MONITORING REPORT

CARBON OFFSET UNIT (CoU) PROJECT

Title: Renewable Biomass Based Power Generation, Harinbhatta, Chhattisgarh

UCR PROJECT ID: 108

Version 1.0
Date 31/05/2022
First CoU Issuance Period: 8 Years, 0 Months
Crediting Period: 01/01/2014 to 31/12/2021 (both days inclusive)
Monitoring Period: 01/01/2014 to 31/12/2021 (both days inclusive)

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

BASIC INFORMATION	
Title of the project activity	**Renewable Biomass Based Power Generation, Harinbhatta, Chhattisgarh**
Scale of the project activity	Small Scale
UCR PROJECT ID	108
Completion date of the MR	31/05/2022
Project participants	Project Proponent: Neeraj Power Pvt Ltd Aggregator: Carbon Equalizers, KATNI UCR ID : 660687753
Host Party	India
Applied methodologies and standardized baselines	**CDM UNFCCC Methodology** **AMS-I.D**: Grid connected renewable electricity generation (Ver.18.0) & UCR Standard for Emission Factor
Sectoral scopes	01 Energy industries (Renewable/NonRenewable Sources)
Calculated amount of annual average GHG emission reductions	2014: 28931 tCO_2 (28931 CoUs)
	2015: 27885 tCO_2 (27885 CoUs)
	2016: 29146 tCO_2 (29146 CoUs)
	2017: 31467 tCO_2 (31467 CoUs)
	2018: 30746 tCO_2 (30746 CoUs)
	2019: 22144 tCO_2 (22144 CoUs)
	2020: 25103 tCO_2 (25103 CoUs)
	2021: 30444 tCO_2 (30444 CoUs)
Calculated total GHG emission reductions this crediting period	**225866 tCO_2 (225866 CoUs)**

SECTION A. Description of project activity

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

The project **Renewable Biomass Based Power Generation, Harinbhatta, Chhattisgarh** is located at Village Harinbhatta, Taluka Simga, District Balodabazar-Bhatapara, State Chhattisgarh, Country India (Pin: 493101).

The details of the registered project are as follows:

A.1 Purpose of the project activity:

The project activity involves the installation of a 7.5 MW rice husk based power generation plant by the project proponents, Neeraj Power Pvt Ltd. The plant was commissioned on **01/11/2006** and utilises rice husk as the primary fuel, and coal as the secondary fuel for supply of electricity to the grid.

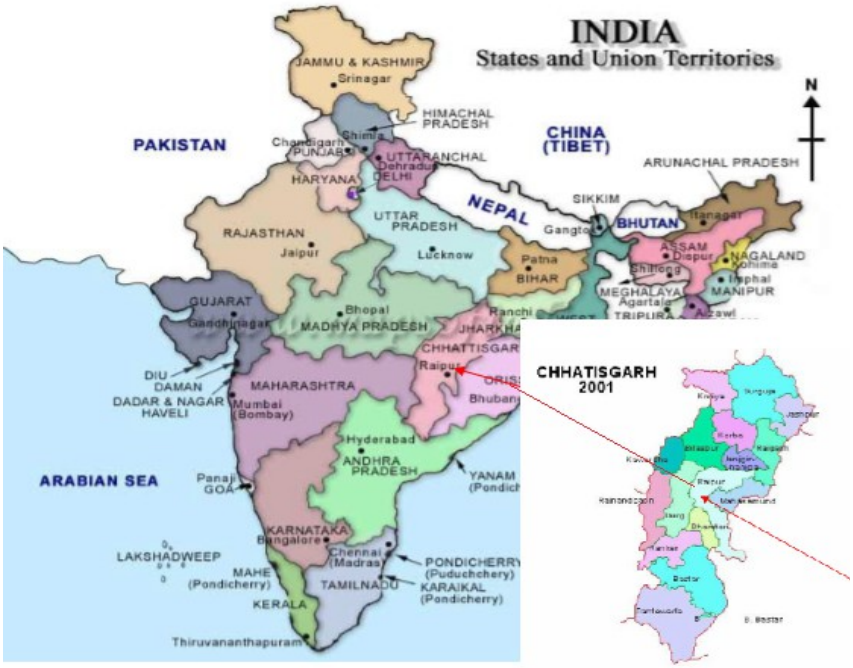
The project activity utilises renewable biomass (rice husk) for generation of power that is supplied to the local grid. The annual biomass requirement for the 7.5 MW plant running on 100% rice husk is about 75,000 tonnes. When biomass is not available, coal is co-fired for continous power supply and makes about **14.9%** of total fuel used in the entire setup (hence it is lower than the UCR CoU Standard applicable threshold of **25% for biomass co-fired with coal project types**). Hence the project activity is a co-fired system – that uses both fossil fuels and renewable energy source in a single boiler for simultaneous combustion, while fossil fuel is used during a period of time when the biomass is not available.

Average coal consumption over the monitored period (01/01/2014 to 31/12/2021) was **8956 MT/year.** Average biomass consumption over the monitored period was **61486 MT/year.**

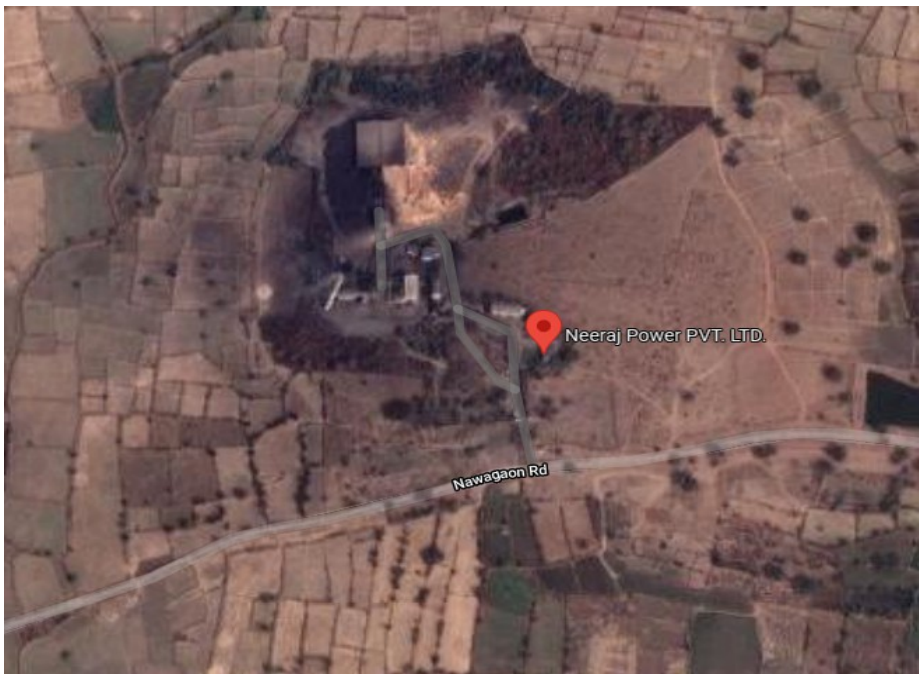
The project activity is located in the immediate vicinity of rice mills in the region and additionally, the project proponents also owns rice mills in the vicinity and hence surplus biomass in the form of rice husk is available in this district for the power plant activity. Hence there are no project emissions related to biomass transport to the project activity.

A.2. Location of project activity >>

Country: India
Village: Harinbhatta
Taluka: Simga
District: Balodabazar-Bhatapara
State: Chhattisgarh
Latitude: 21:38:00N (21.6334)
Longitude 81:42:54E (81.7151)



Map of India showing Chhattisgarh



A.3. Technologies/measures >>

The project involves the installation of a high pressure 38 tonnes per hour (TPH), Pressure: 66 kilograms / cm^2 , Temperature 505^o C Cethar Vessels AFBC Boiler and an 8 MW condensing Triveni turbine generator and provides 7.5 MW of electrical power to the Chhattisgarh State Electricity Board at 33 KV through the local substation. The electricity is supplied to the grid via the Duldula substation at Simga, 3 kilometres from the plant. The technologies are readily available in India and similar systems have been supplied to other Independent Power Producers using agro-residues. Other on-site generation units consist of a 320 KVA Jackson India Diesel generation set. This unit is used for backup power in emergencies and for maintenance work when the power plant is not operating and the grid is down. It dose not supply electricity to the grid and is therefore outside the project boundary. The project also involves environmental technologies that mitigate the risks of ash, boiler flue gases and fugitive dust generated during the operation of the plant. The plant location is selected based on surplus availability of biomass in the form of rice husk, an agro-industrial residue (biomass).

For such biomass co-fired project activities, the use of coal is restricted by the Ministry of New and Renewable Energy of India to 25% of the annual total fuel requirement. The project proponents reported a usage of coal to an extent of about 10%- 20% of total fuel as supplementary fuel during the crediting period of the project activity. The CO2 emissions due to the combustion of rice husk/bagasse is neutralized by the photosynthesis process of paddy crops. Hence, it "recycles" atmospheric carbon and does not add to the greenhouse effect. And also the rice husk/bagasse contains negligible quantities of nitrogen and sulphur, hence the other green house gas from the combustion of rice husk/bagasse can be neglected.

The coal being a carbon intensive fuel leads to GHG emissions hence implementation of the project activity leads to GHG emission reductions. No transfer of technology is involved to host country because technology is available within India from reputed manufacturers.

Specification	Value
Installed Capacity	7.5 MW
Temperature	505 ^{0}C
Number of Turbines	1
Pressure	66 kg/cm^2
Feed Material	Rice Husk/Coal
Coal (MJ/kg)	15.7
Specific fuel consumption of biomass	1.13 kg/kWh
Specific fuel consumption of coal	1.19 kg/kWh

*https://www.spiraxsarco.com/resources-and-design-tools/steam-tables/superheated-steam-region

The auxiliary facilities of the power plant include cooling tower, water demineralisation plant, cooling water system, fuel storage and handling system, electrical evacuation system, ash handling system, fire fighting system, compressed air system, instrumentation and control system, all designed according to the stipulations of the statutory authorities such as the Central Pollution

Control Boards and Electrical Inspectorate. The capacity of the turbo generator is 7.5 MW, which exports power to the grid, at 11 kV level.

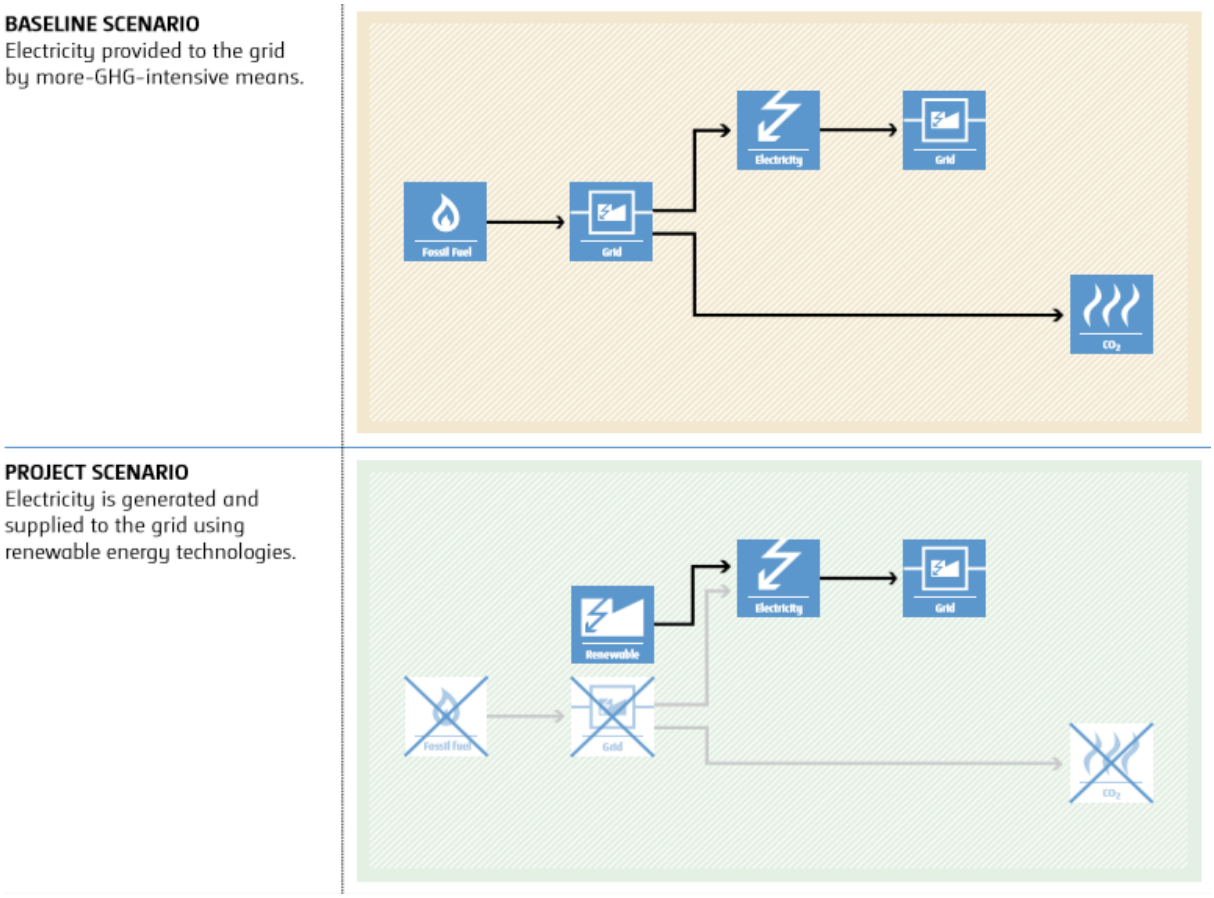
The plant has pollution control measures such as provision of electrostatic precipitator, chimney with adequate height, dust suppression system, ash disposal system, plant effluent quality control, noise control, and water recycling. The project activity's water requirement is met from bore-wells. This water is sufficient to meet the cooling water needs of the plant, including the water requirements for the conventional water cooled condenser system.

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: Neeraj Power Pvt Ltd 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 small-scale UNFCCC CDM project activity categories.

The applicable methodology and simplified modalities and procedures for small scale CDM project activities, states that "*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.*"

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.

Emission coefficient of fuel used in the project activity

The fuel used in the project activity is the biomass residues (rice husk), which is a carbon neutral fuel and therefore the emission coefficient (tC/TJ) is zero. However, the emission coefficient for the coal used is as per the Fuel Emission Factors (EF) (Source: Coal/Lignite - Initial National Communication– in Base Parametres and Assumptions, copy of CEA Database publishing_version2. on www.cea.nic.in which is 0.00009006 tCO_2/MJ**.**

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**

CATEGORY- ***AMS-I.D.: Grid connected renewable electricity generation (Ver. 18.0)***

This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass:

(a) Supplying electricity to a national or a regional grid.

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

The project activity is a power generation project using a biomass (rice husk) and displaces CO2 emissions from electricity generation in power plants that are displaced due to the project activity. Since the project activity utilises biomass (rice husk) for the generation of power, it displaces fossil fuel (coal), and hence it meets the primary applicability criteria of the methodology.
The generation capacity of project activity is 7.5 MW which is less than the threshold of 15MW as per the applied methodology.
The biomass used by the project plant is not stored for more than one year.
Co-fired system – The project activity uses both fossil fuels and renewable energy source in a single boiler for simultaneous combustion and fossil fuel is used during a period of time when the biomass is not available.
The project activity unit co-fires fossil fuel and the capacity of the entire unit does not exceed the limit of 15 MW.
Biomass generated power is used for direct grid supply.
In case biomass is not sourced from dedicated plantations.
The methodology is justified as this category comprises renewable energy generation units such as renewable biomass. The justification that the biomass is renewable. This is in line with the applied methodology AMS I.D requirements.
The main benefit of this project in terms of emission reductions is the avoided burning of fossil fuels in energy mix of the regional grid.
Monitoring consists of metering the electricity generated by the renewable technology.
Biomass and fossil fuel being used as input is be monitored.

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

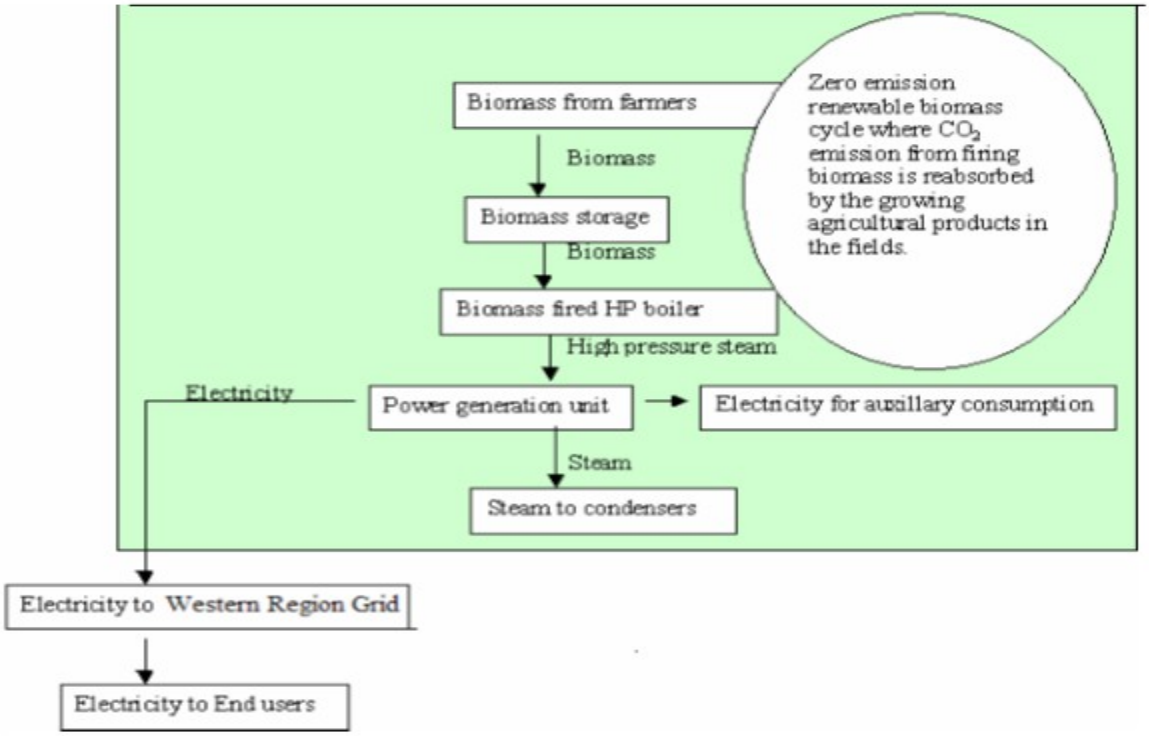
The biomass boiler and condensing turbo-generator unit have unique IDs, which are visible on the unit. The calibration of Meters & Metering for electricity exported to the grid is implemented according to national standards and rules. All the records are documented and maintained by the project proponent. The details of the same will be provided to the UCR verifier during the verification process.

The project proponent had earlier applied for UNFCCC CDM registration in 2007, however, the project is neither a currently registered activity nor has been issued credits for the period 2014-2021 (link: https://cdm.unfccc.int/Projects/Validation/DB/CE33U66U6YJS8M9BYOP55C8UPIXW29/view.html), hence there is no double counting issue related to the double counting of CoUs.

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

The project boundary includes the physical, geographical site(s) of:

- the project power plant and all power plants connected physically to the electricity system that the project activity is connected to.



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

There is no registered or an application to register another small-scale carbon project activity with the same project participants in the same project category within 1 km of the project boundary, hence the project activity is not a debundled component of a large scale project.

	Source	GHG	Included?	Justification/Explanation
Baseline	Co2 Emissions from fossil fuel in baseline grid 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	Emissions from Coal co-fired in Project Activity	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

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

The baseline scenario identified at the PCN stage of the project activity is:

- Renewable energy technologies that displace technologies using fossil fuels, wherein the simplified baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity, times an emission factor for the fossil fuel displaced.

Emission Reductions (ER_y) The emission reduction due to the project activity is calculated as the difference between the baseline emissions and the sum of the project emissions and the leakage:

$$\mathbf{ERy = BE_y - (PE_y + LE_y)}$$

$\boldsymbol{BE_y}$= Baseline emissions in year y (t CO_{2e})

As mentioned in the methodology AMS I.D, the baseline emissions are calculated as follows:

$$\boldsymbol{BE_y = EG_{pj,y} * EF_{grid,y}}$$

Where:

$\mathbf{EG_{pj,y}}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y (Mwh). As fossil fuel is used, the electricity generated from fossil fuel sources is adjusted and deducted using the specific fuel consumption and the quantity of fuel consumed.

$EF_{grid,y}$ = The CO_2 emission factor for grid connected power generation in year y calculated using UCR Standard emission factor (0.9 tCO2/MWh).

PEy = Project activity emissions. The GHG emissions due to the combustion of biomass is neutralized by the sequestration done during the growth of the biomass, thereby making it a carbon neutral fuel. Further the rice husk contains negligible quantities of nitrogen and sulphur, the other green house gas from the combustion of biomass can be considered as negligible. Therefore project emissions are on account of co-firing of coal in the project activity.

PE_y (tCo_2) = Coal consumption (year-kg coal) x 15.7 MJ per kg x 0.00009006 tCO2 /MJ

LE_y = Leakage emissions. Leakages is to be considered if the energy generating equipment is transferred from another activity or if the existing is transferred to another activity. There is no transfer of energy generating equipment or existing equipment to another activity. Further, emissions arising during the transportation of rice husk to the site, is negligible since the biomass is sourced locally within a radius of less than 200 kms, hence considered as negligible.

Year	Baseline Emissions	Project Emissions	Total CoUs
2014	42514	13583	28931
2015	43419	15534	27885
2016	43576	14430	29146
2017	46469	15002	31467
2018	35289	4543	30746
2019	33359	11215	22144
2020	36240	11137	25103
2021	46314	15870	30444
		Total	225866

B.6. Prior History>>

The project activity has applied for CDM registration in the past, however, the project activity has not been registered or issued carbon credits and has not applied to any other GHG program for generation or issuance of carbon offsets or credits for the current crediting period on UCR.

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

There is no change in the start date of crediting period.

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

B.9. Monitoring period number and duration>>

First CoU Issuance Period: 8 Years, 0 Months
Crediting Period: 01/01/2014 to 31/12/2021 (both days inclusive)
Monitoring Period: 01/01/2014 to 31/12/2021 (both days inclusive)

B.8. Monitoring plan>>

Monitoring shall consist of metering the electricity generated by the renewable technology. For projects where only biomass or biomass and fossil fuel are used the amount of biomass and fossil fuel input shall be monitored.
For projects consuming biomass a specific fuel consumption of each type of fuel (biomass or fossil) to be used should be specified ex-ante. The consumption of each type of fuel shall be monitored.

As fossil fuel is used, the electricity metered should be adjusted to deduct electricity generation from fossil fuels using the specific fuel consumption and the quantity of fuel consumed.

The PP, M/s Neeraj Power Pvt Ltd., has the responsibility of the monitoring plan implementation. In this MR, emission factor of the Project is determined as per the UCR CoU guidelines. Therefore the electricity supplied to the grid by the Project is defined as the key data to be monitored. The monitoring plan is designed first of all to focus on monitoring of the electricity output of the Project. The second critical data to be monitored is coal consumption. Therefore the second focus of the monitoring plan is the coal consumption data, and the verification method for the coal consumption data. The other elements following the monitoring methodology concern the comparison of values using two different approaches, and choosing the more conservative of two values.

Monitoring of the electricity supplied to the grid by the project activity is continuously monitored through metering equipments installed both in the project site and substation (interconnection facility connecting the Project to the grid). Staff from the PP and Grid Company areresponsible for measured data collecting and recording on site monthly. All the relevant data records are kept by the PP during the crediting period and two years after for DOE's verification. Sale of power is measured by automated sensors (current transformers) installed at the 33 kVA step up transformer for export of the power to the grid, and through sealed metres installed at the power generation project by the Chhattisgarh State Electricity Board.

Monthly readings form the CSEB metres are taken jointly by the personnel from the CSEB and the plant, and these readings form the basis for the payments of the power sold (JMR). This data is the primary source for calculating baseline emissions in this monitoring plan and can be cross checked against the metres at the step up transformer. Calibration of Meters & Metering is implemented according to national standards and rules

As per the methodology,
Monitoring consists of metering the electricity generated by the renewable technology.
The amount of biomass and fossil fuel input is monitored.
For projects consuming biomass a specific fuel consumption of each type of fuel (biomass or fossil) to be used should be specified ex-ante.
The consumption of each type of fuel is monitored. Since fossil fuel is used, the electricity generation metered should be adjusted to deduct electricity generation from fossil fuels using the specific fuel consumption and the quantity of fossil fuel consumed.

Data and parameters measured ex post or during the monitoring period

Data/Parameter	MWh/annum
Data unit	MWh
Description	Total export to CSEB in kwh – monthly joint meter reading (JMR) statement; summed for annual figure in MWh
Source of data Value(s) applied	Neeraj Power Pvt Ltd Invoice to CSEB with attached signed Departmental certificate of the same and JMR

Year	MWh
2014	55311.2
2015	57475.3
2016	56994.4
2017	60549.1
2018	41910.6
2019	43731.6
2020	46885.8
2021	60892.2

Measurement methods and procedures	The data should be cross-checked against relevant electricity sales receipts and/or records from the grid for quality control. Since the data required to be monitored consists of JMR by the project owner and the grid company, the JMR can be used as guidance on data collection and documentation. Calibration of Meters & Metering should be implemented according to national standards and rules. And all the records are documented and maintained by the project owner for DOE's verification
Monitoring frequency	Daily/Monthly
Purpose of data	Baseline Emissions

Data / Parameter:	**Tonnes/annum**
Data unit:	Tonnes coal
Description:	Total used – computerised daily feed values
Value(s) applied	

Year	Tonnes
2014	9606.45
2015	10985.6
2016	10205.1
2017	10609.9
2018	3212.9
2019	7931.4
2020	7876.1
2021	11223.65

Measurement procedures (if any):	Sensors at the conveyor belt feed the data to the computer
Monitoring frequency:	Monitored continuously.
Any comment:	Electronic data sheets and invoices maintained-

Data / Parameter:	Tonnes/year
Data unit:	Tonnes Biomass
Description:	Total used – computerised daily feed values
Value(s) applied	Year / Tonnes 2014 / 64952.75 2015 / 68080.5 2016 / 69989.6 2017 / 75740 2018 / 50968.3 2019 / 44944.8 2020 / 50323.2 2021 / 66894.28
Measurement procedures (if any):	Sensors at the conveyor belt feed the data to the computer.
Monitoring frequency:	-Monitored continuously by PP
QA/QC procedures:	- The values can be cross checked against the daily purchase records and stocks records
Any comment:	-Baseline emission calculation

Data / Parameter:	**Fixed**
Data unit:	Kg Biomass/kWh
Description:	Specific Biomass consumption
Measurement procedures (if any):	Calculated from Neeraj Power Pvt Ltd computer data
Value(s) applied	1.13 kg/kWh
Monitoring frequency:	Default
Comment:	Baseline emission calculation -

Data / Parameter:	Fixed
Data unit:	Kg coal/kWh
Description:	Specific Coal consumption
Source of data:	Calculated from Neeraj Power Pvt Ltd computer data
Value(s) applied	1.19 kg/kWh
Measurement procedures (if any):	*Default*
Monitoring frequency:	-
QA/QC procedures:	-
Any comment:	Fossil fuel electricity generation from total grid supply calcualtions.