timeframes correspond to the periods during which GHG emission reductions are quantified. The quantification periods are defined in section 10.5 of the BCR Standard.

3.2.3.1 Project start date

- Start date : 01-07-2021
- Baseline Period : 2020-2021
- Termination of Project : 10 years
- Frequency of monitoring, reporting and crediting period: 2-3 years
- Validation and verification activities: as per norms of the registry.

3.2.3.2 Quantification period of GHG emission reductions/removals

The crediting period for the Project Activity Instance will span 10 years. The initial project crediting period extends from 01-07-2021 to 1-7-2031

The most efficient way, in terms of costs, to reduce GHG emissions is to modify the operational conditions of WWTPs units but this is not always possible due to the operational limitations of the installed units. In the following sections, some recommendations about the possible actions to put in practice to operate WWPTs in order to reduce GHG emissions are provided

N_2O Production

Data obtained from the operation of full-scale WWTPs show a wide range of values for the fraction of nitrogen that is emitted as N2O (0–14.6% of the nitrogen load). Such large variation can be related to the different operational conditions imposed in the studied WWTPs. Having this in mind decreasing the amounts of N2O emitted from activated sludge processes presents a great potential for improvement, by avoiding those operational conditions identified as responsible for its production. Some identified conditions are (i) low dissolved oxygen concentration in the nitrification and the presence of oxygen in denitrification stages, (ii) high nitrite concentrations in both nitrification and denitrification stages, (iii) low COD/N ratio in the denitrification stage, (iv) sudden shifts of pH and dissolved oxygen and ammonia and nitrite concentrations, and (v) transient anoxic and aerobic conditions

Therefore, to minimize N2O emissions, biological wastewater treatment plants should be operated at high solid retention times (SRT) to maintain low ammonia and nitrite concentrations in the media. Furthermore large bioreactor volumes are recommended to dispose of systems able to buffer loadings and reduce the risk of transient oxygen depletion.

N2O emissions can be also reduced if nitrous oxide stripping by aeration is limited since microorganisms would have more time to consume it.

CH_4 Production

CH4 emissions can be minimized if thickening sludge tanks and sludge disposal tanks are covered to avoid gas leakages and their emissions are captured by hoods which could be burnt with excess biogas in a torch. Besides the methane produced in the plant itself, methane also enters the plant from outside via the influent since it contains CH4 that has been formed in the sewer. The methane load was estimated as 1% of the influent COD load and is mainly oxidized in the activated sludge tanks (80%), which could be exploited as a means to further decrease methane emissions from wastewater treatment.

CO_2 Production

Organic matter oxidation in the biological reactors and combustion of CH4 are responsible for the direct CO2 emissions while indirect emissions are attributed to the energy consumption of the WWTP [26]. The SRT applied to the biological reactor is a key operational factor that affects these emissions. The operation of the activated sludge system at high values of SRT promotes endogenous respiration of biomass which increases the amount of COD oxidized to CO2 and decreases the overall sludge production. This decrease of sludge production implies a decrease of methane production and, therefore, a decrease of the CO2 emissions associated with its combustion. Both tendencies counteract each other, and the addition value of both quantities remains almost constant. Furthermore, the decrease of the SRT also involves an increase of the energy efficiency of the WWTP and, therefore, a decrease of indirect CO2 emissions. Therefore, CO2 emissions should be minimized by applying the shortest SRT value as possible without negatively affecting the effluent quality.

The effect of SRT on the overall CO2 emissions of a conventional WWTP can be quantified by performing mass and energy balances according to the methodology described by Campos et al. The SRT values tested ranged from 10 to 30 d in order to guarantee stable nitrification. Results showed that an increase of the SRT from 10 to 30 days was supposed an increase of 7.6% of the CO2 emissions.

3.2.3.3 Monitoring periods

Monitoring period activities are as follows.
First monitoring period : 01-01-2021 to DD-MMMM-YYYY
Second monitoring period :

3.3 Identification and description of the baseline or reference scenario

As per applied methodology of AMS-I. D the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants.

The project involved the generation of electricity from the biogas plant and supply to the grid. In the absence of the project activity, the equivalent amount of power would have been supplied to the electricity grid by the operation of grid-connected power plants and by the addition of new generation sources

As per AMS-III.D, "The baseline scenario is the situation where, in the absence of the project activity, biomass and other organic matter (including manure where applicable) are left to decay within the project boundary and methane is emitted to the atmosphere.

In this context, biomass and other organic matter, including manure/poultry waste, are allowed to naturally decay. As a result of this decay process, methane is emitted into the atmosphere

The project aims to mitigate these emissions by capturing and utilizing the methane through the implementation of biogas technology, thereby providing an environmentally friendly and sustainable alternative.

3.4 Additionality

The project activity meets the eligibility criteria to use simplified modalities and procedure for small- scale CDM project activities as set out in paragraph 6(c) of decision 17/CP.7. As per the decision 17/CP.7 Para 43, a CDM project activity is additional if anthropogenic emissions of greenhouse gases by sources are reduced below those that would have occurred in the absence of the registered CDM project activity. Further referring to Annex 14, EB 83 document of indicative simplified baseline and monitoring methodologies for selected small scale CDM project activity categories, project participants have demonstrated the additionally of the project activity by carrying out investment analysis.

National Policies relevant to the project activity

The Government of India enacted the Electricity Act7in the year 2003 to harmonize and rationalize the provisions in the then existing laws in India. The Act consolidated the laws relating to generation, transmission, distribution, trading and use of electricity. Section 3 of the said act requires the Central Government to prepare the national electricity policy and tariff policy, in consultation with the State Governments and the Authority for the development of the power system based on optimal utilization of resources such as coal, natural gas, nuclear substances or materials, hydro and renewable sources of energy. In accordance with the section 3 of the Electricity Act 2003, the Central Government notified the National Electricity Policy on 12. February 2005 which was in force at the time of completion of the baseline study as stated in the PDD of the project activity.

The Electricity Act and the National Electricity Policy lay emphasis on captive power generation to not only secure reliable, quality, and cost-effective power but also to facilitate creation of employment opportunities through speedy and efficient growth of industry. The National Electricity Policy also emphasizes the need to promote the use of non-conventional energy sources to meet the power deficit in the country.

Option (a) of "Tool for Demonstration of Additionally of Small-Scale Project Activities" (EB 83, Annex 14, Version 10.0), i.e., Investment barrier has been selected to demonstrate additionally. Since the project uses the approved methodology AMS I.D. which defines the baseline of the projects, hence for this project discussion on alternatives is not necessary.

To demonstrate the Investment barrier for the proposed small scale CDM project PP has carried out an investment analysis as follows.

Financial Additionally

The project involves the implementation of a biogas-based power project while the identified baseline scenario for the project is the import of power from the grid. As per paragraph 19 of the "Guidelines on the Assessment of Investment Analysis (version 03), "If the alternative to the project activity is the supply of electricity from a grid this is not to be considered an investment, and a benchmark approach is considered appropriate." Accordingly, benchmark analysis has been selected and project NPV has been chosen as a financial indicator. Project NPV and IRR are normally the financial indicators used by lending agencies and investors alike to ascertain the investment worthiness of the project. Moreover, Additionally, Tool permits the use of NPV as a financial indicator for additional demonstration. Further, as the project is financed 100% by equity, the project NPV and equity NPV are one and the same

Guidance 12 of the "Guidelines on the Assessment of Investment Analysis (Version 5.0)" states that "Local commercial lending rates or weighted average costs of capital (WACC) are appropriate benchmarks for a project IRR". Though the project is 100% funded by equity and hence the resultant NPV is equity NPV, as explained above, there is no difference between equity NPV and project NPV in this case. Guidance on Investment Analysis does not restrict the use of commercial lending rate as the benchmark/discount rate for equity NPV. Accordingly, the commercial lending rate (Prime Lending Rate - PLR) published by the Reserve Bank of India for the period July-August 2007, which was the period preceding the decision-making, has been selected as a discount factor. Therefore the discount factor conforms to para 11 of Annex 12, EB 85. The PLR at the time of decision making (12.09.2007) was ranging between 12.75% and 13.25%. The lower end of the range of 12.75% has been chosen as the discount factor, which is conservative.

The project activity involves setting up a 1.5MW bio-Methanation-cum-captive power plant in Maharashtra. The project involves a bio-digester and gas engine. Though bio digester falls within the project boundary, the project developer does not intend to claim any credit for the methane abatement. Therefore, though the investment and operating costs of the bio-digester have been reckoned in the investment and revenue costs, no CERs have been claimed for the methane abatement, which the bio-digester contributes to. The financial indicator - Net Present Value - has been calculated in the additional sheet provided.

3.5 Uncertainty management

The project adopts a robust and conservative approach to the calculation of greenhouse gas (GHG) emission reductions by strictly adhering to methodologies AMS-III.D (methane recovery and avoidance) and AMS-I.D (grid-connected renewable electricity generation) under the Clean Development Mechanism (CDM). These methodologies are designed to minimize uncertainty and ensure environmental integrity by incorporating conservative default values, standardized equations, and well-defined boundary conditions.

To further manage and mitigate uncertainties, the project utilizes clearly defined parameters that align with the monitoring requirements of AMS-III.D, AMS-I.D, and relevant elements from AMS-III.AO. These parameters include, but are not limited to, biogas production volume, methane content, electricity generation and export to the grid, baseline grid emission factors, and methane leakage prevention. Each parameter is selected based on methodological relevance and supported by documented rationale and reliable data sources, including on-site measurements, calibrated instrumentation, and third-party data where applicable.

The monitoring procedures are designed in accordance with the respective methodologies and are embedded within the project's Monitoring Plan. This includes specifications for data collection frequency, metering equipment accuracy, calibration procedures, and quality assurance/quality control (QA/QC) protocols. The project ensures that all monitoring equipment is maintained and calibrated regularly to reduce measurement error and uphold data reliability.

All project data, including raw values, processed information, and derived emission reductions, are systematically recorded and stored in a secure digital data management system. This system supports traceability and transparency, and allows for real-time tracking, validation, and reporting. The system is structured to allow Conformity Assessment Bodies (CABs) to independently verify the accuracy, consistency, and completeness of data during the validation and verification processes.

Additionally, during each verification cycle, uncertainty sources—such as measurement deviations, sampling errors, and estimation uncertainties—are thoroughly reviewed. Where necessary, conservative assumptions are applied to safeguard the credibility of emission reduction claims. The implementation of regular internal audits and capacity-building for monitoring personnel further enhances data quality and minimizes risk.

3.6 Leakage and non-permanence

As per applied methodology AMS-III.D Methane recovery in animal manure management systems and Tool 14 Project and leakage emissions from anaerobic digesters.

The project activity does not use electricity consumption for the operation of anaerobic digester since leakage for this will be zero LE= 0

The project activity consist of the diesel generator in the project location and project boundary, but these generators only used in emergency situation, up to the till date diesel generator not have been used for the operation of anaerobic digestor LE=0

The project activity does not have any physical leakage through roof sidewall and safety valves and no emission from biogas flaring LE=0

Project activity did not transfer any equipment from another activity, they are all brand newly constructed. Therefore, leakage emission is accepted as zero

As per AMS-I.D. in Section 7 states that "The methodology is applicable to a programme of activities, no additional leakage estimations are necessary other than that indicated under leakage section above."

Project activity does not use biomass and does not claim CO_2 emission reduction from the plant residues; therefore, leakage of the project activity is taken as zero as per AMS-I.D

3.7 Mitigation results

- Reduced greenhouse gas emissions: Mitigation measures, such as transitioning to renewable energy sources, improving energy efficiency, and implementing sustainable transportation systems, help reduce the amount of greenhouse gases released into the atmosphere. This reduction contributes to mitigating climate change by limiting the warming effect of these gases.
- Climate change adaptation: Mitigation actions can also help communities adapt to the impacts of climate change. By reducing greenhouse gas emissions, the rate and severity of climate change can be moderated, giving communities more time to adapt and prepare for changes in temperature, precipitation patterns, sea-level rise, and extreme weather events.
- Improved air quality: Many mitigation actions, such as transitioning from fossil fuels to cleaner energy sources, can lead to improved air quality. This reduction in air pollution has significant health benefits, as it decreases respiratory and cardiovascular diseases and improves overall well-being.
- Energy security and independence: Mitigation efforts often involve diversifying energy sources and reducing reliance on fossil fuels. This can enhance energy security by reducing dependence on imported energy and volatile fuel prices. Additionally, renewable energy sources, such as solar and wind, are typically domestically available and can contribute to energy independence.
- Economic opportunities and job creation: The transition to a low-carbon economy can create new economic opportunities and generate jobs. Investments in renewable

energy, energy efficiency, sustainable transportation, and green technologies can stimulate economic growth and foster innovation and entrepreneurship.

- Enhanced public health and well-being: Mitigation measures not only improve air quality but also have broader health benefits. For example, promoting active transportation options like walking and cycling can lead to increased physical activity levels, reducing the risk of chronic diseases. Green spaces and urban greening initiatives associated with mitigation efforts can also improve mental health and well-being.
- Biodiversity conservation and ecosystem preservation: Mitigation actions can help protect and preserve ecosystems and biodiversity. By reducing deforestation, promoting sustainable land use practices, and preserving natural habitats, mitigation efforts contribute to the conservation of ecosystems and the preservation of biodiversity, ensuring their long-term viability.
- Overall, mitigation actions have the potential to address climate change, improve environmental conditions, create economic opportunities, enhance public health, and protect natural ecosystems, leading to a more sustainable and resilient future

3.7.1 Eligible areas within GHG project boundaries (AFOLU sector projects)

GHG project boundaries are not applicable to renewable energy projects.

3.7.2 Stratification (Projects in the AFOLU sector)

GHG project boundaries are not applicable to renewable energy projects

3.7.3 GHG baseline emissions

The baseline scenario of the proposed project activity is off-grid power plant, which is where the electricity delivered by the project is fed to facility/ factory premises for captive purposes. In the absence of the proposed project activity, the same amount of electricity is required to be supplied via either the power plants or thermal power plants, thus increasing GHG emissions. In addition, before the project activity, industrial effluent at the factory/ facility premises was supplied to the WTP plant. Hence greenhouse gases generated from industrial effluent were released directly into the atmosphere.

Hence, emissions associated with the baseline scenario are CH_4 emissions due to the atmospheric release of methane sourced from industrial effluent to WTP and CO_2 emissions due to the power generation by the national grid which is dominated by fossil fuel-burning power plants. Through the project's implementation, the methane previously released from effluent aerobically is captured by anaerobic digestion and utilized to produce electricity / electric energy through biogas generator systems in the biogas power plantIn addition, the electricity generated at the plant is directly fed to facility/factory

premises for captive purposes, avoiding or replacing the dispatch of the same amount of electricity from fossil-fuel-based power plants connected to the grid.

3.7.4 GHG project emissions

In the table below the ex-ante calculations are the estimated GHG emission reductions over the entire quantification period of the proposed project.

Year	Annual estimation of emission reductions in tonnes of CO2e
Year 1	9,203
Year 2	9,203
Year 3	9,203
Year 4	9,203
Year 5	9,203
Year 6	9,203
Year 7	9,203
Year 8	9,203
Year 9	9,203
Year 10	9,203
Total estimated reductions (tonnes of CO2e)	**92,030**
Total nunber of crediting years	**10**
Annual average of the estimated reductions over the crediting period (tones of CO2e)	**9,203**

Indicated the total estimated emission reductions during the project's quantification period and the estimated annual average

3.7.5 GHG leakages.

Year	GHG emission reductions/removals in the baseline scenario (tCO2e)	GHG emission reductions/removals in the project scenario (tCO_{2e})	GHG emissions attributable to leakages (tCO_{2e})	Estimated Net GHG Reduction/Removals (tCO_{2e})
Year 1	1905	11108	0	**9203**

Year	GHG emission reductions/removals in the baseline scenario (tCO2e)	GHG emission reductions/removals in the project scenario (tCO_{2e})	GHG emissions attributable to leakages (tCO_{2e})	Estimated Net GHG Reduction/Removals (tCO_{2e})
Year 2	1905	11108	0	**9203**
Year 3	1905	11108	0	**9203**
Year 4 **Year 5**	1905 1905	11108	0	**9203**
Year 6	1905	11108	0	**9203**
Year 7	1905	11108	0	**9203**
Year 8	1905	11108	0	**9203**
Year 9	1905	11108	0	**9203**
Year 10	1905	11108	0	**9203**
Total	**19050**	**111080**	**0**	**92030**

4 Compliance with Laws, Statutes and Other Regulatory Frameworks

The project activity falls under the White category of industries as per local environmental regulations. Industries classified under the White category are considered non-polluting and are, therefore, exempt from the requirement of obtaining a 'Consent to Operate' from the respective State Pollution Control Board. Owing to the project's classification in this category and its non-polluting nature, the activity is deemed to be in full compliance with applicable local environmental laws and regulations. This assessment excludes policies and guidelines that do not carry legally binding status, in line with the guidance for compliance analysis.

The project is aligned with all relevant national laws and regulations governing energy generation in India, including but not limited to

- Electricity Act 2003
- National Electricity Policy 2005
- The Electricity (Supply) Act, 1948

- The Electricity Regulation Commission Act, 19983
- Tariff Policy 2006
- The factories act 1948

The Project activity conforms to all the applicable laws and regulations in India:

- Power generation using renewable energy is not a legal requirement or a mandatory option
- There are state and sectoral policies, framed primarily to encourage Solar power projects
- These policies have also been drafted realizing the extent of risks involved in the projects and to attract private investments
- The Indian Electricity Act, 2003 (May 2007 Amendment) does not influence the choice of fuel used for power generation

There is not any mandatory requirement to implement the project activity. The project is not enforced by law. Since voluntary commitments/agreements within a sector or by an entity do not constitute the legal requirement.

5 Carbon ownership and rights

5.1 Project holder

Individual or organization	Uniconn Platforms Pvt. Ltd
Contact person	Vinod Beriwal
Job position	CEO
Address	MIDC Mahad, Dist: Raigad, Maharashtra
Phone number	9824399410
Email	vinod@uniconnplatforms.com

5.2 Other project participants

Individual or organization	S & P Feed private limited
Contact person	Sushant Patil
Job position	CEO
Address	Flat No. 101, Rushiraj House, Behind Kotak Mahindra Bank, Kulkarni baug , Lane No.2, College Road, Nashik-422005

Phone number	8888829717
Email	sushantpatil@anandagro.com

Individual or organization	Sri Rajeshwara Hatcheries
Contact person	Rohit Mane
Job position	CEO
Address	At post: Ampally,Tal.: Dharur, Dist.: Vikarabad, state: Telangana, india
Phone number	8007717006
Email	rohitmane518@gmail.com

Individual or organization	Sunmax Hatcheries
Contact person	Yewan Reddy
Job position	CEO
Address	At post: Darsarlapally, Tal.: Mulugu , Dist.: Siddipet, state: Telangana, india
Phone number	7799017894
Email	info@deccanagrofarm.com

Individual or organization	Kissan Hatcheries
Contact person	Vinod
Job position	CEO

Address	At post: Morkhi, Tal.: Pillukhera, Dist.: Jind, state: Haryana, india
Phone number	80532102591
Email	kissanhatcheries@gmail.com

Individual or organization	Siddhivinayak Breeding farm and Hatcheries ltd
Contact person	Ajay Joshi
Job position	CEO
Address	At post: Jiregaon, Tal: Daund, Dist: Pune State: Maharashtra, india
Phone number	9823129389
Email	spbf@ymail.com

5.3 Agreements related to carbon rights

The full ownership of all carbon credits and related environmental benefits generated by the project activity lies with the project proponent, UNICONN Platforms Private Limited. This ownership includes all rights to claim, register, verify, and trade the greenhouse gas (GHG) emission reductions resulting from the implementation of the project.

To ensure clarity and legal certainty regarding carbon rights, all other entities or stakeholders involved in the project activity have formally transferred their rights related to carbon credits to UNICONN Platforms Private Limited. This transfer was executed through a legally binding agreement dated 05 April 2023. The agreement clearly stipulates that UNICONN Platforms Private Limited have exclusive rights over the carbon credits and any associated co-benefits, ensuring there is no conflict of ownership or claim from any third party.

This arrangement complies with the BioCarbon Registry requirements for demonstrating undisputed ownership of emission reductions and supports the transparent and credible issuance of carbon credits under the project.

5.4 Land tenure (Projects in the AFOLU sector)

Land Tenure is not applicable to renewable energy projects.

6 Climate change adaptation

- **Understanding climate risks**: Adaptation begins with understanding the specific climate-related risks and impacts that a particular region or community is facing or likely to face. This involves assessing factors such as temperature changes, sea-level rise, changing precipitation patterns, and increased frequency and intensity of extreme weather events.
- **Vulnerability assessments:** Vulnerability assessments of industrial effluent treatment-based biogas to power projects involve identifying potential risks and vulnerabilities that could impact the project's operations, efficiency, and safety.
- **Building resilience:** Adaptation strategies aim to build resilience, which refers to the ability of a system or community to withstand and recover from climate-related shocks and stresses. This can involve strengthening infrastructure, diversifying livelihoods, improving disaster preparedness, and implementing nature-based solutions that enhance ecosystem resilience
- **Water management:** Climate change affects water availability and quality, making it a critical aspect of adaptation. Strategies for water management can include improving water efficiency, implementing sustainable water storage and distribution systems, and managing risks related to flooding and drought
- **Agriculture and food security:** Changing climate patterns impact agricultural productivity and food security. Adaptation in agriculture involves implementing practices such as crop diversification, water management, soil conservation, and promoting climate-resilient crop varieties to ensure food production and livelihoods in the face of changing conditions
- **Infrastructure and urban planning:** Adapting infrastructure and urban planning to climate change is crucial to ensure the safety and functionality of cities and communities. This can include incorporating climate resilience into the design and construction of buildings, transportation systems, and water and sanitation infrastructure
- **Ecosystem-based approaches:** Ecosystems provide vital services and play a significant role in adaptation of climate change. Protecting and restoring ecosystems, such as forests, wetlands, and coastal areas, can help mitigate climate impacts, regulate water flow, and provide natural buffers against extreme events
- **Knowledge sharing and capacity building:** Adaptation requires the sharing of knowledge, best practices, and lessons learned among stakeholders. Capacity-

building initiatives aim to enhance the skills, resources, and institutional capacities necessary for effective adaptation planning, implementation, and monitoring.

- **Community engagement:** Engaging local communities, including indigenous peoples and marginalized groups, is crucial for successful adaptation. Involving communities in decision-making processes, incorporating traditional knowledge, and supporting community-led initiatives increases the effectiveness and acceptance of adaptation measures
- **Policy and governance:** Adaptation efforts are supported by policies, regulations, and governance frameworks at different levels, from local to international. Governments play a critical role in creating enabling environments, providing funding and incentives, and integrating adaptation into broader development planning and policies.

7 Risk management

The project activity has been designed to minimize environmental, technical, and operational risks through robust planning, technology selection, and management systems. As a grouped biogas-to-power generation project using anaerobic digestion of poultry litter and industrial effluent, key technical and environmental risks are proactively addressed through process standardization, redundancy in critical systems (e.g., backup biogas storage and emergency gensets), and strict monitoring protocols.

Operational risks such as equipment malfunction, gas leakage, or system downtime are mitigated by

- Use of proven technologies
- Routine maintenance schedules and equipment calibration procedures
- Adequate staff training and capacity-building
- Installation of gas cleaning and scrubbing systems for safe engine operation
- Continuous monitoring of biogas production, composition, and power generation as per AMS-III.D and AMS-I. D methodologies

Risks related to data management and credit integrity are managed through a centralized data logging and digital storage system, ensuring accuracy, traceability, and compliance with the monitoring plan.

The project proponent, Uniconn Platforms Private Limited, maintains a strong risk governance structure, including contingency plans and a clear protocol for the inclusion of future instances. For any new instances, eligibility, applicability, and regulatory

conditions will be reviewed to ensure compliance with the approved methodologies and the BioCarbon Registry guidelines.

In summary, the project employs a low-risk operational model, backed by technological safeguards and good practice monitoring, to ensure sustained emission reductions and environmental performance throughout the crediting period.

7.1 Reversal Risk

The project activity involves the generation of renewable energy from biogas derived from poultry litter, industrial effluent, and non-hazardous organic waste. As such, it does not involve carbon sequestration or the storage of carbon in biomass or soil, and therefore is not subject to physical reversal of GHG removals. The emission reductions are achieved through the destruction of methane (CH_4) that would have otherwise been released into the atmosphere and through displacement of fossil fuel-based electricity generation, making the reductions permanent and irreversible once they occur.

Despite the low nature of reversal risk for this type of project, the project proponent, Uniconn Platforms Private Limited, has implemented robust operational and institutional measures to ensure the long-term sustainability of the project and continuity of emission reductions. These measures include.

- A detailed Operations Manual and Work Plan, which outlines all standard operating procedures, maintenance schedules, and emergency response protocols. This document is officially registered with local authorities and forms the basis for obtaining and renewing waste management permits
- Ongoing training and employment of qualified staff, including local workers from nearby villages, which ensures stable operational performance and community support
- The presence of a centralized monitoring and data management system, which ensures transparency, traceability, and early identification of any operational deviations.

7.1.1 Loss Event Report

There is no loss event occurred in the project activity. If any activity or event occurs in the future, the same will be reflected in the monitoring report.

8 Sustainable development safeguards (SDSs)

The project activity has undergone a comprehensive environmental and social impact assessment in line with “Sustainable Development Safeguards (SDSs)”. The results of this

assessment demonstrate that the project does not cause any net harm to the environment or local communities and contributes positively to multiple aspects of sustainable development.

Environmental Impacts

The project involves the treatment of poultry litter, food waste, and industrial effluent through anaerobic digestion, converting organic waste into biogas for electricity generation.

- Reduces methane emissions that would occur if the waste were left to decay unmanaged
- Prevents water and soil contamination by avoiding direct disposal of waste
- Generates organic fertilizer as a by-product, which can be used as a substitute for chemical fertilizers

The project has no adverse impact on biodiversity or ecosystems. No forests or ecologically sensitive areas fall within the project boundary

Social Impact

The project supports the local economy by generating employment for skilled and unskilled workers, particularly from nearby villages. It creates jobs in construction, operations, waste collection, and maintenance. Moreover, local stakeholders were consulted, and feedback collected during stakeholder consultations confirmed that the community supports the project and perceives it as beneficial

No negative social impacts were identified during consultation or implementation. On the contrary, the project contributes to

- Better waste management practices
- Improved local air quality
- Skills development and rural employment
- The project poses no significant risks to human health or the environment
- The project contributes to climate action, clean energy, and sustainable communities

The project activity does not cause any net harm to the environment or communities. It is legally compliant, socially inclusive, and environmentally beneficial. The project safeguards biodiversity, supports local livelihoods, improves waste management, and contributes to India's climate and sustainability goals

9 Stakeholder engagement and consultation

The local stakeholder consultation for the project activity was conducted by Uniconn Platforms Private Limited on 01 September 2023, in line with BioCarbon Registry (BCR)

standards and project requirements. The project proponent ensured that all relevant and interested stakeholders were informed and invited, including local community members, representatives, and authorities.

During the meeting, the project's objectives, technology, and benefits were clearly presented. Stakeholders were given the opportunity to share their feedback and raise concerns. The responses were addressed during the session or incorporated into the project plan as needed.

Overall, the consultation was well received, with stakeholders expressing strong support for the project's environmental and socio-economic benefits. This process confirmed that the project aligns with local interests and complies with BCR's stakeholder engagement guidelines.

Describe the stakeholder consultation process and demonstrate how the process meets the relevant requirements:

(a) **the scope of stakeholder consultations**.

The scope of the stakeholder consultations was to ensure meaningful engagement with all interested and potentially affected stakeholders. The consultation aimed to provide stakeholders with an opportunity to understand the project at an early stage, participate in the decision-making process, and express their views, concerns, and expectations. It served as a platform for dialogue on the potential social, environmental, and economic impacts of the project, while also sharing information on the project's objectives, benefits, and operations.

(b) **the number of stakeholders consulted**.

The project proponent conducted a total of five stakeholder consultations at various locations throughout the project area. These sessions engaged a diverse group of participants representing local communities, interest groups, and institutional stakeholders. In total, approximately 25 to 30 stakeholders were consulted across all sessions, ensuring representation from different segments of the society and interest groups.

(c) **the means used to invite interested parties to participate in the consultations**.

Given the wide range of stakeholders involved in or affected by the project, public notices were used as the primary means to invite interested parties to participate in the consultation sessions. These public notices were distributed through various channels to ensure maximum outreach and visibility. The intent was to reach a broad audience and

inform them about the stakeholder consultation meetings. A copy of the circulated public notice has been attached below to this document for reference.

(d) **information that was made available to stakeholders during the consultation process**.

During the stakeholder consultation sessions, participants were provided with comprehensive information regarding the project. The main agenda focused on informing attendees about:

- The industrial effluent-based biogas power project.
- The process of generating electricity from biogas.
- Its contribution to reducing greenhouse gas (GHG) emissions;
- The overall project cycle;
- The role of local stakeholders in project implementation
- The consultation encouraged community feedback, observations, and discussions to ensure inclusivity. Additionally, **contact details** of the project proponent were shared for further communication

Contact details for further communication

Project holder	Uniconn Platforms Pvt. Ltd
Contact person	Vinod Beriwal
Phone	9824399410
Email address	vinod@uniconnplatforms.com
Address	207, LINKWAY ESTATE, LINK ROAD, MALAD WEST, MUMBAI - 400064

(e) the meetings, workshops and other processes developed in the framework of the stakeholder consultation.

All meetings and workshops were conducted during the designated stakeholder consultation phase. These events provided platforms for open discussions and feedback collection. No additional meetings or workshops were held following the initial consultation sessions, as the purpose of stakeholder engagement was successfully fulfilled during the earlier phase of the project.

Photographs and documents screenshots as proof of the stakeholder consultation

Instance 1

Public Notice

Date: 29-08-2023

Subject: Invitation for Local Stakeholder Meeting of the Project Activity titled "*Industrial Effluent-based Biogas to power bundle project*"

Respected Stakeholder,

We, Uniconn Platforms Pvt. Ltd. are the investor for the project activity titled "*Industrial Effluent-based Biogas to power bundle project*"

For this project activity, Embio Limited has planned to install an "*Industrial Effluent-based Biogas to power bundle project*".

Being a part of the same project activity, Local Stake Holder are invited to give their feedback and comments about the project activity. We are conducting the Local Stakeholder meeting and in this regard, any kind of comments or views from your side are welcome and we are pleased to invite you for the same.

The details of the meeting are, as:-

Organizer:-	**Embio Limited**			
Venue:-	Conference Hall		**Date:-**	**01-09-2023**
District:-	Raigad		**Start Time:-**	15.00 Hrs.
State:-	Maharashtra		**End Time:-**	15.45 Hrs.

For **Embio Limited.**

Authorized Signatory

Embio Limited E-21 E-22/1/2&3 E-23/1,2 MIDC-MAHAD

Registered Office
Embio Limited, 501 Sentinel, 5th Floor, Central Avenue Road
Hiranandani Gardens, Powai, Mumbai - 400 076, India
T: +91 22 66797200/ 25703423 | F: +91 22 66797222

CIN: U24100MH1986PLC038680 | embio@embio.co.in www.embio.co.in

Plant
Plot No. E-21, E-22/1, E-22/2 & 3, MIDC Industrial Estate
Mahad, Dist. Raigad - 402 309, Maharashtra, India
T: +91 8291925955 - 58/ 60/ 61 | F: +91 2145 232375

mahad@embio.co.in

INDUSTRIAL EFFLUENT BASED BIOGAS TO POWER BUNDLE PROJECT

Meeting Minutes

Meeting Date: 01-09-2023

Meeting Location: Embio Limited - Conference hall

1 Meeting Location

Site: Embio Limited
District: Mahad, Raigad
State: Maharashtra

Meeting Timings
Meeting Schedule Start: 15: 00 hrs
Meeting Actual Start: 15: 05 hrs

2 Agenda

The Agenda of the meeting is given below:-

- Opening of meeting
- Explanation of the project by Project Proponent
- Questions for clarification about the project explanation
- Closures of Meeting

The stakeholders gathered at the venue, as per the scheduled time. The meeting was opened by Embio Limited.

The meeting was outlined at making aware stakeholders & local community people, of the industrial effluent-based biogas to-power project & how it leads to reduction of the GHG gases emission. Details regarding the proposed project cycle & also the role of local stakeholders in the project were outlined.

An explanation about the main purpose of the project activity i.e. to generate power from biogas based on industrial effluent and reduce GHG emissions' was narrated. Furthermore, it was elaborated that the said project also conceives the following:-

- The use of energy-efficient cook-stoves will change consumption patterns & will be mitigating the immense stress on the environment.
- Spread of the commercialization of Energy Efficient Cook-stove projects in the region.

Embio Limited E-21 E-22/1/2&3 E-23/1,2 MIDC-MAHAD

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- Contribute to the sustainable development of the region, socially, environmentally & economically.

After the detailed discussion, some of the stakeholders raised questions on the Energy Efficient Cook-stove project to clear their doubts. The following questions were asked (translated from the local language to English) which were adequately explained and answered:

Name of Person: Mr. Santosh Sawant
Q: Will the project provide improved health in our village?
A: Yes, the project will result in improved health reducing health hazards from indoor air pollution.

Name of Person: Mr. Amol Tatkare
Q: Will the project release any harmful pollutants or hazardous toxic or notorious substances in the air?
A: No, not from what we know there is no project emissions associated with the project and does not have any negative impacts.

Name of Person: Mr. Ashok Bhise
Q: Will the project provide health benefits in our village?
A: Yes, the project reduces health hazards from indoor smoke pollution and women and children will have to spend less time collecting contributing to a reduction in GHG emissions.

Name of Person: Mr. Kashinath Pawar
Q: Will there be employment generation due to the project activity for youth from adjoining areas?
A: Responding about the increased possibilities for employment of local youth due to the project activity, it was pointed out that the preference would be given to the locals in employment at the project site.

Name of Person: Mr. Vijay Kamble
Q: Will project support for forest cutting
A: Yes, the project requires less biomass, thus project reduces the rate of deforestation.

Name of Person: Mr. Ajit Khedekar
Q: Will the project leads to water pollution
A: No, the project does not lead to any kind of water pollution.

3 Meeting End

Meeting Schedule End: 16: 00 hrs
Meeting Actual End: 15: 45 hrs

Embio Limited E-21 E-22/1/2&3 E-23/1,2 MIDC-MAHAD

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4 Persons Present for the Meeting

1. PP Representative –
   a. Mr. Ravsaheb K. Gite
   b. Mr. K. C. Choudhary
   c. Mr. Deepak V. Pise
   d. Mr. Subhash R. Kate
   e. Mr. Anil Utekar
2. Local Villagers --
   a. Mr. Anant Chaudhari
   b. Mr. Jitendra Khedekar
   c. Mr. Santosh Sawant
   d. Mr. Sagar Gaikwad
   e. Mr. Kashinath Pawar
   f. Mr. Ajit Khedekar
   g. Mr. Shankar Chaudhari
   h. Mr. Amol Tatkare
   i. Mr. Anil Kadam
   j. Mr. Ashok Bhise
   k. Mr. Rajesh Bhalekar
   l. Mr. Aniket Kadam
   m. Mr. Vijay Kambale
   n. Mr. Prashant Mahamuni

Embio Limited

Authorised Signatory

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Local Stakeholder Consultation Meeting

Project Title: *Industrial Effluent based biogas to power bundle project.*

Location: Mahad, Maharashtra

Project Investor: Uniconn Platforms Pvt. ltd

Attendance Sheet **Date:** 01/09/23

S No	Name	Age	Sex (M/F)	Occupation	Village	Signature/ RTI
1	Anant Chavalkar	43	M	Service	Birwadi	
2	Jitendra Khedekar	33	M	service	Savane	
3	Santosh Sawant	45	M	service	Khaire Savane	
4	Sagar Gaikwad	25	M	service	Sheltoli Sawane	
5	Kashinath Pawar	50	M	service	Birwadi	
6	Asit Khedekar	47	M	service	Sawane	

Local Stakeholder Consultation Meeting

Project Title: *Industrial Effluent based biogas to power bundle project.*

Location: Mahad, Maharashtra

Project Investor: Uniconn Platforms Pvt. ltd

Attendance Sheet **Date:** 01/09/23

S No	Name	Age	Sex (M/F)	Occupation	Village	Signature/ RTI
7	Shankar chavalkar	51	m	service	~~Sawarve~~ Vadghar	
8	Amol tatakare	36	m	service	Kheirat Sawarve	
9	Anil kadam	50	m	Service	Sheltoli Sawarve	
10	Ashok Bhise	50	m	service	Sheltoli Sawarve	
11	Rajesh Bhalekar	40	m	Service	Sawarve	RSB
12	Aniket kadam	22	m	service	Sawarve	A. A kadam

Local Stakeholder Consultation Meeting

Project Title: *Industrial Effluent based biogas to power bundle project.*

Location: Mahad, Maharashtra

Project Investor: Uniconn Platforms Pvt. ltd

Attendance Sheet **Date:** 01/09/23

S No	Name	Age	Sex (M/F)	Occupation	Village	Signature/ RTI
13	Vijay kambale	34	m	service	Sheltoli Sawane	V.P.kamble
14	Anil Utekar	50	m	service	sheltoli Suwane	
15	Prashant mahamuni	32	M	Service	Varandh.	
16	K.C. Chowhay	55	M	Senice	Mahad.	
17	Deepak Rise	55	M	service	Mahad	
18	Subhash R. Kate	51	M	Service	Birwadi	

Local Stakeholder Consultation Meeting

Project Title: *Industrial Effluent based biogas to power bundle project.*

Location: Mahad, Maharashtra

Project Investor: Uniconn Platforms Pvt. ltd

Attendance Sheet **Date:** 01/09/23

S No	Name	Age	Sex (M/F)	Occupation	Village	Signature/ RTI
13	Vijay kambale	34	m	service	Sheltoli Sawane	V.P.Kamble
14	Anil Utekar	50	m	service	sheltoli Suwane	
15	Prashant mahamuni	32	M	Service	Varandh.	
16	K.C. Chowhan	55	M	Service	Mahad.	
17	Deepak Rise	55	M	service	Mahad	
18	Subhash R.Kate	51	M	Service	Birwadi	


Industrial effluent
based biogas to
power Bundle
Project

Instance 2:

S.R. Hatcheries

SRI RAJESHWARA HATCHERIES PVT. LTD.
Plot No.59, Gafoor Nagar, Image Hospital Lane
Madhapur, Hyderabad - 500 081. (T.S) INDIA
Ph : 040 - 3090 3400/3401 Fax : 040 - 3090 3402
PAN No. AACCS8095E
CIN - U01222TG1996PTC024961

Public Notice

Date: 21-09-2023

Subject: Invitation for Local Stakeholder Meeting of the Project Activity titled " *10 TPD poultry litter to 1000 kwh / day electricity plant by Sri Rajeshwara hatcheries Pvt Ltd.*

Respected Stakeholder,

We,Sri Rajeshwara Hatcheries Pvt Ltd. are the investor for the project activity titled "*10 TPD poultry litter based biogas to power project" 1000 kwh / day*

For this project activity, Sri Rajeshwara Hatcheries Pvt. Ltd has planned to install "*10 TPD poultry litter-based biogas to power project bundle project"*

Being a part of the same project activity, Local Stake Holder are invited to give their feedback and comments about the project activity. We are conducting the Local Stakeholder meeting and in this regard, any kind of comments or views from your side are welcome and we are pleased to invite you for the same.

The details of the meeting are, as:-

Organizer:-	Sri Rajeshwara Hatcheries Pvt. Ltd		
Venue:-	Conference Hall ,SR Ampally Unit	**Date:-**	**21-09-2023**
District:-	Vikarabad	**Start Time:-**	Hrs. 11.00AM
State:-	Telangana	**End Time:-**	Hrs. 11.45AM

For, Sri Rajeshwara Hatcheries Pvt Ltd. / PP representative

Authorized Signatory

S.R. Hatcheries

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PAN No. AACCS8095E
CIN - U01222TG1996PTC024961

Local Stakeholder Consultation Meeting

Project Title: *10 TPD Poultry litter based biogas to power project*

Location : Ampally Vill,Dharur (M) Vikarabad(dist) Telangana State -501121

Project Investor: Sri Rajeshwara Hatcheries Pvt Ltd

Attendance Sheet:

Date:-21-09-2023

S No	Name	Age	Sex (M/F)	Occupation	Village	Signature/ RTI
1.	Mr.P.Srinivas Reddy	48	M	Farmer	Ampally	
2.	Mr.Suryanarayana Reddy	47	M	Farmer	Ampally	
3.	Mr.P.Satyanarayana Reddy	53	M	Farmer	Ampally	
4.	Mr.B.Shiva Shankar	36	M	Farmer	Ampally	
5.	Mr.E.Narsimulu	33	M	Farmer	Ampally	

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10 TPD POULTRY LITTER-BASED BIOGAS TO POWER BUNDLE PROJECT

Meeting Minutes

Meeting Date:21-09-2023
Meeting Location: Sri Rajeshwara Hatcheries Pvt Ltd

1 Meeting Location

Site: Sri Rajeshwara Hatcheries pvt ltd
District: Vikarabad
State: Telangana

Meeting Timings

Meeting Schedule Start: 11.00 AM
Meeting Actual Start: 11.00AM

2 Agenda

The Agenda of the meeting is given below:-

- Opening of meeting
- Explanation of the project by Project Proponent
- Questions for clarification about the project explanation
- Closures of Meeting

The stakeholders gathered at the venue, as per the scheduled time. The meeting was opened by Embio Limited.

The meeting was outlined at making aware stakeholders & local community people, about the 10TPD poultry litter to 1000 kwh/day Biogas electricity power project activity & how does it leads to reduction of the GHG gases emission. Details regarding the proposed project cycle & also the role of local stakeholders in the project were outlined.

Explanation an explanation purpose of the project activity i.e. 'to 10 TPD poultry litter to 1000 kwh/day electricity and reduce CHG emissions' was narrated. Furthermore it was elaborated that the said project also conceives the following:

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- Use of 10 TPD poultry litter to 1000 kwh/day electricity, will change consumption patterns & will be mitigating the immense stress on the environment.
- Spread of the commercialization of Energy Efficient Cook-stove projects in the region.
- Contribute to the sustainable development of the region, socially, environmentally & economically.

After the detailed discussion, some of the stakeholders raised questions on the 10 TPD poultry litter to 1000kwh/day electricity project to clear their doubts. The following questions were asked (translated from the local language to English) which were adequately explained and answered:

Name of Person: Mr.P.Srinivas Reddy
Q: Will the project provide improved health in our village?
A: Yes, the project will result in improved health, reducing indoor air pollution hazards.

Name of Person: Mr.Suryanarayan Reddy
Q: Will the project release any harmful pollutants or hazardous toxic or notorious substances in the air?
A: No, not from what we know there is no project emissions associated with the project and does not have any negative impacts.

Name of Person: Mr.P.Satyanarayana Reddy
Q: Will the project provide health benefits in our village?
A: Yes, the project reduces health hazards from indoor smoke pollution and women and children will have to spend less time collecting contributing to a reduction in GHG emissions.

Name of Person: Mr.B.Shiva Shankar
Q: Will there be employment generation due to the project activity for youth from adjoining areas?
A: Responding about the increased possibilities for employment of local youth due to the project activity, it was pointed out that the preference would be given to the locals in employment at the project site.

Name of Person: Mr.E.Narsimulu
Q: Will the project leads to water pollution
A: No, the project does not lead to any kind of water pollution.

3 Meeting End

Meeting Schedule End: 11.45 AM
Meeting Actual End: 12.00 PM

4 Persons Present for the Meeting

1. PP Representative
2. Local Villagers

9.1 Summary of comments received

A local stakeholder meeting is a meeting between a project or organization and the people who are likely to be affected by it. The purpose of the meeting is to inform stakeholders about the project, to gather their feedback and concerns, and to build relationships.

Local stakeholder meetings are important for a number of reasons. First, they help to ensure that stakeholders are aware of the project and its potential impacts. Second, they provide an opportunity for stakeholders to express their concerns and suggestions. Third, they help to build trust and understanding between the project team and the community.

9.2 Consideration of comments received

After the meeting, participants stated their positive comments to the project activity. They all stated that they are happy about the project because it does not give harm to environment and produce clean energy. In addition to the meeting, one to one verbal communications with villagers were also so positive. Project did not change their life, did not provide negative consequences, and on the contrary provided job opportunities to local people. In summary a project is welcomed by the community.

10 Sustainable Development Goals (SDGs)

Regarding the United Nations Sustainable Development Goals (SDGs), the project achieves the following SDGs.

SDG 7 Affordable and Clean Energy

SDG 7.2 By 2030, increase substantially the share of renewable energy in the global energy mix / SDG 7.2.1 Renewable energy share in the total final energy consumption.

Project activity generates renewable energy, about 2363 MW annually, by capturing biogas from pouty litter via anaerobic digestion and supplies it to the fossil fuel dominated Indian national grid system. Through this way, project contributes to the SDG 7.2. target, and the relevant indicator is SDG 7.2.1

SDG Goal 8 Decent Work and Economic Growth

SDG 8.5 By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value / 8.5.1 Average hourly earnings of employees, by sex, age, occupation and persons with disabilities

Project created job opportunities during both construction and operation phases. During operation, project employs 6 people and 2 of them are from local villages

SDG Goal 13 Climate Action

SDG 13.2 Integrate climate change measures into national policies, strategies and planning SDG 13.2.2 Total greenhouse gas emissions per year

The project will naturally play an important role in global climate change mitigation activities through preventing emissions of methane that would otherwise be released to the atmosphere in the baseline conditions. Project annually achieves 23,083 tCO_2 emission reduction. This way, it contributes to SDG 13 goals of the UN

SL.n	SDG	Impact
1 	**SDG Goal 2:** End hunger, achieve food security and improved and promote sustainable agriculture	• Restoring soil through the recycling of nutrients, organic matter and carbon • Increasing crop yields through the use of nutrient-rich digestate bio-fertilizer • Recirculating phosphorus which is essential for the growth of plants but limited in supply.
2	**SDG Goal 3:** Ensure healthy lives and promote well-being for all at all ages	• Reducing air pollution by substituting fossil fuel with biogas

		• Treating and recycling sewage and organic wastes to reduce odors and the spread of diseases
3 	**SDG Goal 7:** Ensure Access to affordable, reliable, sustainable, and modern energy for all	• Reducing dependence on fossil fuel-based energy sources by replacing with biogas • Utilizing locally produced wastes and crops to generate energy for rural and remote communities. • Storing biogas to produce energy when required • Methane, constituting about 55-60% of landfill gas , is utilized to increase the share of renewable energy in the global energy mix
4 	**SDG Goal 9:** Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	• Improving self-sufficiency and sustainability of industries by extracting energy from local waste and efficiency and using it for the generation of renewable clean fuel • Collaboration between industries and agriculture for mutual benefit • Generation of short-term construction employment and long-term equipment manufacturing and maintenance employment.
5 	**SDG Goal 11:** Make cities and human settlements inclusive, safe resilient, and sustainable	• Preventing the spread of diseases through the collection and proper management of organic cattle waste • Improving sanitization and hygiene through decentralized and local treatment of bio solids. • Reducing greenhouse gas emissions by using biogas-based resendable energy in the transportation industry

6 	**SDG Goal 13:** Make cities and human settlements inclusive, safe resilient, and sustainable	• Reducing carbon dioxide emission by replacing fossil fuel-based energy sources with biogas and commercial fertilizers with digestate bio fertilizers. • Reduction of methane and nitrous oxide emission from livestock manures. • Reduction of methane from other organic wastes capturing emissions from landfills.
7 	**Goal 15:** Project, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combats desertification, and halt and reverse degradation and halt biodiversity loss.	• Recirculating nutrients and organic matter in organic waste through AD and returning them to the soil in the form of digestate bio fertilizer.

11 REDD+ Safeguards (For REDD+ projects)

The project activity is not a REDD+ project. Hence not applicable.

12 Special categories, related to co-benefits (optional)

The project activity does not intend to Special categories, related to co-benefits hence not applicable.

13 Grouped projects (if applicable)

The project activity is registered as a group project under the BioCarbon Registry. At present, it does not include any defined clusters but consists of five operational instances. While there is currently no formal cluster structure, the project is designed to allow for future expansion through the addition of new instances under the group project framework.

Should the project proponent, Uniconn Platforms Private Limited, choose to expand the project in the future by adding new instances, each instance will be subject to a thorough assessment to ensure it fully meets the eligibility criteria and applicability conditions outlined in the applied methodologies AMS-III.D and AMS-I.D. Prior to inclusion, all

relevant requirements will be carefully reviewed and verified to ensure continued alignment with the original project design and BioCarbon Registry standards.

14 Other GHG program

Project did not receive and/or did not apply for any other GHG-related environmental crediting certifications.

Project has not been registered or is not seeking registration under any other GHG programs

15 Double counting avoidance

The project activity is fully aligned with the principles and procedures outlined in the Bio Carbon Registry's Avoiding Double Counting (ADC) Tool, Version 2.0 (February 2024). To ensure environmental integrity, the project proponent, Uniconn Platforms Private Limited, confirms that the project is not registered under any other GHG program or carbon registry and has not issued Verified Carbon Credits (VCCs) under any other standard. The emission reductions generated by the project are claimed exclusively under the Bio Carbon Registry, eliminating any risk of double issuance, use, or claiming.

All Verified Carbon Credits (VCCs) issued under this project are ex-post, traceable, and assigned unique serial numbers within the Bio Carbon Registry system. The Registry ensures that these VCCs are securely stored, tracked, and transparently managed, preventing duplication or re-use of credits. Additionally, the registry system is linked with global platforms such as CAD Trust to facilitate cross-checks and enhance transparency, minimizing risks of overlaps and duplicate registration.

If the project is expanded to include new instances in the future, each new instance will be subject to a preliminary assessment to confirm that it does not overlap with any other registered projects and complies with Bio Carbon's ADC provisions. The project boundaries and geographic coordinates (including KMZ files) are publicly available, ensuring that any potential overlaps can be identified and addressed during validation by Conformity Assessment Bodies (CABs).

Should the project require eligibility under international mechanisms such as CORSIA, a Host Country Attestation (HCA) will be obtained and published, declaring that the host country will not count the same emission reductions towards its Nationally Determined Contributions (NDCs) under the Paris Agreement, thereby preventing double claiming.

Thus, the project strictly follows the Bio Carbon Registry's framework to avoid double issuance, use, and claiming, ensuring credibility, transparency, and alignment with global carbon market standards.

16 Monitoring plan

16.1 Description of the monitoring plan

The monitoring plan is developed in alignment with the BCR Standard and the applied methodologies AMS-III.D and AMS-I.D. It outlines procedures to ensure accurate, consistent, and verifiable measurement of GHG emission reductions, while maintaining transparency and quality assurance across all project instances:

(a) Project boundary monitoring

- All operational biogas plants generating renewable electricity
- Animal manure management systems (as per AMS-III.D)
- Grid interface points (for grid-connected instances under AMS-I.D). Each project instance is geo-referenced to ensure clarity of location and avoid overlaps

(b) Monitoring of the execution of project activities

All installations are monitored to confirm continuous biogas production, purification, and electricity generation. Each instance is tracked for

- Biogas digester operational time
- Volume of slurry fed
- Volume and quality of biogas produced
- Downtime and maintenance logs

(c) Monitoring of the quantification of project emission reduction/removals

- Volume of biogas generated (m^3/day)
- Electricity exported to the grid or consumed onsite (kWh)
- Baseline grid emission factor (as per national grid data). Calculations are performed per AMS methodologies using standardized emission factors

(d) Quality control and quality assurance procedures

- Instruments (e.g., gas flow meters, electricity meters) are calibrated periodically
- Data is double-checked using automated and manual validation steps
- Internal audits are performed to ensure data reliability

(e) Verification of field data

- Field data from each plant is logged daily by trained site operators
- Verification is conducted by project managers and third-party auditors during each crediting cycle

- Cross-verification of meter readings, digester logs, and maintenance schedules is ensured

(f) Review of information processing

- All monitored data is reviewed for anomalies
- Data outliers are flagged and investigated
- Aggregated monthly reports are generated for review and record-keeping

(g) Data recording and archiving system

- Minimum 2-year retention post-crediting period
- Secure access and audit trails maintained

The monitoring plan has been developed to establish a structured and reliable system for data collection, measurement, and record-keeping, in line with the requirements of AMS-III.D (Version 21.0) and AMS-I.D (Version 18.0). It is tailored to the specific needs of the project, which involves methane recovery from industrial effluent and the generation of renewable electricity from biogas. This plan ensures that GHG emission reductions are calculated accurately and transparently, and that all project activities are monitored effectively.

Monitoring parameter

Based on the applied AMS-III.D (Version 21.0) and AMS-I. D (Version 18.0) methodologies, here is a list of monitored parameters that must be included in your project's Monitoring Plan, tailored to your biogas-based electricity generation project

Parameter	Unit	Description	Monitoring Frequency
VSLT,y	kg dry matter/animal/year	Volatile solids excreted by livestock LT per year. Used to calculate methane generation potential.	Annually
Nda,y	Days	Number of days the animal is alive in the farm.	Annually (monthly records)
Np,y	Number	Number of animals produced per year.	Annually
W_{site}	KG	Average animal weight of a defined livestock population at the project site	Annually
Qmanure,j,LT,y	tonnes/year	Quantity of manure treated by the digester.	Continuously / Weekly

BGburnt,y	m^3	Volume of biogas combusted or flared. Used to estimate methane destruction.	Continuously / Daily
EGy	MWh	Electricity generated from biogas use (if AMS-I.D is applied).	Continuously / Daily

Data collection process

The data collection process is structured to ensure the accurate, consistent, and verifiable monitoring of all parameters necessary for calculating greenhouse gas (GHG) emission reductions, as per the requirements of the applied methodologies AMS-III.D and AMS-I.D. The process involves routine monitoring, systematic recording, and secure archiving of relevant data throughout the crediting period.

Parameter Identification: All relevant parameters related to livestock population, manure management, biogas production, and electricity generation are identified and clearly defined in accordance with the approved methodologies

Data Measurement and Recording: Measurements are carried out using calibrated instruments such as flow meters, gas analyzers, and energy meters. Manual logs may also be maintained where necessary. Data is recorded daily, weekly, or monthly depending on the nature and frequency required for each parameter.

Designated personnel are assigned for data collection, monitoring, equipment handling, and maintenance. Site operators, technical staff, and project managers are trained to handle and review the data responsibly

Calibration and Maintenance: All monitoring instruments are calibrated at intervals recommended by the manufacturer. Calibration records are maintained to ensure traceability and data integrity

QA and QC

To maintain the accuracy and reliability of monitoring data, the project follows a structured QA/QC process. All data is recorded electronically, backed up regularly, and checked daily by assigned staff. The Project Manager reviews the data. Key equipment such as flow meters, gas analyzers, and energy meters are calibrated and maintained as per manufacturer guidelines, with calibration records retained. Staff involved in monitoring are trained on data collection, equipment use, and QA/QC procedures. Internal audits are conducted to ensure compliance with monitoring protocols and identify any issues for correction.

16.2 Data and parameters determined at registration and not monitored during the quantification period, including default values and factors

Data / Parameter	φ_y
Data unit	Dimensionless
Description	Model correction factor to account for model uncertainties for year y
Source of data used	CDM Tool 04 Emissions from solid waste disposal, Version 08.0. Data will be archived electronically during the project plus 5 years
Value (s)	0.85
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of baseline emissions
Justification of choice of data or description of measurement methods and procedures applied	Suggested by CDM Tool 04, Version 08.0. Data will be archived electronically during project plus 5 years
Additional comments	-

Data / Parameter	**GWP_{CH4}**
Data unit	tCO_2/tCH_4
Description	Global Warming Potential (GWP) of CH_4
Source of data used	IPCC 5th Assessment Report (AR5) Chapter 8, Table 8.7
Value (s)	28
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of baseline emissions

Justification of choice of data or description of measurement methods and procedures applied	IPCC 5th Assessment Report (AR5) Chapter 8, Table 8.7 Data will be archived electronically during project plus 5 years
Additional comments	-

Data / Parameter	**$Default_{org,x}$**
Data unit	Unitless
Description	The value of $Default_{org,x}$ depends on the climate zone. These values were derived by an analysis of registered CDM projects with verified waste compositions, and the $Default_{org,x}$ values are selected to ensure conservativeness of the resulting baseline emissions (using 95% confidence and 10% precision)
Source of data used	CDM Tool 04, Version 8.0, Appendix Simplified Approaches, Reduced waste composition monitoring, p.23
Value (s)	Table 2. $Default_{org,x}$ values for simplified procedure: Tropical wet column
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of baseline emissions
Justification of choice of data or description of measurement methods and procedures applied	CDM Tool 04, Version 8.0, Appendix Simplified Approaches, Reduced waste composition monitoring. Data will be archived electronically during project plus 5 years
Additional comments	-

Data / Parameter	**D_{CH4}**
Data unit	t/m^3
Description	CH_4 density (0.00067 t/m^3 at room temperature (20 ºC) and 1 atm pressure)

Source of data used	AMS-III.D Version 21.0., p.7
Value (s)	0.00067
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of baseline emissions
Justification of choice of data or description of measurement methods and procedures applied	This is a scientifically proven constant value. AMS-III.D Version 21.0., p.7. Data will be archive electronically during project plus 5 years
Additional comments	-

Data / Parameter	**UF_b**
Data unit	Unitless
Description	Model correction factor to account for model uncertainties (0.94)
Source of data used	AMS-III.D Version 21.0, p.7
Value (s)	0.94
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of baseline emissions
Justification of choice of data or description of measurement methods and procedures applied	AMS-III.D Version 21.0, p.7 Data will be archive electronically during project plus 5 years
Additional comments	-

Data / Parameter	**$VS_{LT,y}$**

Data unit	kg-dm/animal/year
Description	Volatile solids production/excretion per animal of livestock LT in year y
Source of data used	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10, Table 10A-4
Value (s)	$VS_{LT,y}$ = 17.50 for poultry
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of baseline emissions
Justification of choice of data or description of measurement methods and procedures applied	Default value taken from IPCCC Guidelines Data will be archive electronically during project plus 5 years
Additional comments	-
Data / Parameter	**MCF_j**
Data unit	%
Description	Annual methane conversion factor (MCF) for the baseline animal manure management system j (j: Liquid/Slurry with natural crust cover)
Source of data used	2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10, Table 10.17
Value (s)	50%
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of baseline emissions
Justification of choice of data or description of measurement methods and procedures applied	IPCC data. Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10, Table 10.17.

	Data will be archive electronically during project plus 5 years
Additional comments	

Data / Parameter	**$B_{0,LT}$**
Data unit	$m^3CH_4/kg\text{-}dm$
Description	Maximum methane producing potential of the volatile solid generated for animal type LT
Source of data used	For Poultry: 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Chapter 10, Table 10A-4
Value (s)	For poultry: 0.36
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	
Justification of choice of data or description of measurement methods and procedures applied	As per AMS-III.D, where no country specific value is available, a default value is applied. Defaults values for Eastern Europe from 2006 IPCC Guidelines are applied as this is the location of the project activity. Data will be archived electronically during project plus 5 years
Additional comments	-

Data / Parameter	**CEF_{grid}**
Data unit	tCO_2/MWh
Description	Carbon emissions factor for the grid in the project scenario (tCO2e/MWh)
Source of data used	CEA database 2023
Value (s)	0.9125 fixed ex-ante for the first crediting period
Indicate what the data are used for (Baseline/	Calculation of baseline emissions

Project/ Leakage emission calculations)	
Justification of choice of data or description of measurement methods and procedures applied	CEA database 2023, published by Indian government. Calculations are provided in the ER_Calculations.xls. Archive electronically during project plus 5 years
Additional comments	

Data / Parameter	**$FC_{i,m,y}$**
Data unit	ton
Description	Amount of fuel type i consumed by power unit m in year y y: 2019, 2020 and 2021
Source of data used	-
Value (s)	ER_Calculations.xls Fixed ex-ante for the first crediting period (simple OM and BM calculations).
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of baseline emissions
Justification of choice of data or description of measurement methods and procedures applied	Archive electronically during project plus 5 years
Additional comments	-

Data / Parameter	**$NCV_{i,y}$**
Data unit	GJ/ton
Description	Net calorific value (energy content) of fuel type i in year y y: 2019, 2020 and 2021
Source of data used	NCV_{coal}: The Ministry of Environment and Spatial Planning,

	"Initial Communication of the Republic of Serbia Under the United Nations Framework Convention on Climate Change", Belgrade, 2010., p.134. https://unfccc.int/sites/default/files/resource/srbnc1.pdf $NCV_{HeavyFuelOil}$: 2006 IPCC Guidelines, Volume 2, Chapter 1., p.18-19. https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf NCV_{Oil} : 2006 IPCC Guidelines, Volume 2, Chapter 1., p.18-19. https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
Value (s)	NCV_{coal}= 6.00 GJ/ton $NCV_{HeavyFuelOil}$=39.8 GJ/ton NCV_{Oil}=41.4 GJ/ton Fixed ex-ante for the first crediting period (simple OM and BM calculations)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of baseline emissions
Justification of choice of data or description of measurement methods and procedures applied	NCV value for coal is taken from the "Initial Communication of the Republic of Serbia Under the United Nations Framework Convention on Climate Change". Other NVC values are taken from 2006 IPCC Guidelines. Archive electronically during project plus 5 years
Additional comments	-

Data / Parameter	**$EF_{CO2,i,y}$**
Data unit	tCO_2/GJ

Description	CO_2 emission factor of fuel type i in year y y: 2019, 2020 and 2021
Source of data used	$EF_{CO2,coal,y}$: The Ministry of Environment and Spatial Planning, "Initial Communication of the Republic of Serbia Under the United Nations Framework Convention on Climate Change", Belgrade, 2010., p.134. https://unfccc.int/sites/default/files/resource/srbnc1.pdf See Mramorak1&2ERCalculations.xls $EF_{CO2, HeavyFuelOil,y}$: 2006 IPCC Guidelines, Volume 2, Chapter 1., p.23. https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf $EF_{CO2,oil,y}$: 2006 IPCC Guidelines, Volume 2, Chapter 1., p.23. https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_1_Ch1_Introduction.pdf
Value (s)	$EF_{CO2,coal,y}$: 0.1132 tCO2/GJ $EF_{CO2,HeavyFuelOil,y}$: 75,500 kg CO2/TJ = 0.0755 tCO2/GJ $EF_{CO2,oil,y}$: 72,600 kg CO2/TJ = 0.0726 tCO2/GJ Fixed ex-ante for the first crediting period (simple OM and BM calculations).
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of baseline emissions
Justification of choice of data or description of measurement methods and procedures applied	Default values from credible sources, 2006 IPCC Guidelines and "Initial Communication of the Republic of Serbia Under the United Nations Framework Convention on Climate Change". Archive electronically during project plus 5 years

Additional comments	-

Data / Parameter	**ηm,y**
Data unit	ratio
Description	Average net energy conversion efficiency of power unit m in year y y: 2019, 2020 and 2021
Source of data used	CDM Tool 09: Determining the baseline efficiency of thermal or electric energy generation systems, Version 03.0. Table 2
Value (s)	0.62 Fixed ex-ante for the first crediting period (simple OM and BM calculations)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of baseline emissions
Justification of choice of data or description of measurement methods and procedures applied	Default value from the Tool 09. Archive electronically during project plus 5 years
Additional comments	

Data / Parameter	**EGm,y**
Data unit	MWh
Description	Net quantity of electricity generated and delivered to the grid by power unit m in year y
Source of data used	y: 2019, 2020 and 2021
Value (s)	ER_Calculations.xls

	Fixed ex-ante for the first crediting period (simple OM and BM calculations)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of baseline emissions
Justification of choice of data or description of measurement methods and procedures applied	Archive electronically during project plus 5 years
Additional comments	-

16.3 Data and parameters monitored

Data / Parameter	$\mathbf{f}_y$
Data unit	Unitless/fraction
Description	Fraction of methane captured at the SWDS and flared, combusted or used in another manner that prevents the emissions of methane to the atmosphere in year y
Measured /Calculated /Default:	As per the requirements in "Tool to calculate the emission factor for an electricity system
Source of data	In India, there is no regulation that enforces the combustion of methane released by the SWDSs
Value(s) applied	0 (zero)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	In India, there is no regulation that enforces the combustion of methane released by the SWDSs. Therefore, this value is taken as zero
Monitoring frequency	Annually
Measuring/ Reading/ Recording frequency	-
Measurement/Calculation method (if applicable)	-

QA/QC procedures applied	Archive electronically during project plus 5 years.

Data / Parameter	**$W_{j,x}$**
Data unit	Ton/year
Description	Amount of solid waste type j disposed or prevented from disposal in the SWDS in the year x (t)
Measured /Calculated /Default:	Measured
Source of data	Project proponents log book records show the municipal organic wastes accepted by the.
Value(s) applied	3000 ton/year
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of baseline emissions
Monitoring frequency	Continuously, aggregated at least annually for year
Measuring/ Reading/ Recording frequency	Continuously, aggregated at least annually for year
Measurement/Calculation method (if applicable)	Project proponents log book records that show the municipal organic wastes accepted by the
QA/QC procedures applied	Archive electronically during project plus 5 years

Data / Parameter	**$N_{LT,y}$**
Data unit	Unitless
Description	Annual average number of animals of type LT in year y (numbers)
Measured /Calculated /Default:	Measured
Source of data	Project proponent farm records

Value(s) applied	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of baseline emissions
Monitoring frequency	Annually, based on monthly records
Measuring/ Reading/ Recording frequency	Annually, based on monthly records
Measurement/Calculation method (if applicable)	farm records
QA/QC procedures applied	Counting animals at the farms is a mandatory business process of the project owner. Therefore, all data in the correct way is available at the project proponent. Archive electronically during project plus 5 years

Data / Parameter	**MS%BI,j**
Data unit	Unitless/fraction
Description	Fraction of manure handled in baseline animal manure management system j
Measured /Calculated /Default:	Measured
Source of data	Project proponent farm records
Value(s) applied	100%
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of baseline emissions
Monitoring frequency	Annually, based on daily measurement and monthly aggregation
Measuring/ Reading/ Recording frequency	Annually, based on daily measurement and monthly aggregation

Measurement/Calculation method (if applicable)	Project proponent farm records
QA/QC procedures applied	Data will be archived electronically during project plus 5 years

Data / Parameter	**Qmanure,y**
Data unit	ton
Description	Quantity of raw waste/manure treated and/or wastewater co-digested in the year y (tonnes)
Measured /Calculated /Default:	Measured
Source of data	Project proponents' records. On-site data sheets recorded monthly using weigh bridge
Value(s) applied	450
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	-
Monitoring frequency	Monthly
Measuring/ Reading/ Recording frequency	Monthly
Measurement/Calculation method (if applicable)	Project proponents' records. On-site data sheets recorded monthly using weigh bridge
QA/QC procedures applied	Weighbridge will be subject to periodic calibration (in accordance with stipulation of the weighbridge supplier. Data will be archived electronically during project plus 5 years

Data / Parameter	**$FC_{i,f}$**
Data unit	kg/km

Description	Specific consumption of fuel type f in volume or mass units per km for vehicle type i
Measured /Calculated /Default:	Default
Source of data	Project Proponent's project records. In the project activity, trucks use diesel oil for transporting the manure. According to the statement of the project owner, trucks consume 25 liter fuel per 100 km. Density of diesel oil is 0.85 kg/lt. Based on that trucks use 0.2125 kg/km diesel oil
Value(s) applied	0.2125
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of project emissions
Monitoring frequency	Annually
Measuring/ Reading/ Recording frequency	Monthly
Measurement/Calculation method (if applicable)	-
QA/QC procedures applied	Data will be archived electronically during project plus 5 years

Data / Parameter	**nd_y**
Data unit	Number
Description	Number of days the central treatment plant was operational in year y
Measured /Calculated /Default:	
Source of data	Project proponent.

	Incoming waste records, measured at the weight scale at the entrance of the project facility
Value(s) applied	365
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of baseline emissions
Monitoring frequency	Monthly
Measuring/ Reading/ Recording frequency	Monthly
Measurement/Calculation method (if applicable)	-
QA/QC procedures applied	Data will be archived electronically during project plus 5 years

Data / Parameter	**$FV_{RG,h}$**
Data unit	m^3/hr
Description	Volumetric flow rate of the captured biogas in dry basis at normal conditions in hour h
Measured /Calculated /Default:	*Measured*
Source of data	Flow meters are an electronic gas metering valve for single point injection. It has integrated sensors and electronics, which provide the correct gas flow under all specified conditions
Value(s) applied	511.2 m^3/hr for each biogas facility. Hence 1022.4 m^3/hr in total (expected annual average value)
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of project emissions
Monitoring frequency	Continuously by flow meter

Measuring/ Reading/ Recording frequency	Continuously by flow meter
Measurement/Calculation method (if applicable)	By flow meter
QA/QC procedures applied	Calibration and maintenance of flare and meters will be carried out periodically as per the technical specifications of manufacturer

Data / Parameter	**$fv_{CH4,RG,h}$**
Data unit	Fraction
Description	Volumetric fraction of methane in the captured biogas on dry basis in hour h
Measured /Calculated /Default:	Measured
Source of data	Project Proponent. Biogas flow from both main and post digester units to the gas engine unit are continuously analyzed by the biogas analyzer
Value(s) applied	0.55
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of project emissions
Monitoring frequency	Continuously by flow meter
Measurement/Calculation method (if applicable)	By flow meter
QA/QC procedures applied	Biogas analyzers are calibrated every 5 years

Data / Parameter	**$EG_{pj,y}$**
Data unit	MWh

Description	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh)
Measured /Calculated /Default:	Measured
Source of data	Project Proponent invoices issued and daily generation logbook
Value(s) applied	
Indicate what the data are used for (Baseline/ Project/ Leakage emission calculations)	Calculation of baseline emissions
Monitoring frequency	Continuous measurement, but recorded monthly
Measuring/ Reading/ Recording frequency	monthly
Measurement/Calculation method (if applicable)	-
QA/QC procedures applied	Calibration and maintenance is done in accordance with the national regulation

Data / Parameter	**$V_{t,db}$**
Data unit	m^3 /min
Description	Volumetric flow of the gaseous stream in time interval t on a dry basis (m^3 dry gas/h)
Measured /Calculated /Default:	
Source of data	For mass flow of methane, the maximum combustion capacity of the flare units capacities will be used. This is a conservative approach
Value(s) applied	-
Indicate what the data are used for (Baseline/ Project/	Calculation of project emissions

Leakage emission calculations)	
Monitoring frequency	Continuous
Measuring/ Reading/ Recording frequency	-
Measurement/Calculation method (if applicable)	-
QA/QC procedures applied	Since the maximum combustion capacity of the flare unit will be used, there is no monitoring device installed

Appendix 1. Post-registration changes summary.

Not applicable.

NOTE: This Project Document (PD) shall be completed following the instructions included. However, it is important to highlight that these instructions are complementary to the BCR STANDARD, and the Methodology applied by the project holder, in which more information on each section can be found.