MONITORING REPORT

CARBON OFFSET UNIT (CoU) PROJECT

Title: **Biomass based power project by Shri Shyam Warehousing and Power Pvt. Ltd, Banari, Chhattisgarh**

UCR PROJECT ID: 352

MR Version 2.0

MR Date: 13/11/2023

UCR Monitored Period: 01
UCR 1st CoU Issuance Period: 10 Years, 00 Months (Both Days Inclusive)
UCR 1st Monitoring Period: 01/01/2013 to 31/12/2022 (Both Days Inclusive)
UCR 1st Crediting Period: 01/01/2013 to 31/12/2022 (Both Days Inclusive)

	Monitoring Report (MR) **CARBON OFFSET UNIT (CoU) PROJECT**

BASIC INFORMATION

Title of the project activity	Biomass based power project by Shri Shyam Warehousing and Power Pvt. Ltd, Banari, Chhattisgarh
Scale of the project activity	Small Scale
UCR PROJECT ID	352
Completion date of the MR	13/11/2023
Project participants	**Project Proponent:** Shri Shyam Warehousing and Power Pvt. Ltd (SSWPPL) **Aggregator:** Carbon Equalizers, KATNI UCR ID : 660687753
Host Party	India
Applied methodologies and standardized baselines	**CLEAN DEVELOPMENT MECHANISM (CDM) UNFCCC Methodology** ***AMS-I.C.*** *Small-scale Methodology Thermal energy production with or without electricity* Version 22.0 **UCR CoU Standard for Baseline Grid Emission Factor**
Sectoral scopes	01 Energy industries (Renewable/NonRenewable Sources)
Estimated total amount of average GHG emission reductions per year (Year: Quantity)	2013: 39851 tCO2 (39851 CoUs)
	2014: 41722 tCO2 (41722 CoUs)
	2015: 43340 tCO2 (43340 CoUs)
	2016: 43490 tCO2 (43490 CoUs)
	2017: 40273 tCO2 (40273 CoUs)
	2018: 42675 tCO2 (42675 CoUs)
	2019: 38219 tCO2 (38219 CoUs)
	2020: 47765 tCO2 (47765 CoUs)
	2021: 33322 tCO2 (33322 CoUs)
	2022: 50500 tCO2 (50500 CoUs)
Estimated total amount of average GHG emission reductions for the entire monitoring period (2013-2022)	421157 tCO_2 (421157 CoUs)

SECTION A. Description of project activity

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

The project activity, **Biomass based power project by Shri Shyam Warehousing and Power Pvt. Ltd, Banari, Chhattisgarh** is located at Village: Banari, District: Janjgir, State: Chhattisgarh, Country: India.

The details of the UCR project activity are as follows:

Purpose of the UCR project activity:
The project activity involves the installation of a 10 MW biomass (rice husk) based cogeneration power plant to generate electricity by utilising the renewable biomass potential available in the region, thereby reducing GHG emissions. The project activity achieves GHG emission reductions by supplying the net electricity generated to the Northern, Eastern, Western, and North-Eastern (NEWNE) grid which is predominantly dependent on fossil fuel based power plants.

The project proponent (PP) Shri Shyam Warehousing and Power (P) Limited (SSWPPL) has entered into a long term power purchase agreement (PPA) with the Chhattisgarh State Power Distribution Company Limited (CSPDCL) dated **19.12.2007** for the supply of **10 MW_h** power to the grid and a supplementary PPA dated **16.04.2012** for the supply of **9 MW_h** power to the grid for a period of 20 years (source). Hence the commissioning date or start date of this UCR project activity is **19/12/2007**. Though the project is a co-generation project, the **PP is entitled to claim UCR CoUs based only on the renewable electrical energy supplied/exported to grid** as per the UCR CoU program policy and guidelines related to small scale biomass to grid power projects. In the absence of project activity, the PP would have continued operating its existing two (2) units of rice husk fired boilers and the grid would have purchased fossil electricity from other power plants.

The generation of power from biomass residues will contribute to reducing greenhouse gas (GHG) emissions in the current energy mix. As the project utilises rice husk as the source of fuel for the generation of electricity it will qualify as a renewable source of electricity. The project activity comprises the installation of a high pressure boiler of 50 tonnes per hour capacity (68 kg/cm^2, 490±5 °C) and an extraction bleed cum condensing type steam turbine generator set of 10 MW capacity. The project activity also involves the installation of ancillary equipment to generate electricity for the grid from a renewable energy source (rice husk).

The project activity will involve the collection of rice husk within a 75 km radius of the plant. The project activity generates and exports 10 MW of electrical power at 11 kV and supply to the Chhattisgarh State Electricity Board (part of the NEW NE regional grid) at 33 kV through the local substation. The necessary transmission lines from the power plant to the substation is laid by the project activity

The project activity supplies and displaces approximately **700673 MWh** of fossil energy (coal) fired with renewable (biomass) power from the grid each year.

The project activity uses rice husk as fuel for cogeneration power unit, which is a renewable biomass fuel and does not add any net carbon-dioxide to the atmosphere because of the carbon recycling during growth of rice. The term rice husk refers to the byproduct produced in the milling of paddy and forms 16-25% by weight of the paddy processed. In the majority of rice producing countries much of the husk produced from the processing of rice is either burnt for heat or dumped as a waste. India alone produces around 120 million tons of rice paddies per year, giving around 24 million tons of rice husks per year (source). Therefore, the project activity leads to zero CO_2 on-site emissions associated with rice husk combustion.

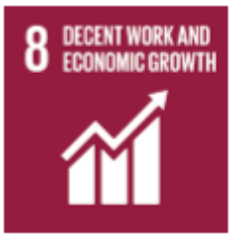
The export of electricity hence reduces GHG emissions by replacing the fossil fuel dominated grid based electricity with a renewable source of electricity. The high pressure boilers are fired by rice husk, a byproduct from the rice manufacturing process to generate steam, which in turn powers the steam turbine to generate electricity. **Consent to establish the project activity issued by Chhattisgarh Environment Conservation Board dated 06/05/2010. No Objection Certificate issued by Boiler Inspectorate dated 08/11/2010.**

The UCR project activity is the construction and operation of a power plant/unit that uses renewable energy sources and supplies renewable electricity to the grid. The UCR project activity is thus the displacement of electricity that would be provided to the grid by more-GHG-intensive means and provides long-term benefits to the mitigation of climate change. The UCR project activity qualifies under the environmental additional positive list of pre-approved project types under the UCR carbon incentive model for issuance of voluntary carbon credits.

UCR Monitoring Period Number	01
UCR Crediting Start Date for this Period	01/01/2013
UCR Crediting End Date for this Period	31/12/2022
Total Emission Reductions over the monitoring period	421157 **tCO_2**

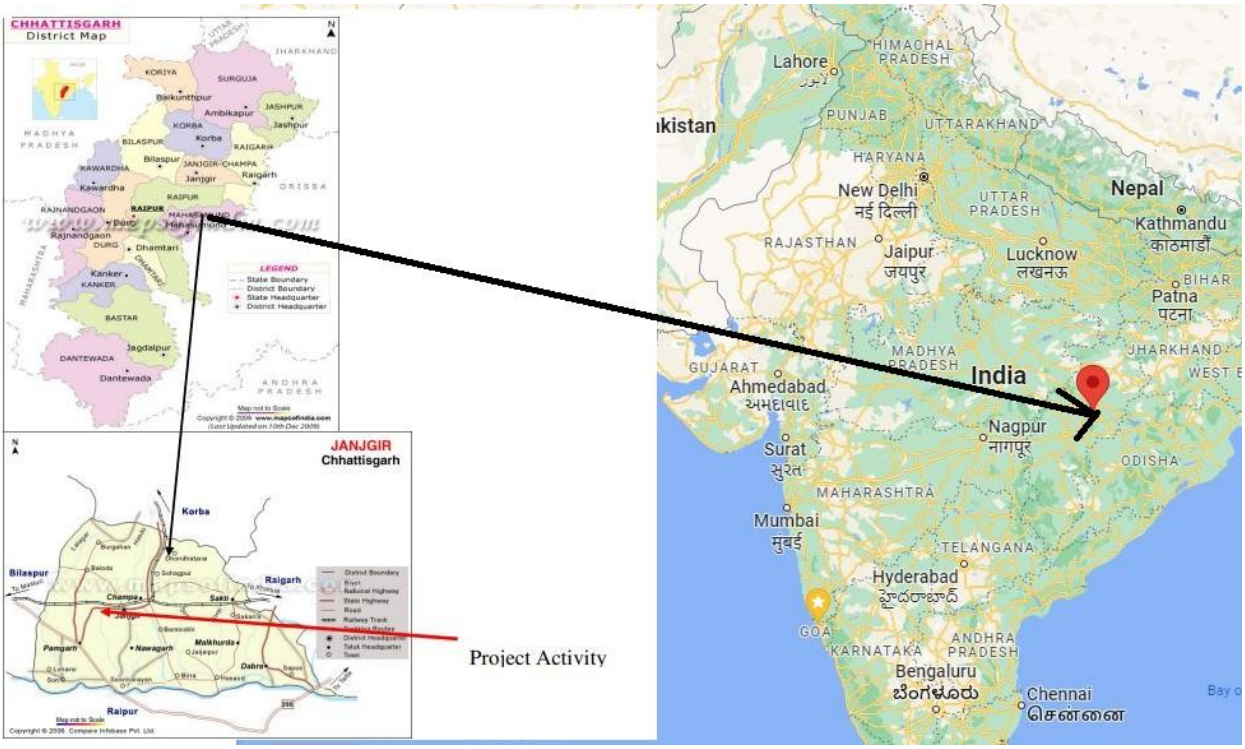
Contribution to UN SDGs: The project activity, beside "Climate action' (i.e., SDG 13), addresses multiple other UN SDGs too. The list of the SDGs addressed through the project activity is mentioned below:

SDG	Description of Contribution
SDG 7: Affordable and Clean Energy	Biomass fired power generation systems are a GHG neutral system and by requesting submission of this project under the UCR CoU Standard, the project owner is evidently seeking international cooperation to facilitate FDI into clean energy infrastructure of India.

	The biomass used in the project is made from "biomass residue" as per "Definition of renewable Biomass" EB23, Annex 18.
SDG 13: Climate Action 	Biomass based cogeneration systems reduce the GHG emissions of the planet at large.
 SDG 8: Decent work and Economic Growth	By using renewable energy sources for economic productivity to achieve same outcomes at the process level- the PP aims to decouple environmental degradation, global warming and climate crisis from economic productivity.
 SDG 9: Industry, Innovation and Infrastructure	The project activity directly contributes to abatement of carbon dioxide emissions.

A.2. Location of project activity >>

Country: India
Village: Banari,
District: Janjgir,
State: Chhattisgarh
Latitude 21^0 59’ 51.83” N
Longitude: 82^0 31’ 04.59”E



A.3. Technologies/measures>>

The UCR project activity produces renewable energy from the combustion of a renewable biomass. The technology employed is a biomass fired plant which consists mainly of a boiler and turbine generator. The technology employed is domestically available in India and the main equipment i.e. boiler and turbine are supplied by well-known Indian manufacturers.

All the equipment are designed as per industry guidelines, meet the environmental and safety guidelines and comply with the criteria laid down by the state Pollution Control Board ensuring that the project activity will install environmentally safe technology. The project generates electricity using a 50 TPH (tonnes per hour) AFBC boiler and a 10000 kW_h (10 MW_h) capacity extraction bleed cum condensing type steam turbo-generator. The technical parameters of boiler and turbo-generator are given below:

Travelling grate boiler		Turbo-generator	
MCR (Maximum Continuous Rating)	50 TPH	Steam parameters at turbine inlet	65 kg/cm^2(A), 485°C
Steam outlet parameters	68 kg/cm^2(A), 490±5°C	Generator rating	10 MW, 50Hz, 11 kV

The steam generated from the boiler drives steam turbine at the rated pressure and temperature coupled to an electric generator. The steam for the process steam requirements is trapped off from an intermediate stage and is directly fed to the process steam header. The power generated is evacuated to CSEB, substation. As proposed project activity is cogeneration activity, some quantity of steam generated from project activity is also meeting the steam requirement of existing rice mills located in the project premises.

The steam generated from the boiler is 47.06tph, out of which 0.1tph and 0.25tph is go in a sealing and ejector process respectively whereas 46.71tph is going to turbine. From turbine 12tph of steam is consumed in the process, 29.03tph is utilised for condenser and 6.66tph is utilised in the de-aerator. The power generated from the project activity is exported to the CSEB grid at Banari 220kV/33kV sub-station at 33kV through an independent single circuit 33kV overhead line from the proposed project activity. The sub-station is located at a distance of 200m from the project activity. Since the project is a cogeneration project it cannot apply AMS-I.D.

The plant is designed with all other auxiliary plant systems like

- Rice husk handling system with storage and processing arrangements,
- High pressure feed water heaters,
- Ash handling system,
- Water treatment plant,
- Compressed air system,
- Air conditioning system,
- Main steam, medium pressure and low pressure steam systems,
- Fire protection system,
- water system which include raw water system, circulating water system, condensate system, De-Mineralised water system and service with potable water system and
- The electrical system for its successful operation.

CHHATTISGARH STATE POWER DISTRIBUTION CO. LTD R-32(A

(Successor Company of CSEB)

MONTHLY METER READING PERFORMA

(Report Type:export)

Name of Consumer	SHRI_SHYAM_WEARH			
Date of Reading	01/02/2015 12:00:00PM	Consumer No	:-	1005503
Meter Serial No	CSE38387	Division Name	:-	O&M_CHAMPA
ME CTR	200.00	Meter CTR	:-	100.00
ME PTR	33.00	Meter PTR	:-	11.00
Supply Voltage	33 KV			
EMF	6.0000	Contract Demand	:-	1,176

PARTICULARS	KWH	KVARH		KVA(MD)	KVAH
		LAG	LEAD		
Current Reading	22680210.0000	152250.0000	1025970.0000	1556.0000	227[illegible]
Previous Reading	21620360.0000	147770.0000	999090.0000	1524.0000	216[illegible]
[illegible]rence	1059850.000	4480.000	26880.000	1556.0000	[illegible]
Diffrence *EMF	6359100.000	26860.000	161280.000	9336.000	[illegible]
Assessment if any					
Total	**6359100.000**	**26880.000**	**161280.000**	**9336.000**	[illegible]
Power Factor(%)	**99.93**				

TOD KWH	Current	Previous	Difference *EMF	RESET COUNT		CMD(KVA)	
				Previous	Present	Previous	Present
C1	12285510.0000	11712410.0000	3438600.000				
C2	4731490.0000	4507750.0000	1342440.000		72		[illegible]
C3	5663200.0000	5400190.0000	1578060.000				
Total	**22680200.000**	**21620350.000**	**6359100.000**				

[illegible]KVAH	Current	Previous	Difference *EMF
C1	12,315,850.0000	11,742,430.0000	3,440,520.00
C2	4,743,430.0000	4,519,410.0000	1,344,120.00
C3	5,679,640.0000	5,416,520.0000	1,578,720.00
Total	**22,738,920.00**	**21,678,360.00**	**6,363,360.00**

REMARKS:-

METER DISPLAY VOLTAGE			METER DISPLAY CURRENT(A)		
R	Y	B	R	Y	[illegible]
6.804 kV	6.848 kV	6.847 kV	74.659 A	73.273 A	72.2[illegible]

This is an electronically generated report and doesn't require signature

Sample Monthly Meter Reading/Details on File

SHRI SHYAM WAREHOUSING AND POWER PVT. LTD.

VILLAGE – BANARI, DISTT. - JANJGIR-CHAMPA CHHATTISGARH 495-668
MOBILE NO. 081203-50035, 099263-18851

Ref : SSWPL/CSPDCL/2014-15/10 Date: 02/02/2015

To,

The Superintending Engineer (Commercial) - I
Office of the Chief Engineer (Commercial)
Chhattisgarh State Power Distribution Corporation Limited
"Vidyut Sewa Bhavan", Danganiya,
Raipur – 492013. (C.G.)

Ph. No. : 2574441
Fax No. : 2574442

Dear Sir,

Sub : Statement of fuel used, breakup of biomass and fossil fuel separately

With reference to the above, please find below the statement of fuel, breakup of biomass and fossil fuel used in our Plant separately for the month of:

Month	Monthly consumption of rice husk in the boiler in MT	Monthly consumption of Coal in MT	Ratio of the fuel mixed for boiler operation during the month Husk : Coal	Generation of Bio Mass Power in KWH	Export of Bio Mass Power in KWH
January 2015	7860.200	1387.090	85:15	7113300	6359100

Thanking you Sir,

Yours faithfully,

Shri Shyam Warehousing & Power Pvt. Ltd.

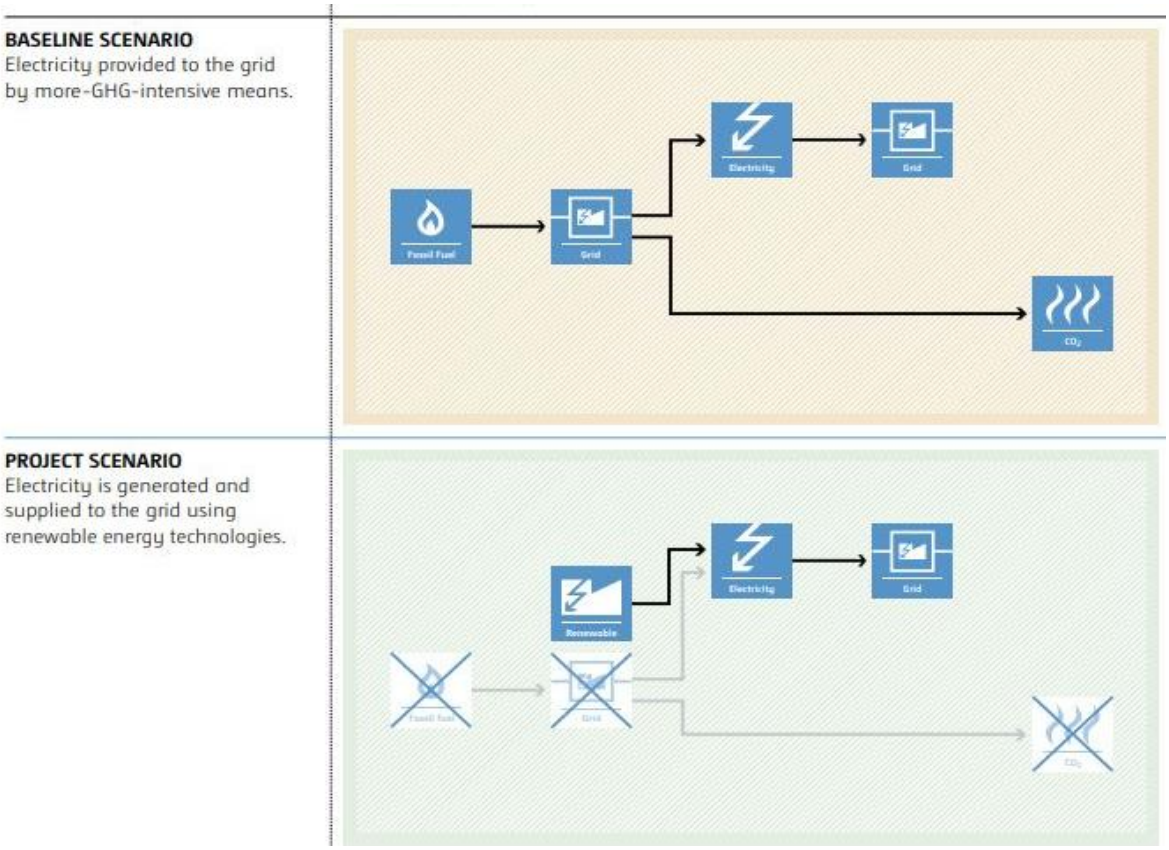
Monthly Power Exported/Biomass/Coal Consumption Data on File (Sample)

A.4. Parties and project participants>>

Project activity does not involve any public funding from Annex I Party, which leads to the diversion of the official development assistance.

Party (Host)	Participants/Aggregator
India	Project Owner: Shri Shyam Warehousing and Power Pvt. Ltd, Banari, Chhattisgarh Aggregator: Carbon Equalizers, KATNI UCR ID : 660687753 Contact: Mr Vikas Chamadia Email: vikaschamadia@rediffmail.com **Mob**: 9303068600

A.5. Baseline Emissions>>



The approved baseline methodology has been referred from the indicative simplified baseline and monitoring methodologies for selected large scale UNFCCC CDM project activities that involve generation of power and heat in thermal power plants, including cogeneration plants using biomass.

The applicable methodology and simplified modalities and procedures for small scale CDM project activities is "*the baseline scenario is displacement of more-GHG-intensive electricity generation in grid."*

For project activities that do not displace captive electricity generated by an existing plant but displace grid electricity import and/or supply electricity to a grid, the emission factor of the grid shall be calculated as per the procedures detailed in **AMS-I.D**

The applicable baseline scenario is

- *"displacement of more-GHG-intensive electricity generation in grid."*

Emission coefficient of fuel used in the baseline scenario

The CO_2 emission factor for grid connected power generation in year y calculated using UCR Standard emission factor is 0.9 tCO2/MWh for the period 2013-2022.

A.6. Debundling>>

This project is not a debundled component of a larger registered carbon offset 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 (Small Scale)**

UCR Positive List Environmental Additionality

CATEGORY- ***UNFCCC CDM AMS-I.C. Small-scale Methodology***
Thermal energy production with or without electricity Version 22.0

Typical project(s):
Thermal energy production using renewable energy sources including biomass-based cogeneration and/or trigeneration. Projects that seek to retrofit or modify existing facilities for renewable energy generation are also applicable.

Type of GHG emissions mitigation action:
Renewable energy. Displacement of more-GHG-intensive thermal energy production, displacement of more-GHG-intensive thermal energy and/or electricity generation. This methodology is applicable to project activities that operate biomass (co-)fired power and-heat plants. The project activity includes the installation of new plants at a site where currently power or heat generation occurs. The new plant replaces or is operated next to existing plants (capacity expansion projects).

Scope:
This methodology comprises renewable energy technologies that supply users i.e. residential, industrial or commercial facilities with thermal energy that displaces fossil fuel use. These units include technologies such as solar thermal water heaters and dryers, solar cookers, energy derived from renewable biomass and other technologies that provide thermal energy that displaces fossil fuel.

Applicability: Biomass-based cogeneration and trigeneration systems are included in this category. Emission reductions from a biomass cogeneration or trigeneration system can accrue from the following activities:
(a) Electricity supply to a grid

For project activities that do not displace captive electricity generated by an existing plant but displace grid electricity import and/or **supply electricity to a grid**, the emission factor of the grid shall be calculated as per the procedures detailed in ***AMS-I.D.***

UCR CoU Standard is used to determine the baseline grid emission factor for the 2013-2022 period for conservativeness, has been considered.

B.2. Applicabilityofmethodologiesandstandardizedbaselines>>

The project activity involves the generation of electricity from the combustion of rice husk, a renewable biomass and the electricity is supplied to the grid. Since the project activity utilises biomass (rice husk) for the generation of power and supplies it to the local grid, it displaces fossil fuel (coal), and hence it meets the primary applicability criteria of the methodology.
The project activity is a biomass based cogeneration plant producing both heat and electricity. The total installed capacity of project activity is **10 MW** which is below the small scale specified limit of 15MW. The project is a biomass based co-generating system that supplies electricity (i) to the grid, (ii) thermal energy to the existing facilities. The project activity claims for emission reductions only from the supply of electricity to the grid.
The project activity involves the installation of **10MW** biomass cogeneration system at the adjacent rice mill. It is physically distinct from the existing units as a new set of equipment has been installed as part of the project activity which are not connected to the existing equipment, thus meeting the criteria of the methodology.
There is no CDM registered project of the same category & technology as the project activity within 1 km of the project boundary
The project activity is a new power plant and does not involve retrofit or modification of an existing facility. The steam produced is used for captive consumption by the adjacent rice mill and not delivered to another facility or facilities within the project boundary.
The biomass used by the project plant is not stored for more than one year. The biomass used by the project plant is not processed chemically or biologically (e.g. through esterification, fermentation, hydrolysis, pyrolysis, bio- or chemical degradation, etc.) prior to combustion. The project activity is not using biomass fuel in briquette form.
The Project Activity uses biomass residues from a production process (e.g. production of rice in mill), and the implementation of the project does not result in an increase of the processing capacity of (the industrial facility generating the residues) raw input (e.g. rice) or in other substantial changes (e.g. product change) in this process
The project activity is not charcoal based biomass energy generation. The project activity unit does not exceed the limit of 25% co-firing fossil fuel criteria as per the UCR Protocol for such projects. Co-firing with rice husk is limited to 15% with coal fines within the project activity.
Biomass generated power is used for direct grid supply and for meeting the captive needs at the facility. The project activity involves the grid-connected rice husk based electricity generation capacity involving the installation of facilities for allowing the export of electricity to the regional grid
The project activity also does not include any GHG emissions related to the decomposition or burning of biomass. The baseline heat emissions for the project activity are not included in the project boundary nor does it claim for emission reductions from heat.
The project activity is a co-fired system uses both fossil and renewable fuel in the production of electricity with the total thermal installed capacity of **39.5MWth** which is less than the **45MWth**. As the project activity is claiming the emission reductions solely on account of the electrical energy production, the small scale limit for the project activity was confirmed since the project activity involves the installation of **10MW** biomass cogeneration system at the adjacent rice mill. It is physically distinct from the existing units as a new set of equipment has been installed as part of the project activity which are not connected to the existing equipment, thus meeting the criteria of the methodology.

B.3. Applicability of doublecounting emission reductions>>

The biomass boilers and turbines are constructed by the project proponent within the project boundary. The biomass boilers, turbines and energy meters have unique IDs, which is visible on the units. The Monitoring Report has the details of the same and will be provided to the UCR verifier during the verification process.

The UCR project activity had been validated and registered as a prior UNFCCC CDM project activity under the title: ***Biomass based power project by Shri Shyam Warehousing and Power Pvt. Ltd***. (Project ID 7261). Details as below:

CDM Registration Date	13/12/2012
Crediting Period	13/12/2012-12/12/2019 (Renewable –Expired) Renewal under CDM no longer possible
CERs Issued (Period 1)	None
Monitoring Report (Period 1)	13/12/2012 to 31/12/2015. Displayed on the CDM Registry

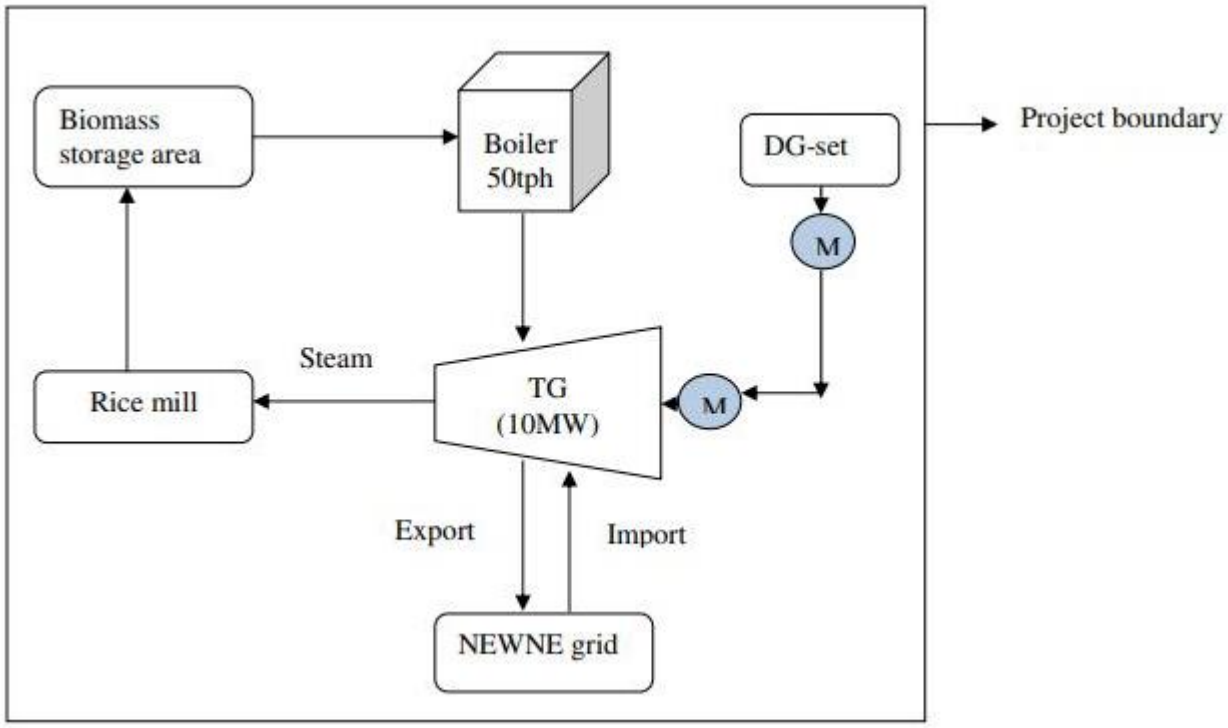
The PP has indicated that they would not be pursing the CDM program for carbon credits from 01/01/2013 onwards and since the project activity has never been issued voluntary carbon credits for the 2012-2015 period, the current (1st) UCR monitored period is for 2013-2022 vintage years.

Hence the UCR project activity has never been issued voluntary carbon credits for the current 2013-2022 vintage years and there is no double counting of the credits envisioned. Additionally, the same has been stated in the undertaking provided in the Double Counting Avoidance Assurance Document (DAA) by the PP.

B.4. Projectboundary,sources and greenhousegases(GHGs)>>

As per the methodology, the spatial extent of the project boundary encompasses:
(a) All plants generating electricity and/or thermal energy located at the project site, whether fired with biomass, fossil fuels or a combination of both;
(b) All power plants connected physically to the electricity system (grid) that the project plant is connected to;
(c) Industrial, commercial or residential facility, or facilities, consuming energy generated by the system and the processes or equipment affected by the project activity;
(a) the project power plant and all power plants connected physically to the electricity system that the project activity is connected to.

Hence, the project boundary of the project activity includes the following:
• Adjacent rice mill
• Biomass storage area
• Steam and power generating equipment i.e. boiler and turbine
• Regional grid



Leakage Emissions (LE_y)
Leakage emissions is not applicable as the project activity does not use technology or equipment transferred from another activity.

Hence $\mathbf{LE_y} = 0$

	Source	GHG	Included?	Justification/Explanation
Baseline	GHG Emissions from fossil fuel in Grid Baseline Power Generation	CO_2	**Included**	Major source of GHG emissions
		CH_4	Excluded	Excluded for simplification. This is conservative
		N_2O	Excluded	Excluded for simplification. This is conservative
Project Activity	On-site fossil fuel co-firing and electricity consumption due to the project activity (stationary or mobile) Cultivation of biomass	CO_2	**Included**	Fossil fuel co-fired with biomass is included as a project emission source. For microscale and small-scale project activities, a default emission factor for accounting cultivation of rice husk is recommended and applied. Diesel CO_2 emissions are negligible and neglected. This is conservative. Consumption of diesel in DG set is for catering for emergency start-up requirements.
		CH_4	Excluded	Excluded for simplification. This is conservative
		N_2O	Excluded	Excluded for simplification. This is conservative

Project Emissions (PEy)

The project emissions (PEy) under the methodology may include

- CO_2 emissions from transportation of biomass residue to the project site,
- CO_2 emissions from on-site consumption of fossil fuels due to project activity,

The project activity derives energy from co-fired (biomass and coal) co-generation system that provides thermal & electrical energy (the ratio of coal does not exceed 25% as per the UCR guidelines). The net electricity supplied to the grid displaces an equivalent quantity of electricity from the grid system which is predominantly fossil fuel based. Thus the project activity displaces fossil fuel. However, project emissions arise from the CO2 emissions due to the on-site consumption of fossil fuels due to the project activity. As the project activity uses between 5-15% coal fines, we consider project emissions due to the consumption of coal. These emissions are calculated as per the "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".

$PE_{FC,j,y}$ = are the CO_2 emissions during the year y due to fossil fuels co-fired by the generation facility in tons of CO_2, in process j during the year y (tCO_2 / yr);

$$PE_{FC,j,y} = \sum_i FC_{i,j,y} \times COEF_{i,y}$$

FC $_{i,j,y}$ = the quantity of fuel type i combusted in process j during the year y (mass or volume unit / yr);

COEF $_{i,y}$ = the CO_2 emission coefficient of fuel type i in year y (tCO_2 / mass or volume unit);
i = the fuel types combusted in process j during the year y.

The coefficient of emission factor of the fuel is calculated in accordance with the option 'B' of the "Tool to calculate project or leakage CO2 emissions from fossil fuel consumption" which states that "The CO_2 emission coefficient ***COEF $_{i,y}$*** is calculated based on net calorific value and CO_2 emission factor of the fuel type i as follows:"

$$COEF_{i,y} = NCV_{i,y} \times EF_{CO2,i,y}$$

Where:
COEF $_{i,y}$ = the CO_2 emission coefficient of fuel type i in year y (tCO_2/ mass or volume unit);
NCV *i,y* = the weighted average net calorific value of the fuel type i in year y (GJ/ mass or volume unit);
EF $_{CO2,i,y}$ = weighted average CO_2 emission factor of fuel type i in y

CO2 emission factor for coal	0.09970 tCO2e/GJ	Confirmed from IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in table 1.4 of Chapter1 of Vol. 2 (Energy) of the 2006 IPCC Guidelines on National GHG Inventories (99,700kg/TJ)
Hence, the project emission estimate on account of firing of coal fines is calculated as:	$COEF_{I,y} = NCV_{i,,y} \times EFCO_{2\,i\,y}$	= 0.0142358 GJ/kg x 0.09970 tCO2e/GJ = 0.001419305 tCO2e/kg

B.5. Establishment and description of baseline scenario >>

The approved baseline methodology has been referred from the indicative simplified baseline and monitoring methodologies for selected large scale UNFCCC CDM project activities that involve generation of power and heat in thermal power plants, including cogeneration plants using biomass.

The applicable methodology and simplified modalities and procedures for small scale CDM project activities is "*the baseline scenario is displacement of more-GHG-intensive electricity generation in grid."*

For project activities that do not displace captive electricity generated by an existing plant but displace grid electricity import and/or supply electricity to a grid, the emission factor of the grid shall be calculated as per the procedures detailed in **AMS-I.D**

The applicable baseline scenario is

- *"displacement of more-GHG-intensive electricity generation in grid."*

PE_y = Project activity emissions

Project emissions (**PE $_y$**) involve emissions resulting from the **cultivation of biomass,**

transportation of biomass, processing of biomass, transportation of biomass residues and processing of biomass residues. As an alternative to the monitoring of the parameters needed to calculate the emissions from the biomass (rice husk) transportation, PP is allowed to apply the following option:

(a) *For microscale and small-scale project activities, a default emission factor of 0.0142 tCO_2/tonne of biomass*. *(source: TOOL16 Methodological tool Project and leakage emissions from biomass Version 05.0*)

Leakage due to transport of the biomass to the project site: PP conducted a biomass assessment study in the study area of 75 kilometres around the project boundary. This biomass assessment study was performed by an independent party and was approved by the nodal agency 'Chhattisgarh State Renewable Energy Development Agency' (CREDA). As all the biomass fuel will be available from within 75 km radius of project site and is in surplus of more than 25%, there are no leakage emissions to be considered. In accordance of the footnote of the methodology AMS I.C, since the transport of biomass is from within 200 kilometres, the emissions related to transport of biomass can be neglected. Hence leakage emissions in this case can be neglected.

$\mathbf{LE_y}$ = Leakage emissions = 0

For this methodology, it is assumed that transmission and distribution losses in the electricity grid are not influenced significantly by the project activity and are therefore not accounted for and also the UCR grid emission factor results in conservative estimates of the carbon credits.

Year	Net Power Exported Mwh	Baseline Emission Reductions tCO2eq	Project Emissions (coal) tCO2eq	Project Emissions Biomass Cultivation tCO2 eq	ER tCO2eq
2013	69495.62	62546	21477	1218	39851
2014	71581.2	64423	21399	1302	41722
2015	73661.46	66295	21641	1314	43340
2016	72554.94	65299	20529	1280	43490
2017	72513.617	65262	23638	1351	40273
2018	72187.128	64968	21004	1289	42675
2019	60085.95	54077	14751	1107	38219
2020	72731.75	65458	16241	1452	47765
2021	62441.8	56197	21558	1317	33322
2022	73420.475	66078	14037	1541	50500
Total	700673.94	630603	196275	13171	421157

B.6. PriorHistory>>

The project has received no public funding. The project activity was registered under the UNFCCC CDM and also the voluntary carbon market in the past. Details have been explained in the relevant section (B3) of this MR.

The project activity has not applied to any other GHG program for generation or issuance of carbon offsets or credits for the current crediting period.

B.7.Changes to startdate of crediting period >>

The 1st crediting, and issuance period as per the PCN has been updated and changed. The **updated**

crediting, monitoring and issuance period is as follows:
UCR Monitored Period: 01 (Monitored Period Duration: 10 Years, 00 Months)
1st UCR Monitoring Period: 01/01/2013 to 31/12/2022
1st UCR Crediting Period: 01/01/2013 to 31/12/2022

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

There are no permanent changes from registered PCN monitoring plan and applied methodology, except for the change in the 1st crediting/issuance period as described in section B.7.

B.9.Monitoring period number and duration>>

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UCR Monitored Period: 01 (Monitored Period Duration: 10 Years, 00 Months)
1st UCR Monitoring Period Dates: 01/01/2013 to 31/12/2022
1st UCR Crediting Period Vintages: 01/01/2013 to 31/12/2022

B.10.Monitoring plan>>

The monitoring of electricity data revolves around the power generation from the turbine generators and the auxiliary consumption of the power plant. All auxiliary units at the power plant is metered and there are also main meters attached to each turbine generator to determine their total generation.

The methodology does not require monitoring of Gross generation, auxiliary consumption, in-plant consumption of electricity directly. The net electricity supplied to grid is monitored using two way electronic trivector meters capable of monitoring electricity export and import.

There is no consumption of any auxiliary fuel in the project activity. The electricity import used for auxiliary consumption, shall be accounted while calculating the net electricity supplied to grid.

Though the project is a co-generation project, the PP is claiming emission reductions only based on the electrical energy supplied to grid. Hence, the parameters Steam generation, pressure of steam temperature of steam, feed water inlet temperature are not applicable as per the applied methodology AMS-I.C.

Operational records and other evidences have been documented, collected and archived in either hard-copies or electronic manners. The energy generation is metered by calibrated meters. The biomass consumption is measured by Weigh Bridge calibrated after every two year by state government organisation. Steam quantity, temperature and pressure are measured by calibrated meters. The date of calibration and next due date of calibration can be checked against the calibration certificates. All the values can be checked from the source data ie. plant records. The calorific value of biomass can be checked against the third party analysis reports.

The management of the plant has designated one person to be responsible for the collation of data as per the monitoring methodology. The designated person collects all data to be monitored as mentioned in this MR and reports to the head of the plant.

The overall project management responsibility remains with the Plant Head. The electricity generation from turbines and auxiliary consumption is recorded continuously on an hourly basis by the operators in the shift. At the end of the day this data is collated by the engineer in charge and signed off by the power plant manager. The steam data is also manually recorded on an hourly basis

from the meters. The data is recorded in logbooks by the operators and the engineer in charge collates the data from these log books and stores them electronically. This data is used by engineer in charge to prepare a monthly report and send it to Plant Head for verification. The monthly reports become a part of the Management Information System (MIS) and are reviewed by the management during the quarterly review meeting.

The monthly reports are made available during the verification of the project activity, to estimate the monthly emission reductions, which are also, included in the MIS. The monitoring personnel are familiar with the process of monitoring and documentation.

All the meters are checked and calibrated each year by an independent agency and they are maintained as per the instructions provided by their suppliers. Hence there are no uncertainties or adjustments associated with data to be monitored. An internal audit team, comprising of personnel from the factory but from a department other than utility, reviews the daily reports, monthly reports, procedure for data recording and maintenance reports of the meters. This team checks whether all records are being maintained as per the details provided in the MR and PCN.

Month	Quantity of coal (Tonnes) combusted in the project plant(10 MW) (Tonnes)	Quantity of biomass residue (MT) combusted in the project plant(10 MW)	Net quantity of electricity exported to grid (kwh)
Jan-13	1235.412	7000.665	5753800
Feb-13	1281.474	7261.63	5898200
Mar-13	1318.905	7473.799	6068400
Apr-13	1354.329	7674.535	6218500
May-13	1017.848	5767.81	4610500
Jun-13	1317.445	7465.52	6079900
Jul-13	1291.751	7319.927	5746800
Aug-13	1261.542	7148.742	5752800
Sep-13	1263.38	7159.159	5811800
Oct-13	1405.971	7967.169	6483480
Nov-13	1102.64	6248.296	5118240
Dec-13	1281.337	7260.914	5953200
Jan-14	1267.289	7181.308	5863560
Feb-14	1190.353	6745.34	5510940
Mar-14	1404.287	7957.63	6469140
Apr-14	1331.226	7543.614	6092520
May-14	1148.4	6507.6	5207640
Jun-14	1259.81325	7138.94175	5486640
Jul-14	1429.54875	8100.77625	6287460
Aug-14	1491.372	8451.108	6565440
Sep-14	1252.03725	7094.87775	5523000
Oct-14	950.0265	8550.2385	6177180
Nov-14	914.976	8234.784	6045180

Dec-14	1437.56775	8146.21725	6352500
Jan-15	1387.0905	7860.1995	6359100
Feb-15	1327.7682	7524.0198	5989680
Mar-15	1390.95	7882.05	6267840
Apr-15	1418.8878	8040.3642	6383100
May-15	959.2176	8632.9584	6470520
Jun-15	827.9516	7451.5644	5541300
Jul-15	1500.9675	8505.4825	6666900
Aug-15	1508.524	8548.301	6634860
Sep-15	1169.259	6625.801	5338980
Oct-15	1053.331	5968.88	4875240
Nov-15	1345.163	7682.837	6450780
Dec-15	1358.733	7760.279	6683160
Jan-16	1092.776	7977.558	6639000
Feb-16	851.855	7666.673	6233400
Mar-16	907.874	8170.878	6638340
Apr-16	1112.622	6354.632	5450940
May-16	1154.141	6591.778	5598720
Jun-16	1093.075	6242.989	5054400
Jul-16	1439.933	8224.007	6610680
Aug-16	1458.435	8329.754	6651420
Sep-16	1432.273	8180.308	6367380
Oct-16	1387.801	7926.302	6141660
Nov-16	1016.113	5803.43	4532580
Dec-16	1516.981	8664.091	6636420
Jan-17	1510.609	8627.692	6591480
Feb-17	1336.527	7633.464	5858700
Mar-17	1451.313	8289.041	6339980
Apr-17	1292.785	7383.619	5702600
May-17	1440.646	8228.102	6390997
Jun-17	1066.541	6091.466	4703220
Jul-17	1202.141	6865.922	5206440
Aug-17	1525.774	8714.326	6629640
Sep-17	1502.846	8583.379	6403800
Oct-17	1525.86	8714.815	6481380
Nov-17	1296.854	7406.861	5610960
Dec-17	1502.728	8582.685	6594420
Jan-18	1462.165	8351.016	6445825
Feb-18	1238.609	7074.192	5509100
Mar-18	1325.872	7572.587	5897500
Apr-18	1329.925	7595.748	5995900
May-18	1140.076	8128.832	6390200
Jun-18	1366.318	7803.602	6381860
Jul-18	1224.926	6996.056	5808312
Aug-18	1377.577	7867.909	6419563
Sep-18	1347.907	7698.449	6343440
Oct-18	999.501	5708.56	4677360
Nov-18	1061.462	7498.716	5937428
Dec-18	924.174	8410.918	6380640
Jan-19	872.911	7944.368	6416080

Feb-19	800.984	7289.766	5310093
Mar-19	870.883	7925.913	6041505
Apr-19	914.485	6770.265	5289320
May-19	1148.387	7753.836	5992025
Jun-19	1365.717	7800.168	6180000
Jul-19	808.595	7359.027	5536300
Aug-19	0	0	0
Sep-19	375.865	2146.717	1694690
Oct-19	1327.545	8223.139	6420312
Nov-19	1261.762	7500.473	5907500
Dec-19	645.821	7230.039	5298125
Jan-20	687.574	9277.267	6485937.5
Feb-20	1381.97	7892.995	6072500
Mar-20	856.494	8767.038	6219062.5
Apr-20	476.87	9255.165	6299312.5
May-20	1078.56	6680.865	4881412.5
Jun-20	1471.297	8403.182	6300000
Jul-20	1360.523	8427.415	6247500
Aug-20	866.889	9236.711	6449837.5
Sep-20	749.421	8773.086	6096562.5
Oct-20	728.557	9362.261	6407187.5
Nov-20	1066.371	7410.345	5394375
Dec-20	718.217	8732.012	5878062.5
Jan-21	1096.295	6311.103	4311775
Feb-21	1319.343	7535.308	5076000
Mar-21	1521.575	8690.338	5862000
Apr-21	1494.67	8536.669	5752000
May-21	1486.188	8763.382	5926000
Jun-21	1110.67	8718.267	5704000
Jul-21	1281.68	8005.853	5390000
Aug-21	1368.15	8880.165	5888000
Sep-21	1352.145	8582.793	5730000
Oct-21	1426.131	8443.286	5692000
Nov-21	717.655	4161.031	2826000
Dec-21	1014.731	6106.186	4284025
Jan-22	1584.679	9381.955	6475500
Feb-22	1477.98	8679.960	6009750
Mar-22	1555.68	9277.746	6608250
Apr-22	401.862	8410.894	5436000
May-22	478.597	10473.273	6696000
Jun-22	923.967	9021.857	6108750
Jul-22	1036.26	9462.831	6493500
Aug-22	842.665	8636.131	6174000
Sep-22	536.387	9180.774	6147000
Oct-22	331.759	7681.743	5141250
Nov-22	389.332	8167.417	5564975
Dec-22	330.828	10138.42	6565500

Data/Parameter	**NCV_k**
Data unit	GJ/kg
Description	Net Calorific Value of Biomass Residue Type *K*
Source of data Value(s) applied	Measurements is carried out by reputed labs and reported in dry biomass basis. Value: **0.01352401**
Measurement methods and procedures	On site and in labs. Measurement in laboratories according to relevant national/international standards. Measure quarterly, taking at least three samples for each measurement. The average value can be used for the rest of the crediting period. Measure the NCV based on dry biomass
Monitoring frequency	Every 6 months
Purpose of data	Quality control

Data/Parameter	**$Q_{biomass,yr}$**
Data unit	MT/yr
Description	The quantity of rice husk used to generate steam in the boilers each year
Source of data Value(s) applied	Plant records and log books receipts. 45000 kg weighbridge purchase order and installation certificate is provided to the verifier.
Measurement methods and procedures	Monitoring: The quantity of biomass fed into the boiler is controlled. Data type: Measured Responsibility: Boiler Operator
Monitoring frequency	Daily. Each truck that enters the site is recorded at the weighbridge installed at the factory. The biomass quantity is calculated on dry basis based on the moisture content of biomass
QA/QC	The amount of biomass used can be cross checked by the purchase orders and stock inventory. The weighbridge records are tallied against transporters receipts or against the computer generated payment invoices. Calibration frequency - annually Cross checked with annual energy

Data/Parameter	**$EF_{grid,y}$**
Data unit	Grid Emission Factor
Description	tCO_2/MW_h

Source of data Value(s) applied	**0.84** tCO2/MWh for the period 2013-2014 UCR CoU Standard Default for Indian grid **0.9** tCO_2/MW_h for the period 2015-2021
Measurement methods and procedures	NA
Monitoring frequency	NA
QA/QC	The parameter is conservative.
Purpose of data	To estimate baseline emissions

Data/Parameter	**B moisture**
Data unit	% water content
Description	Moisture content of the biomass
Source of data Value(s) applied	Calculated, Plant records **8.92**
Measurement methods and procedures	On-site measurement The moisture content of rice husk is monitored for every batch and average value of all three batches for a day recorded in logbook signed off by Controller, Laboratory. Daily data aggregated into monthly data. The moisture content (% of water) data are obtained from the laboratory records. The weighted average of monthly data is calculated for this monitoring period
Monitoring frequency	Daily
QA/QC	The moisture content is measured by laboratory. In case of dry biomass residue, this parameter is not necessary.
Purpose of data	To estimate baseline emissions

Data/Parameter	**EF CO2,coal,y**
Data unit	tCO2 /GJ
Description	CO2 emission factor for coal
Source of data Value(s) applied	CEA **0.0997**
Measurement methods and procedures	CEA
Monitoring frequency	Annually

QA/QC	The parameter is conservative. A default value is applied as values from the fuel supplier in not available. Any future revisions of the IPCC Guidelines will be taken into account. Project Participant has no control on the parameter. Hence, no QA/QC procedures are applicable.
Purpose of data	To estimate baseline emissions

Data/Parameter	**$FC_{coal,j,y}$**
Data unit	Tonnes/y
Description	Quantity of coal fines used in the project activity in the year y
Source of data Value(s) applied	Calculated, Plant records
Measurement methods and procedures	The amount of coal used in the project activity is measured via a calibrated weighbridge system as and when consumed on continuous basis. The total quantity of coal procured for the project activity is completely combusted in the boiler. Hence, the total quantity of coal procured and quantity of coal combusted is considered as the same for the project activity.
Monitoring frequency	Daily
QA/QC	Weigh bridge undergoes maintenance / calibration subject to appropriate industrial standards, at least annually. The data recorded were cross checked against purchase receipt. Cross check the measurements with an annual energy balance that is based on purchased quantities and stock changes, and the calibration frequency is once in three years.
Purpose of data	To estimate project emissions

Data/Parameter	**NCV_{coal}**
Data unit	GJ/kg
Description	Net Calorific Value of coal
Source of data Value(s) applied	Measured Plant records Value: **0.0142358**
Measurement methods and procedures	The sample of type of coal is collected from the plant according to the procedures of sample collection for analysis and analysed by reputed laboratories. The measurements are carried out according to relevant standards.
Monitoring frequency	The consistency of the measurements is compared with the measurement of previous years, relevant data sources

Purpose of data	To estimate project emissions

Data/Parameter	**Diesel consumption ($FC_{i,j,y}$)**
Data unit	MT/yr
Description	Quantity of diesel consumed on site every year
Source of data Value(s) applied	Plant records and log books receipts. **66.00586**
Measurement methods and procedures	Level Indicator Gauge The level indicator gauge is calibrated by Government accredited/ ISO certified agency every two years. The diesel consumption quantities were crosschecked with the record of the quantity of diesel issued by the stores manager and maintained in a logbook in the storeroom.
Monitoring frequency	Measured Daily and recorded monthly.
QA/QC	A monitoring cell fitted with a level indicator gauge above the fuel tank of the D.G Set is used to monitor the diesel consumption every month. Logbook is maintained for the same purpose. The fuel tank of the D.G. Set is filled every five to eight months (As the consumption is very low and is neglected for project emissions) and with the help of level indicator gauge reduction in diesel level (on consumption) is monitored every month.