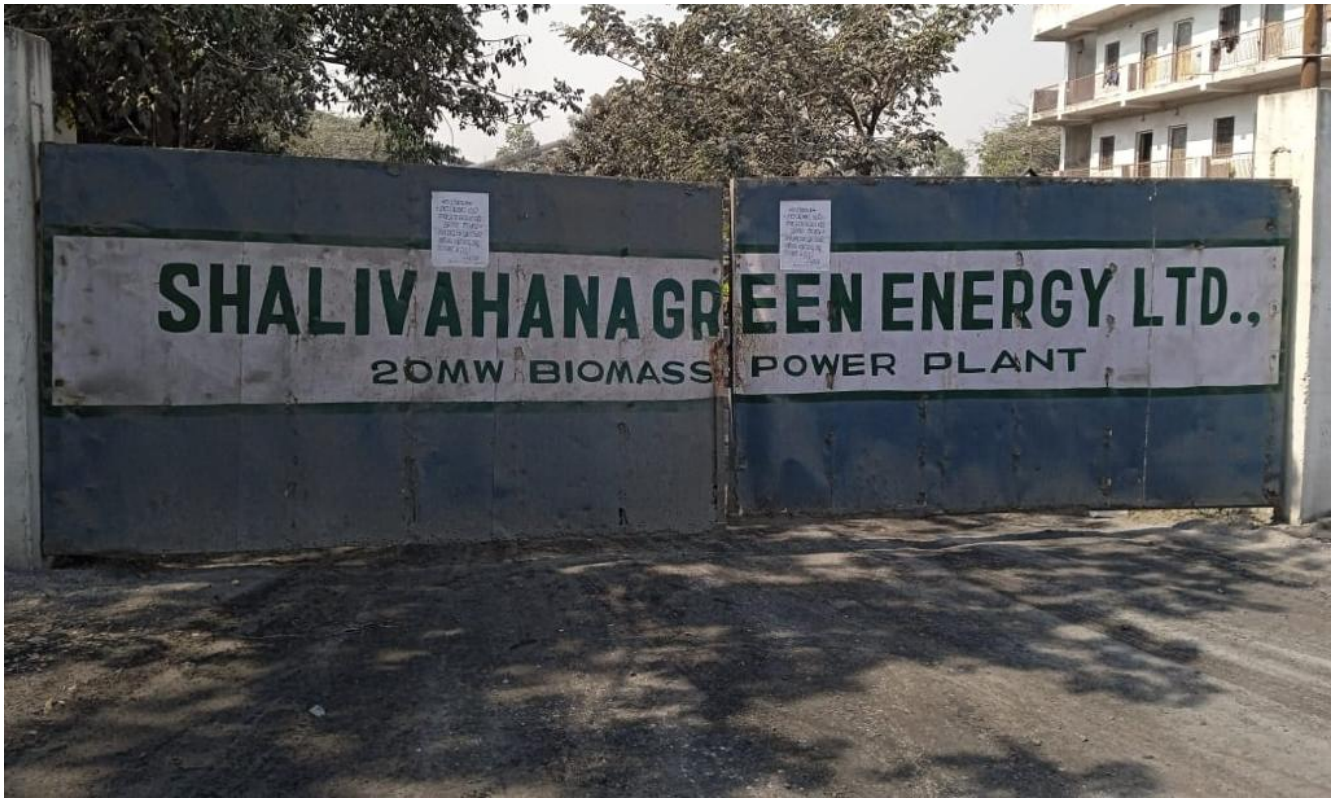
PROJECT CONCEPT NOTE

CARBON OFFSET UNIT (CoU) PROJECT



Title: "**20 MW Capacity Biomass based Power Project of M/s. SHALIVAHANA GREEN ENERGY LIMITED" Version 1.0**

Date 30/12/2022

First CoU Issuance Period: 10 Years, 00 Months

Date: 01/01/2018 to 31/12/2027

Project Concept Note (PCN)
CARBON OFFSET UNIT (CoU) PROJECT

BASIC INFORMATION	
Title of the project activity	20 MW Capacity Biomass based Power Project of M/s. SHALIVAHANA GREEN ENERGY LIMITED
Scale of the project activity	Large Scale Project Activity
Completion date of the PCN	30/12/2022
Project participants	M/s. Shalivahana Green Energy Limited (SGEL)
Host Party	India
Applied methodologies and standardized baselines	ACM0018.: Electricity generation from biomass in power-only plants --- Version 6.0[1]
Sectoral scopes	**1-** Energy industries (renewable - / non-renewable sources)
Estimated amount of total GHG emission reductions	1,135,296 CoUs **(1,135,296 tCO2eq)**
Estimated amount of total GHG emission reductions per annum	**113,529.60 (tCO2eq per annum)**

[1] https://cdm.unfccc.int/methodologies/DB/4HISH6FQZNGKPAHOA6YVN9DJ5J97T3

SECTION A. Description of project activity

A.1. Purpose and general description of Carbon offset Unit (CoU) project activity >>

The project 20 MW Capacity Biomass based Power Project of M/s. SHALIVAHANA GREEN ENERGY LIMITED is located in Village : Nimdha.: Taluk & Dist : Dhenkanal, State: Orissa, and Country India.

The details of the registered project are as follows:

Purpose of the project activity:

M/s. SHALIVAHANA GREEN ENERGY LIMITED (SGEL) is establishing a green field biomass based power plant of capacity 20 MW which supplies electricity only to grid system. The power plant constitutes a Bubbling Fluidised Bed Combustion (BFBC) boiler which will use surplus biomass residues available in the region like paddy stalks, ground nut shell, stalks of red grams, mung, til, maize etc. agro industrial waste (rice husk) and woody biomass (juliflora & casuarina twigs, etc) from agricultural/waste lands. The electricity generated from the project activity will be supplied to the grid system owned by Orissa Power Transmission Corporation Limited (OPTCL), a state utility which is part of NEWNE grid. The project activity envisages to install 20 MW biomass based power plant. The project activity is installing a BFBC (Bubbling Fluidised Bed Combustion) boiler with high temperature and pressure parameters that can take multi-fuels to generate steam to drive the turbo- generator. The generation of electricity is achieved through sustainable means without causing any negative impact on the environment and contributes to climate change mitigation. The biomass fuel is considered as carbon neutral in nature and the electricity generation from the project activity is a clean form of energy.
The project activity utilizes renewable biomass residues for power generation, through Rankine cycle of direct combustion (technology) of biomass residues, since, the biomass fuel is considered as carbon neutral in nature, the electricity generation from the project activity is considered as a clean form of energy. The project activity exports the generated electricity to the carbon intensive NEWNE region grid that is highly dominated by thermal energy sources; thereby it reduces the equivalent amount of emissions in to the atmosphere. The project activity would protect and conserve the local environment by avoiding unintended emissions from the decay and uncontrolled burning of biomass, which is a common practice in the region.

A.2 Do no harm or Impact test of the project activity>>

There are social, environmental, economic and technological benefits which contribute to sustainable development.

Social benefits:

- The project would level up (which is a major concern in India) collection, processing and supply of the biomass fuels envisaged.
- Create jobs for operating the plant as well for fuel collection system, transportation of fuel material to the project plant from sources.
- The generation of eco-friendly green power and contribution to the availability of quality power in the rural area where the plant is located which brings about socio economic development of rural.

Environmental benefits:

- The project activity utilises biomass potential available for power generation, which otherwise is dominated by fossil fuels such as coal, lignite and gas.
- The project contributes to climate change mitigation, through renewable energy generation and reducing the demand for fossil fuel based power.

Economic benefits:

- Employment generation for the local population which results in economic well being.
- Generation of additional income for rural farmers due to creation of commercial value for the neglected biomass in and around the project region would bring in additional investment consistent with the needs of the people.

Rational: as per 'Central Pollution Control Board (Ministry of Environment & Forests, Govt. of India)', final document on revised classification of Industrial Sectors under Red, Orange, Green and White Categories, it has been declared that renewable energy project activity falls under the "White category". White Category projects/industries do not require any Environmental Clearance such as 'Consent to Operate' from PCB as such project does not lead to any negative environmental impacts. Additionally, as per Indian Regulation, Environmental and Social Impact Assessment is not required for renewable energy projects.

PP had proposed to implement a 20 MW non-conventional renewable energy source (i.e., biomass)

The GHG emissions of the combustion process, mainly CO2 are sequestered by Crop Husk/ mustard / bagasse /corn crop plantation, representing a cyclic process. So, the project leads to zero net GHG on-site emissions. The stakeholders identified for the project are as under.

• Elected body of representatives administering the local area (village Panchayat)
• Odisa State Pollution Control Board (CSPCB)
• Ministry of Environment Forest & Climate Change (MoEF & CC), Government of India
• Ministry of Non-conventional Energy Sources (MNES)
• Non-Governmental Organizations (NGOs)
• Consultants Equipment Suppliers
• Biomass suppliers and farmers
• Biomass collectors

Stakeholder list includes the government and non-government parties, which are involved in the project at various stages. PP has not only communicated with the relevant stakeholders under statutory

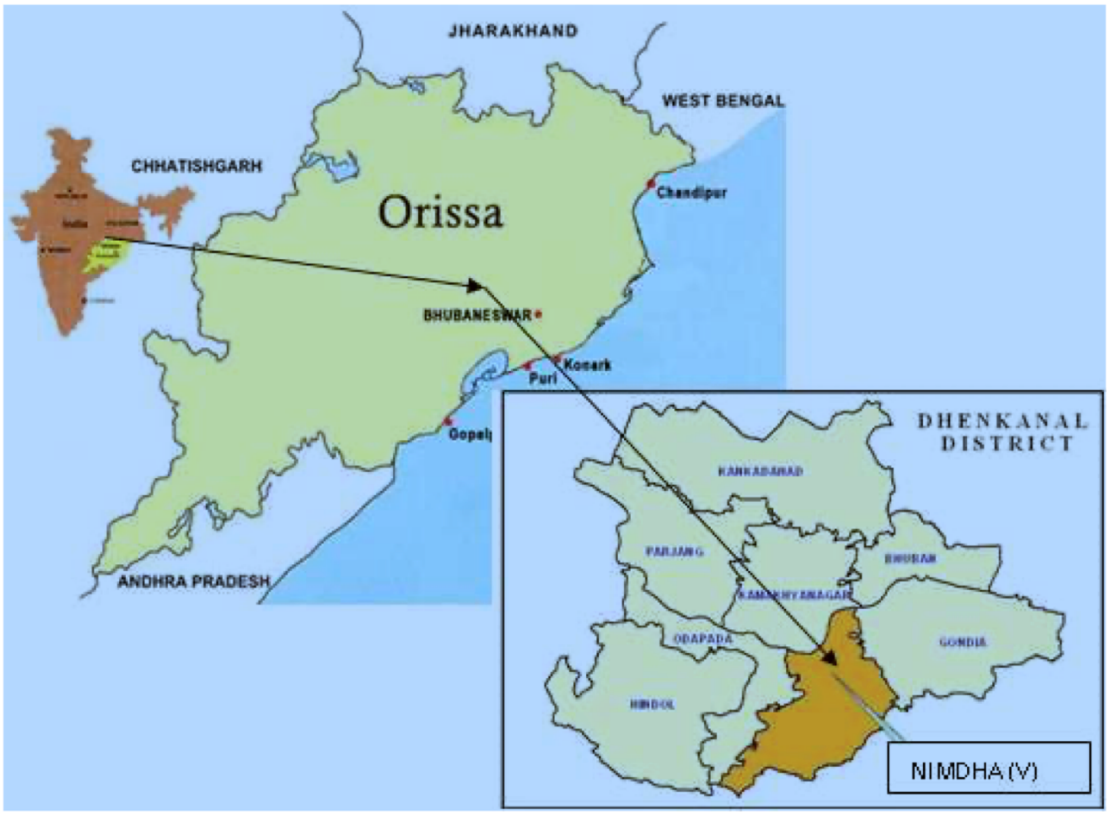
obligations but also has engaged the other stakeholders in a proactive manner in expressing and accounting their opinions on the project. The feedback and inputs received from stakeholders confirm that no negative impact is foreseen by the stakeholders.

A.3. Location of project activity >>

Village : Nimdha.:
Taluk & Dist : Dhenkanal,
State: Orissa, and Country India

Google map & other map showing location of the project activity

The project is located at Nimdha village and is located on Sambalpur –Cuttak road. The nearest major town Dhenkanal which is at a distance of 40 km and railway station is Meera mandali, which is at a distance of 10 km from the project location. The geographical coordinates of the project site are 85°19'08.02"E and 20°46'35.25"N. The location of the site is shown in the following maps.



A.4. Technologies/measures >>

The project is a green field renewable energy power generation project connected to the grid and supplies electricity only to the grid. The project activity is generating electricity using biomass (agricultural residues) with a 90 TPH biomass fired boiler (BFBC) using a 23 MW turbine whose capacity will be governed at 20MW. On an annual average basis, the project exports around 124.57 GWh to the OPTCL grid, which is belongs to eastern grid, which is a part of the NEWNE grid. Considering auxiliary power consumption of 10 % the plant is expected to operate at an annual average plant load factor of 80%.
The plant and machinery of the project consists of one number traveling grate boiler, one number steam

turbine generator set, power evacuation system and fuel handling system etc. The electricity voltage level generated by the turbo generator is stepped to the voltage that is suitable to interface with the grid electricity. Other plant equipment includes HP heater, DM water system, water cooling system/radiator cooling system, compressed air system, firefighting equipment, fuel and ash handling system, switchgear and switch yard etc. The technology of power generation through direct combustion of fuels is already established in India.
The boiler of 90 TPH is a multi-fuel fired boiler with a provision to fire coal to an extent of maximum 15% of total energy basis as specified in the MNRE guidelines. The auxiliary equipment are fuel handling & preparation systems, Ash handling system, electrostatic precipitator, cooling tower, DM plant, power evacuation system etc. The activity also included necessary civil works and site development, fire protection systems and electrical works. The steam conditions at the boiler outlet 20 are 90 TPH of super heated steam at 89 kg/cm (a) pressure and 520 ± 5 C.

A key technical specification of the major equipments for the project is as given in the below table:

Boiler	
Manufacturer	Cethar Vessels Limited
Type	BFBC boiler
Boiler capacity (100 % load) / Steam Flow rate	90 TPH
Steam pressure at super heater outlet	89 kg/cm^2 (a)
Steam temperature at super heater outlet	520±5 °C
Turbo Generator	
Make	Triveni engineering & Industries Limited
Type	Impulse type Bleed cum Condensing turbine
Capacity	23 MW (Maximum)
Steam pressure at the TG inlet	88 kg/cm^2 (a)
Steam temperature at the TG inlet	515 °C
Exhaust steam pressure	0.1 kg/cm^2 (a)
Steam inlet quantity	88.24 TPH for 20 MW
Generator Voltage	11 kV ±10%
Frequency	50 Hz ±5%
Power factor	0.8
RPM	1,500
Condenser type	Surface condenser
Power evacuation	
Grid Voltage	132 kV
OPTCL Sub station	Hindmetals & Industries premises, Kharagprasad
Energy production	
Gross power	20 MW

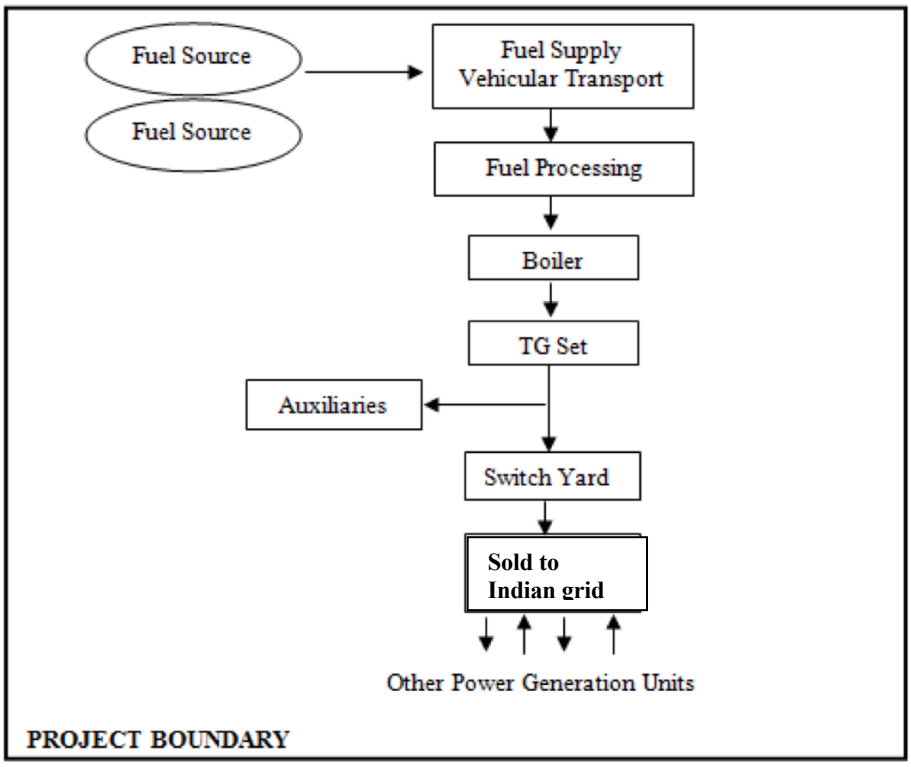
Auxiliary consumption (10%)	2 MW
Net power for export after auxiliary consumption	18 MW

A.5. Parties and project participants >>

Party (Host)	Participants
India	M/s. SHALIVAHANA GREEN ENERGY LIMITED (SGEL)

A.6. Baseline Emissions>>

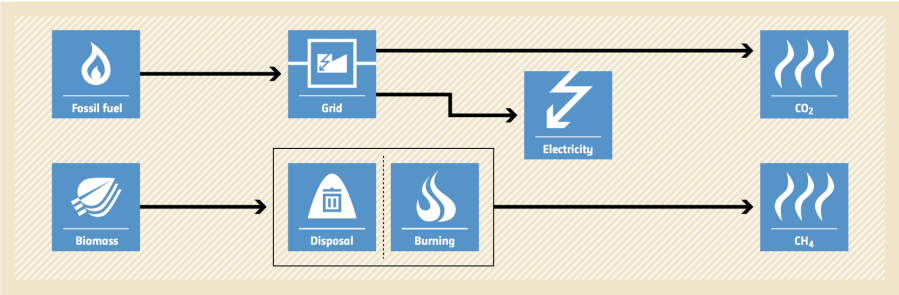
The baseline scenario identified at the PCN stage of the project activity is: Grid In the absence of the project activity, the equivalent amount of electricity would have been generated by the operation of fossil fuel-based grid-connected power plants and fed into Indian grid system, which is carbon intensive due to use of fossil fuels. Hence, baseline scenario of the project activity is the grid-based electricity system, which is also the pre-project scenario. Schematic diagram showing the baseline scenario:



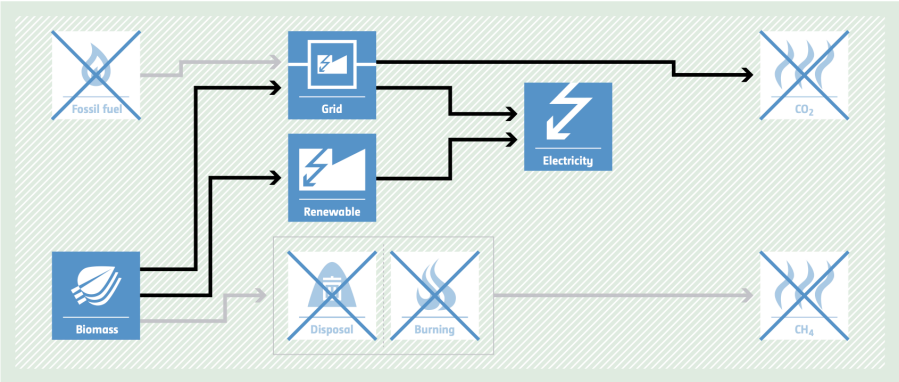
Baseline Scenario: As per the approved consolidated methodology ACM0018 Version 06, if the project activity is the Electricity generation from biomass in power-only plants the baseline scenario is the following: "The baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid". The project activity involves setting up of a new power plant which generates electricity from combustion of biomass which is a renewable source and to supply the produced power to the grid. In the absence of the project activity, the equivalent amount of power would have been supplied by the Unified grid, which is fed mainly by fossil fuel fired plants. Hence, the baseline for the project activity is the equivalent amount of power produced at the Indian grid.

DIAGRAM OR FLOW SHOWING BASELINE SCENARIO

BASELINE SCENARIO
Electricity would be produced by more-carbon-intensive technologies based on fossil fuel or less efficient power plants. Biomass could partially decay under anaerobic conditions, resulting in methane emissions.



PROJECT SCENARIO
Use of biomass residues replaces fossil fuel use. Decay of biomass residues used as fuel is avoided.



A.7. Debundling>>

This project activity is not a debundled component of a larger project activity.

SECTION B. Application of methodologies and standardized baselines

B.1. References to methodologies and standardized baselines >>

SECTORAL SCOPE: 01, Energy industries (Renewable/Non-renewable sources)

TYPE: I - Renewable Energy Projects

CATEGORY: ACM0018. (Title: "Electricity generation from biomass in power-only plants", version 06)

Note: PP had applied the version 10 of the methodology as the project is a CDM and VCS registered project under the CDM[1] with the version 1.3 of the applied methodology. The project was registered at CDM on 18/07/2012 with first crediting period of 10 years (from 18/07/2012 – 17/07/2022 (Fixed)).
And VCS[2] Crediting Period:18/07/2012 - 17/07/2022
But PP has never taken any issuance during the crediting period as no verification has been done. Hence, for UCR registration the latest version of methodology i.e., version 06 is being considered for emission reduction calculation which is also the current version applied under CDM & VCS.

B.2. Applicability of methodologies and standardized baselines >>

[1] https://cdm.unfccc.int/Projects/DB/DNV-CUK1331900319.3/view
[2] https://registry.verra.org/app/projectDetail/VCS/2047

The project activity involves generation of grid connected electricity from the renewable biomass based power generation project and is a Greenfield project activity. The project activity is having 20 MW installed capacity; therefore, falls in small scale project activity and eligible under small scale methodology ACM0018. The project status corresponding to the methodology ACM0018. Version 06 and applicability of methodology is discussed below:

Applicability Criterion	Project Case
The installation of new biomass residues (co-) fired power-only plants at a site where currently no power generation occurs (green field power projects);	The Project involves the installation of a new biomass residue co-fired power-only plant at a site where currently no power generation occurs, which is a green field power project.
The installation of new biomass residues (co-)fired power-only plants, which replace or are operated next to existing power-only plants fired with fossil fuels and/or biomass residues (power capacity expansion projects);	The project activity is a green field project and is a new power plant Hence; there is no existing power or heat plant operation at the project site. So It is not applicable
The improvement of energy efficiency of existing biomass residues (co-)fired power-only plants (energy efficiency improvement projects), which can also lead to a capacity expansion, e.g. by retrofitting the existing plant	The project activity is a green field project and is a new power plant Hence, It is not applicable
The total or partial replacement of fossil fuels by biomass residues in an existing power-only plant or in a new power-only plant that would have been built in the absence of the project (fuel switch projects), e.g. by increasing the share of biomass residues use as compared to the baseline, by retrofitting an existing plant to use biomass residues, etc.	The project activity is a green field project and is a new power plant Hence, It is not applicable.
Applicability Criterion	**Project Case**
No other biomass types than biomass residues, as defined in the baseline methodology, are used in the project plant	The project activity is an Independent power producer that uses only surplus biomass residue as fuel in the boiler. According to Biomass assessment report the biomass residues such as paddy stalks, stalks of red grams, mung, til, maize, etc., rice husk, groundnut shells and woody biomass like juliflora, casuarina twigs from agricultural/ wastelands, are available in surplus quantity and the same are envisaged to use in the project activity.

Fossil fuels may be co fired in the project plant. However, the amount of fossil fuels co-fired shall not exceed to 80% of the total fuel fired on an energy basis;	The project activity may co-fire fossil fuel (coal) to an extent of 15% on annual energy 3 basis conform to MNRE guidelines as supporting fuel as & when required. According to an assessment made by the project proponent, the biomass residues proposed for the project activity are in surplus quantity as evidenced. Hence there is no possibility to use coal more than 15% of total fuel fired on annual energy basis.
For projects that use biomass residues from a production process (e.g. production of sugar or wood panel boards), the implementation of the project shall not result in an increase of the processing capacity of raw input (e.g. sugar, rice, logs, etc.) or in other substantial changes (e.g. product change) in this process;	The project activity is proposed to use off-site biomass residues, which are available in the project region and there is no production process unit at project site from which biomass residues could be used.
The biomass residues used by the project facility should not be stored for more than one year;	The project activity would not store biomass residues for more than one year, since the project would run on a continuous basis throughout the year. As the project consumes the biomass residues on first come first serve basis; there is no possibility of storing the procured biomass for more than one year.
Projects that chemically process the biomass residues prior to combustion (e.g. by means of esterification, fermentation and gasification) are not eligible under this methodology. The biomass residues can however be processed physically such as by means of drying, pelletization, shredding and briquetting;	The identified and considered biomass residues are transported from source to the project site and if required mechanically treated prior to the combustion in the boiler. The project proponent is not proposing to use any chemical processing of the biomass residues.
No power and heat plant operates at the project site during the crediting period.	The project activity involves a multi-fuel fired boiler to generate heat (steam) for electricity generation and no intension to connect heat produced by any other on-site or off-site equipment.

If any heat which is used for purposes other than power generation (e.g. heat which is produced in boilers or extracted from the header to feed thermal loads in the process) is generated during the crediting period or was generated prior to the implementation of the project activity, by any on-site or off-site heat generation equipment connected to the project site, the following conditions should apply: a) The implementation of the project activity does not influence directly or indirectly the operation of the heat generation equipment, i.e. the heat generation equipment would operate in the same manner in the absence of the project activity. b) The heat generation equipment does not influence directly or indirectly the operation of the project plant(e.g. no fuels are diverted from the heat generation equipment to the project plant); and c) The amount of fuel used in the heat generation equipment can be monitored and clearly differentiated from any fuel used in the project activity.	
In the case of fuel switch project activities, the use of biomass residues or the increase in the use of biomass residues as compared to the baseline scenario is technically not possible at the project site without a capital investment in : • The retrofit or replacement of existing heat generators/boilers; or • The installation of new heat generators/boilers; or • A new dedicated biomass residues supply chain established for the purpose of the project (e.g. collecting and cleaning residues that would otherwise not be used for energy purposes); • Equipment for preparation and feeing of biomass residues.	The project is a Greenfield power plant and not a fuel switch project.

B.3. Applicability of double counting emission reductions >>

There is no double accounting of emission reductions in the project activity due to the following reasons:

- Project is uniquely identifiable based on its location coordinates,
- Project has dedicated commissioning certificate and connection point,

- Project is associated with energy meters which are dedicated to the consumption point for project developer

PP had applied the version 10 of the methodology as the project is a CDM registered project under the CDM[3] with the version 10 of the applied methodology. The project was registered at CDM on 03/09/2007 with first crediting period of 10 years (from 03/09/2007 – 02/09/2017 (Fixed).

Note -But PP has never taken any issuance during the crediting period as no verification has been done, However PP will provide declaration letter for no double accounting signed on his letter head during the period of verification of this project activity.

B.4. Project boundary, sources and greenhouse gases (GHGs)>>

As per applicable methodology ACM0018. Version 06, "The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the project power plant is connected to."
Thus, the project boundary includes the biomass-based steam generator, steam turbine generators and the Indian grid system.

	Source	Gas		Justification / Explanation
Baseline	Electricity generation	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification. This is conservative
		N_2O	Excluded	Excluded for simplification. This is conservative
	Uncontrolled burning or decay of surplus biomass residues	CO_2	Excluded	It is assumed that CO_2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector
		CH_4	Included	B1, and/or B3 has been identified as the most likely baseline scenario
		N_2O	Excluded	Excluded for simplification. This is conservative. Note also that emissions from natural decay of biomass are not included in GHG inventories as anthropogenic sources
Project Activity	On-site fossil fuel consumption	CO_2	Included	May be an important emission source as the boiler can be cofired with fossil fuel (coal) along with biomass residues.
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small

[3] https://cdm.unfccc.int/Projects/DB/DNV-CUK1331900319.3/view

	Source	Gas		Justification / Explanation
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small
	Off-site transportation of biomass residues	CO_2	Included	May be an important emission source
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be very small
	Combustion of biomass residues for electricity	CO_2	Excluded	It is assumed that CO_2 emissions from surplus biomass do not lead to changes of carbon pools in the LULUCF sector
		CH_4	Included	This emission source included as CH_4 emissions from uncontrolled burning or decay of biomass residues in the baseline scenario are included
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be small
	Storage of biomass residues	CO_2	Excluded	It is assumed that CO_2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector
		CH_4	Excluded	Excluded for simplification. Since biomass residues are stored for not longer than one year, this emission source is assumed to be small
		N_2O	Excluded	Excluded for simplification. This emissions source is assumed to be very small
	Wastewater from the treatment of biomass residues	CO_2	Excluded	It is assumed that CO_2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector
		CH_4	Excluded	This emission source is excluded as the waste water is not treated even partly under anaerobic conditions
		N_2O	Excluded	Excluded for simplification. This emission source is assumed to be small

B.5. Establishment and description of baseline scenario (UCR Standard or Methodology) >>

This section provides details of emission displacement rates/coefficients/factors established by the applicable methodology selected for the project.

As per para 19 of the approved consolidated methodology ACM0018. Version 6, if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

"The baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid".

The project activity involves a new biomass-based power plant to harness energy from combustion of biomass and generate renewable energy i.e., electricity which is used for sale to national grid through PPA arrangement. In the absence of the project activity, the equivalent amount of power would have been generated by the operation of grid-connected fossil fuel-based power plants and by the addition of new fossil fuel-based generation sources into the grid, the power produced at grid from the other conventional sources which are predominantly fossil fuel based. Hence, the baseline for the project activity is the equivalent amount of power produced at the Indian grid.

A "grid emission factor" refers to a CO_2 emission factor (tCO_2/MWh) which will be associated with each unit of electricity provided by an electricity system. The UCR recommends an emission factor of **0.9 kg CO2e / kWh** for the 2014 - 2020 years as a conservative estimate for Indian projects not previously verified under any GHG program. Hence, the same emission factor has been considered to calculate the emission reduction under conservative approach.

- **Net GHG Emission Reductions and Removals**

Thus,

$ER_y = BE_y - PE_y - LE_y$ Where:
ERy = Emission reductions in year y (tCO2/y)
BEy = Baseline Emissions in year y (t CO2/y)
PEy = Project emissions in year y (tCO2/y)
Ley = Leakage emissions in year y (tCO2/y)

- **Baseline Emissions**

Baseline emissions include only CO_2 emissions from electricity generation in power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants.

The baseline emissions are to be calculated as follows:

$$BEy = EGBL,y \times EFgrid,y$$

Where-

BE_y	=	Baseline emissions in year y (t CO_2)
$EG_{BL,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of this project activity in year y (MWh)
$EFgrid,y$	=	UCR recommended emission factor of 0.887 kg CO2e / kWh has been considered. (Reference: General Project Eligibility Criteria and Guidance, UCR Standard, page 4)

Project Emissions

As per paragraph 39 of ACM0018, version 06, for most renewable energy project activities emission is zero.

As per applied methodology only emission associated with the fossil fuel combustion, emission from use of alternate fuel during unavailability of biomass, would be accounted for the project emission on actuals. Therefore, following project emission type has been considered for the project activity:

Coal or lignite consumption:

The project activity will be using fossil fuel like coal and lignite as alternate fuel to meet the emergency requirements of the powerhouse; hence emissions due to usage of fossil fuel will be accounted as project emissions. As per the latest guidelines of Government of India, 15% of conventional fossil fuel can be used in case of any emergency.

CO2 emissions from fossil fuel combustion in the project activity are calculated based on the quantity of fuels combusted and the CO2 emission factor of those fuels, as follows:

$$\mathbf{PE_{FC,y} = \Sigma\, FC_{i,y} \times NCV_{i,y} \times EF_{CO2,i}}$$

Where:

$PE_{FC,y}$ = Project Emission due to alternate fossil fuel consumed during monitoring period
$FC_{i,y}$ = Quantity of fuel type 'i' consumed in liters (lit) or tones (t)
$NCV_{i,y}$ = Net Calorific Value of type of fuel used
$EF_{CO2,i}$ = IPCC 2006 Emission factor for type of fuel used
i = fuel types combusted during the monitoring period

Hence, $PE_y = PE_{FC,y}$

Leakage

As per the para 23 of the tool "Leakage in biomass small-scale project activities" version 04, under "Competing uses for the biomass" category – "The project participant shall evaluate ex-ante if there is a surplus of the biomass in the region of the project activity, which is not utilized. If it is demonstrated (e.g., using published literature, official reports, surveys etc.) at the beginning of each crediting period that the quantity of available biomass in the region (e.g., 50 km radius), is at least 25% larger than the quantity of biomass that is utilized including the project activity, then this source of leakage can be neglected otherwise this leakage shall be estimated and deducted from the emission reductions".

In order to assess the availability of biomass in the project region, a biomass availability survey has been conducted by a credible third-party agent. Based on the biomass availability survey report it has been confirmed that there is sufficient biomass available in the region less than 50 km surrounding the site of the project activity. It confirms that there is no such leakage anticipated.

Hence, LEy = 0

The actual emission reduction achieved during the first CoU period shall be submitted as a part of first monitoring and verification. However, for the purpose of an ex-ante estimation, following calculation has been submitted:

Estimated annual baseline emission reductions (BEy)

Ex-ante calculation of emission reductions is equal to ex-ante calculation of baseline emissions as project emissions and leakage are nil.

Baseline emission factor (Combined Margin) ($\mathbf{EF_{grid,\,CM,\,y}}$ / $\mathbf{EF_{grid,\,CO2,y}}$) = 0.887 kg CO2e / kWh

Annual Net electricity generation = 20 MW (project capacity) × 80% (PLF) × 8760 (operating hours)
= 126144 MWh

Combined CO_2 emission factor of the INDIAN Grid = 0.9 kg CO2e / kWh

Baseline emissions from the project activity = (net electricity from the project activity* emission factor of the INDIAN grid)

Baseline emissions from the project activity = (net electricity from the project activity* emission factor of the INDIAN grid)
= (126144 * 0.9)
= 113529.60 t CO2/yr
Emission Reductions from the project activity = 113529.60tCO2/yr

Hence, the total emission reductions after rounding off the above result, is 113529.60tons of CO2 annually and 1135296 tons of CO2 for the entire duration of the crediting period.

B.6. Prior History>>

The project activity is a small-scale biomass fired project following are the key details under the prior history of the project:

PP had applied the version 10 of the methodology as the project is a CDM registered project under the CDM[4] with the version 1.3 of the applied methodology. The project proponent had earlier applied for carbon credits under the CDM mechanism in 2012, however, the project is neither a currently registered CDM activity nor has been issued credits for the period 2014-2022 under any GHG program (from 18 Jul 12 - 17 Jul 22 (Fixed)).
This project is also registered with VCS with project ID is VCS: 2047[5] with Crediting Period: 18/07/2012 - 17/07/2022 (Has Expired).

Note -But PP has never taken any issuance during the crediting period as no verification has been done in any GHG program, However PP will provide declaration letter for no double accounting signed on his letter head during the period of verification of this project activity.

B.7. Changes to start date of crediting period >>

There is change in the start date of crediting period, the project is applied under UCR with its first crediting period starting from 01/01/2018.

B.8. Permanent changes from PCN monitoring plan, applied methodology or applied standardized baseline >>

Not Applicable

B.9. Monitoring period number and duration>>

First Monitoring Period:
4 years 0 months 1 days including the end date
01/01/2018 to 31/12/2022 (inclusive of both dates)

Crediting period of the project activity is from 01/01/2018 to 31/12/2027

[4] DNV_Draft_Validation Report_Laharipower_ET070618 (unfccc.int)
[5] https://registry.verra.org/app/projectDetail/VCS/2047

B.8. Monitoring plan>>

Data and Parameters available at validation (ex-ante values):

Data / Parameter	UCR recommended emission factor
Data unit	tCO_2 /MWh
Description	A "grid emission factor" refers to a CO_2 emission factor (tCO_2/MWh) which will be associated with each unit of electricity provided by an electricity system. The UCR recommends an emission factor of e 0.887 kg CO2e / kWh for the 2014 - 2020 years as a fairly conservative estimate for Indian projects not previously verified under any GHG program. Hence, the same emission factor has been considered to calculate the emission reduction under conservative approach.
Source of data	https://a23e347601d72166dcd6-16da518ed3035d35cf0439f1cdf449c9.ssl.cf2.rackcdn.com//Documents/UCRCoUStandardAug2022updatedVer6_090822220127104470.pdf[6]
Value applied	0.9
Measurement methods and procedures	-
Monitoring frequency	Ex-ante fixed parameter
Purpose of Data	For the calculation of Emission Factor of the grid
Additional Comment	The combined margin emission factor as per CEA database (current version 16, Year 2021) results into higher emission factor. Hence for 2021 vintage UCR default emission factor remains conservative.

Data / Parameter	$NCV_{k,y}$
Data unit	GJ/mass or volume unit
Description	Net calorific value of biomass type k
Source of data	Laboratory record (Archived on paper)
Value applied	- (an average value is given for representation)
Measurement methods and procedures	IPCC Default Value is considered. *OR* Monitoring equipment – Bomb Calorimeter Water equivalent = H □ M □ (CV_t + CV_w) / T Where:

[6] https://a23e347601d72166dcd6-16da518ed3035d35cf0439f1cdf449c9.ssl.cf2.rackcdn.com//Documents/UCRCoUStandardAug2022updatedVer6_090822220127104470.pdf

	H = Calorific value of Benzoic acid in cal/gm M = Mass of sample in gm CV_t = calorific value of thread (per cm = 2.1 cal) CV_w = calorific value of ignition wire (per cm = 2.331 cal) T = final rise in temperature
Purpose of Data	Calculation of baseline emission
Comments	The data will be archived electronically, and the archived data will be kept for 2 years beyond the Crediting Period

Data / Parameter	$EF_{CO2,i}$
Data unit	tCO_2e/TJ
Description	CO2 emission factor of fossil fuel type i
Source of data	IPCC default value
Value applied	74.8
Measurement methods and procedures	The project proponent chooses default value option i.e., IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in Table 1.2 of Chapter 1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories and is fixed Ex-ante. This is in accordance to the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion", latest version applied.
Purpose of Data	Calculation of project emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data and Parameters to be monitored (ex-post monitoring values):

Note: For the purpose of baseline ER accounting only one ex-post parameter is relevant, i.e. Net Electricity supplied to the Grid by the project activity ($EG_{BL,y}$). However, in line with the registered CDM monitoring plan, few other monitoring parameters are also included. Hence, at the time of baseline emission reduction calculation only the $EG_{BL,y}$ will be used; whereas other parameters may be considered only for reporting purposes.

Main Monitoring Parameter for calculation:

Data / Parameter	$EG_{BL,y}$
Data unit	MWh / year
Description	Net electricity supplied to the grid by the project activity
Source of data	Monthly Meter Reading Performa by CSEB
Measurement procedures (if any):	Monitoring equipment – MAIN Energy Meter Accuracy class - 0.2s Calibration frequency- once in five years Monitoring equipment – CHECK Energy Meter Accuracy class - 0.2s Calibration frequency- once in five years Measured readings of the energy meter installed at the plant switchyard outgoing feeder grid interconnection point. This will be recorded every month by Monthly Meter Reading by OSEB. This record will be archived and stored.
Measurement Frequency:	Monthly
Value applied:	126,144 per year (Annualized average value has been considered here for an ex-ante estimation only, whereas this is an-ex post parameter hence actual value shall be applied during monitoring and verification)
QA/QC procedures applied:	Calibration of the Main meters will be carried out once in five (5) years as per National Standards (as per the provision of CEA, India) and faulty meters will be duly replaced immediately as per the provision of power purchase agreement. Cross Checking: The meter reading is cross checked with the sales receipts of electricity. The meters installed are owned by the state utility and the meter is tri-vector type of meter which can measure both export and import.
Purpose of data:	The Data/Parameter is required to calculate the baseline emission.
Any comment:	All the data will be archived till a period of two years from the end of The crediting period.