PROJECT CONCEPT NOTE

CARBON OFFSET UNIT (CoU) PROJECT

Title: SBPIL Waste Heat to Power Project, Borjhara, India

Version 1.0
Date of PCN: 19/12/2023
1st CoU Issuance Period: 01/09/2015-31/12/2022 (07 years 04 months)
1st Crediting Period: 01/09/2015-31/12/2022 (07 years 04 months)

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

BASIC INFORMATION	
Title of the project activity	**SBPIL Waste Heat to Power Project, Borjhara, India**
Scale of the project activity	Large Scale
Completion date of the PCN	19/12/2023
Project participants	**Project Proponent**: Shri Bajrang Power and Ispat Limited (SBPIL) **UCR Aggregator**: Carbon Equalizers, Katni **UCR ID** : 660687753
Host Party	India
Type	Type III (Energy Efficiency)
Applied methodologies and standardized baselines	**UNFCCC Methodology *ACM0012*** Waste energy recovery Version 6.0 UCR Protocol Standard Baseline
Sectoral scopes	01 Energy industries (Renewable/NonRenewable Sources) 04. Manufacturing industries
SDG Impacts:	SDG 7 Affordable and Clean energy SDG 8 Decent work and economic growth SDG 13 Climate Action
Estimated amount of total GHG emission reductions per year	**63194** CoUs/yr (**63194** tCO_{2eq}/yr)

SECTION A. Description of project activity

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

The project activity titled, **SBPIL Waste Heat to Power Project, Borjhara, India** is located in Urla Industrial Area, Village: Borjhara, District: Raipur, State: Chhattisgarh, Country: India.

Purpose of the project activity:
GOEL GROUP of Industries is one of the leading business houses in the State of Chhattisgarh, India. The group has entered into the business of Iron & Steel with a Re-Rolling Mill in the name of M/s Shri Bajrang Alliance Ltd. (formerly known as M/s Shri Bajrang Alloys Ltd). M/s Shri Bajrang Power & Ispat Ltd belongs to this group has also entered in the business of TMT Bars, which is selling the product under the brand name Goel TMT.

The group has been further strengthened by establishing Shri Bajrang Power and Ispat Limited ("SBPIL") which has emerged as one of the leading integrated steel companies based out of central India and is one of the top 10 players in India in terms of capacity for iron ore pellets, iron ore beneficiation and sponge iron. The plant was commissioned in 2005 (also called Unit I) manufactures TMT Bars, Ferro alloys, steel billets, sponge iron and fly ash bricks. The project activity takes place at a sponge iron plant (Unit I) and involves the generation of electrical power through the installation of waste heat recovery boilers and steam turbine generators (STGs). The waste heat produced during the manufacture of sponge iron is passed through boilers and the resultant steam is utilised to generate electrical power. The power generated from two condensing turbines (**8 MW and 10 MW**) is consumed in captive requirements and surplus is exported to the grid via Chhattisgarh State Electricity Board (CSEB). The energy generated in the project is measured by meters installed at both STGs in the power plant. The project activity was commissioned in phase wise wherein the 8 MW STG started operating on 12/07/2005 and 10 MW STG started operating on 31/08/2005 and has been operating till date on regular basis.

The electricity is generated at 11 kV which is then stepped up to 132 kV in the plant before being fed through a 132 kV sub-station (Urla substation). Apart from the waste heat recovery boilers, steam from an AFBC boiler is also added to the common steam header (from September 2008 onwards), however carbon credits or CoUs are not being claimed for the increased generation due to the additional steam source (this additional steam source has been added as the turbines cannot run at their rated capacity with the steam from the waste heat recovery boilers only). This apportioning of generation based on steam supply is in line with the tool in the methodology. The project activity thus entails utilisation of waste heat of flue gases generated in Direct Reduced Iron (DRI) kilns of sponge iron plants of SBPIL (Project Proponent or PP hereafter) in power generation. DRI, is a type of kiln used in the production of sponge iron, where iron ore is reduced to sponge iron using coal & Iron ore through a rotary Kiln at high temperature (1000 ^{0}C). The reduction process yields carbon di-oxide and carbon monoxide. This waste heat of flue gases is utilised in the generation of steam in (WHRB), which is further expanded in two turbines with total installed capacity **18MW (08 MW+ 10 MW)** to generate power. The **8MW** turbine generator was synchronised with the grid on **12/07/2005**, while the **10MW** turbine generator was synchronised with the grid on **31/08/2005**. After these synchronisations, the turbines were tested and trials were undertaken on **01/09/2005** and this would be the *earliest commissioning date* that the project activity could evacuate electricity to the grid.

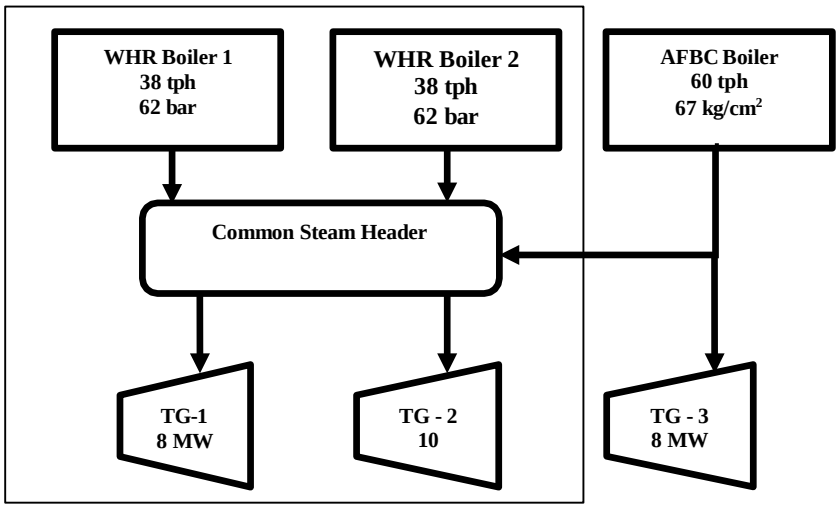
Type of GHG emissions mitigation action	**Energy efficiency: Waste energy recovery in order to displace more-carbon intensive energy/technology.**

This power, from the WHRB plant, displaces an equivalent amount of power from the Chhattisgarh State Electricity Board (CSEB) grid, which is part of Western Region (WR) grid in India and is primarily fossil fuel based. The project activity results in reduced carbon emissions by avoiding generation of this power in grid connected power stations. The grid emission factor for WR grid is as the recommended UCR conservative estimate for the years 2015-2022.

The electricity generated by the project activity displaces electricity generation from fossil fuels in the electricity grid as it is wheeled over the grid to a steel manufacturing company which has historically purchased electricity from the grid. There will be no fuel switch in the sponge iron process after implementation of the project activity.

The total auxiliary consumption as per the requirement of the auxiliary equipment at the WHRB plant **1.8 MW** (approx. 10% Auxiliary). There are a total of **2 (two) WHRBs each of 38 TPH** capacity working at 62 bar pressure. Steam from 02 nos. WHRBs is taken to the turbines through a common header.

The DRI gas, as it comes out after burning chamber, contains sufficient quantity of heat energy that if not recovered would be wasted. A 350 TPD DRI Kiln for sponge iron production emits normally around 90,000 Nm^3 /hour of hot gas at a temperature of 950^0C -1000^0C.



The project activity is the installation of WHRBs and turbine generators to generate electrical power from the waste heat gases produced during the manufacture of sponge iron. In the absence of the project activity, SBPIL would draw power from CSEB grid, which in turn generates power from fossil fuel power plants. The project activity thus displaces equivalent amount of power generation in WR grid connected power stations.

As per the approved UNFCCC CDM methodology, the useful energy generated from the utilization of waste energy carried in the project activity is for:

(a) Generation of electricity

The project activity is an approved positive activity as per the revised guidelines and updates of UCR, (source of update). Regulations do not require the PP to recover and/or utilize the waste energy prior to the implementation of the project activity.

Captive Power Plant

The project activity is displacing an estimated annual net electricity generation i.e., **93278 MW_h** from the Indian grid system, which otherwise would have been generated by the operation of fossil fuel-based grid-connected power plant.

The estimated annual average CO_{2e} emission reductions by the project activity is expected to be **63194 tCO_{2e}**, whereas actual emission reduction achieved during the first CoU period shall be submitted as a part of the initial UCR monitoring and verification activity.

Documents on File	Date
Factory's License	15/07/2005
Electrical Inspector's Report of the Installations	16/06/2005
Permission for running 18 MW TG set captive power plant	2005
Copy of Purchase Order for Boiler placed on M/s Thermax Limited	19/04/2004
Copy of Purchase Order for Turbine placed on M/s Triveni Engineering Industries Ltd	19/04/2004
Boilers Inspection Report	29/06/2005 and 12/09/2005

Project's Contribution to Sustainable Development

Steelmaking is a highly raw material and logistics intensive business, with one tonne of steel requiring the movement of four tonnes of raw materials. For a secondary steel producer, raw materials account for around 70.0% of the cost of steelmaking. Iron ore and coal are the two most critical steel making ingredients, and proximity to iron ore and coal mines give considerable competitive advantage to a steel player due to lower logistics costs for raw material procurement. As per Indian Minerals Yearbook 2019, Chhattisgarh recorded the second highest production of 34.94 MnT of iron ore, i.e., about 16.9% of the country's total production among all states in 2018-19.

Chhattisgarh being rich in minerals, steel players in the region have per tonne logistics costs 50.0% to 90.0% lower as compared to other steel plants in southern states. Chhattisgarh is also one of the few power surplus states in the country. Korba district in Chhattisgarh is known as the power capital of India. The state's huge coal reserves present a large opportunity for electricity generation. Steel companies having their own captive power plant in Chhattisgarh not only ensures more regular and uninterrupted power supply but also helps in reducing power and fuel cost providing competitive advantage.

The project activity is innovative in the steel manufacturing sector and has adopted the use of direct rolling process for manufacturing of re-rolled products. Direct rolling process is a technical evolution of hot charging, where continuous cast billet is directly pushed to the rolling mill, without the need of an intermediate process of re-heating. This process eliminates the need for re-heating the ingots/ billets and results in savings in fuel as well as reduction in emission of GHGs. (source).

The project activity is close to coal mines and coal can be easily procured for power generation. Char, a by-product from sponge iron kilns having good fuel properties and can also be used in power generation in the absence of the project activity. Despite such advantages, the PP chose to use WHRB for power generation, thus promoting sustainable development within the industry.

Thermal power plants are the major consumers of coal in India and yet the basic electricity needs of a large section of population are not being met. This results in excessive demands for electricity and places immense stress on the environment.

The Government of India has stipulated following indicators for sustainable development in the interim approval guidelines for such projects which are contributing to GHG mitigations. The Ministry of Environment, Forests & Climate Change, has stipulated economic, social, environment and technological well-being as the four indicators of sustainable development. It has been envisaged that the project shall contribute to sustainable development using the following ways:

Social well being:

 Social well being is assessed by contribution by the project activity towards improvement in living standards of the local community.

 The project activity has resulted in increased job opportunities for the local population on temporary and permanent basis.

Economic well being

 The project activity has created direct and indirect job opportunities to the local community. The project activity has a positive impact in terms of employment, infrastructure facilities and enhancement of per capita income of the village.

 The investment for the project activity has increased the economic activity of the local area.

 The project activity also contributes in economic well being of the nation's economy by reducing import of fossil fuel for electricity generation in hard currency.

Environmental well being

 The project activity helps reducing GHG emission in power generation in the grid, which is primarily fossil fuel based.

Reduced emissions of NOx and SOx in power generation.

Green belts are all around the project boundary complex to reduce dust and smoke, assuring healthy environment.

Technological well being

 It provides the necessary impetus to other industries to come up with similar projects and become self-sustainable for their power needs

With many similar project activities coming up, technology suppliers/manufacturers will put in more efforts/ funds in further improvement of equipment/ machinery and help in removing existing technological barriers to implementation of such project activities.

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

The PP has an online environmental monitoring database and reporting facility related to fugitive emissions, water quality, groundwater use and other environmental factors that are monitored regularly and free to access (link).

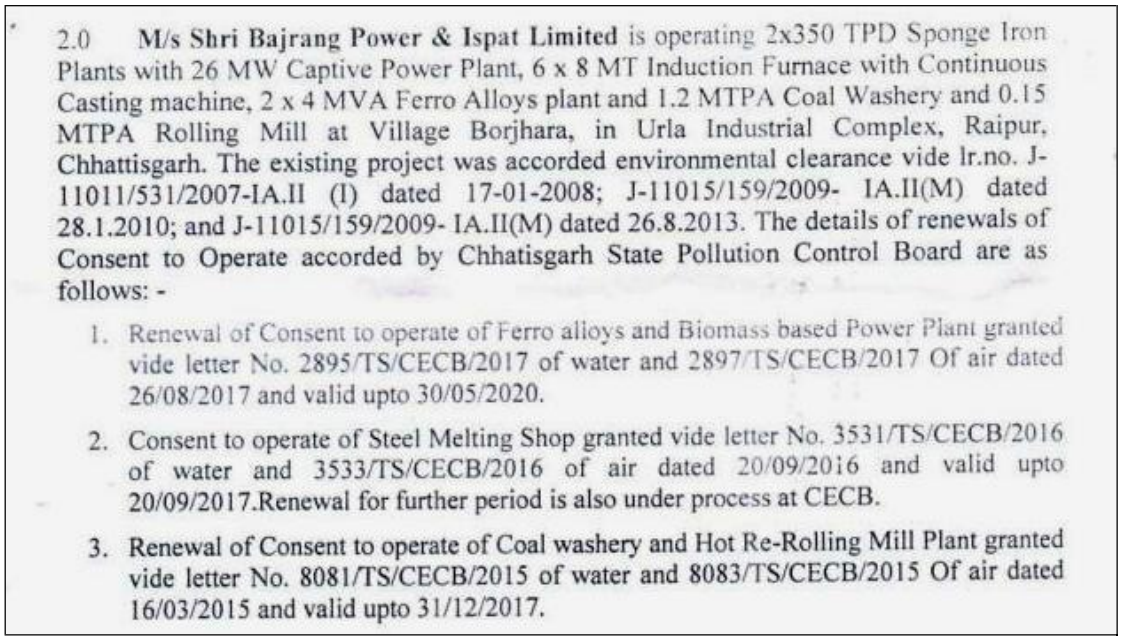
The Unit I site is supported by in-house captive power generating facilities with an installed capacity of **18MW** from waste heat recovery boilers ("WHRB"), and **8 MW** from biomass. This non-conventional source of 'green' power through WHRB and biomass reduces the PPs dependence on thermal power using additional fossil fuel, which helps control carbon emissions. These operating divisions are fully equipped with machineries and plants with high technical specifications such as: two rotary kilns, each having diameter of 4.30 meter and length of 76-meter, steam turbines, sub merge arc furnace, furnace transformers, 80 ton pressing capacity mould, waste heat recovery boilers, biomass based boilers, solar panels, fly ash brick making machines, induction furnace, furnace transformer, hot billet transfer mechanism, and other accessories. Unit I is ISO 45001:2018 certified in connection of health and safety management system for manufacturing of sponge iron, ferrous billet and blooms, ferro alloys, dry beneficiation of coal, rolled steel TMT

Bars, and facility management operation and maintenance of 18MW WHRB power plants and 8 MW biomass power plant.

Ecological and Environmental Sensitivity (Within 10 Km):- WLS-Wild Life Sanctuaries; NPA-Notified Protected Area; ESAs-Eco Sensitive Areas; ESZs-Eco Sensitive Zones	
Details of Ecological Sensitivity	
ESA	None within 10 km radius
Wildlife Corridors	None within 10 km radius
Corridors	None within 10 km radius
WLS	None within 10 km radius
ESZs	None within 10 km radius
Forest	None within 10 km radius

Source: https://environmentclearance.nic.in/auth/ECGeneral_Report.aspx?pid=41811

All the Integrated steel plants are listed at S. No. 3(a) under Category "A" of the Schedule of EIA Notification 2006 and appraised at the Central level. An Environment Impact assessment study for the project activity and facility was done prior to operations commencement. The impact of project activity was considered on the environment.



2.0 **M/s Shri Bajrang Power & Ispat Limited** is operating 2x350 TPD Sponge Iron Plants with 26 MW Captive Power Plant, 6 x 8 MT Induction Furnace with Continuous Casting machine, 2 x 4 MVA Ferro Alloys plant and 1.2 MTPA Coal Washery and 0.15 MTPA Rolling Mill at Village Borjhara, in Urla Industrial Complex, Raipur, Chhattisgarh. The existing project was accorded environmental clearance vide lr.no. J-11011/531/2007-IA.II (I) dated 17-01-2008; J-11015/159/2009- IA.II(M) dated 28.1.2010; and J-11015/159/2009- IA.II(M) dated 26.8.2013. The details of renewals of Consent to Operate accorded by Chhatisgarh State Pollution Control Board are as follows: -

1. Renewal of Consent to operate of Ferro alloys and Biomass based Power Plant granted vide letter No. 2895/TS/CECB/2017 of water and 2897/TS/CECB/2017 Of air dated 26/08/2017 and valid upto 30/05/2020.
2. Consent to operate of Steel Melting Shop granted vide letter No. 3531/TS/CECB/2016 of water and 3533/TS/CECB/2016 of air dated 20/09/2016 and valid upto 20/09/2017.Renewal for further period is also under process at CECB.
3. Renewal of Consent to operate of Coal washery and Hot Re-Rolling Mill Plant granted vide letter No. 8081/TS/CECB/2015 of water and 8083/TS/CECB/2015 Of air dated 16/03/2015 and valid upto 31/12/2017.

The Ministry of Environment and Forests has given the project activity an environmental clearance under the provisions of EIA Notification dated 14th September, 2006 (source).

Present Water Consumption: 2442m^3 /day
Source: River Kharun
PP has obtained consent for drawl of surface water since beginning through Kharun River from Water Resources Department, Govt. of Chhattisgarh, vide letter No. 5010/302/JS/TS/AJP/03-D-4, Raipur dated 26/10/2004.

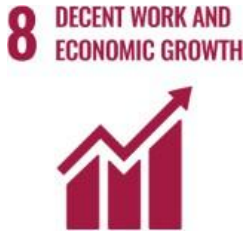
There will be no impact on groundwater as close circuit water circulation system has been designed so as to minimize make-up water requirement. All wastewater generated is recycled through thickener and residue water is treated in the effluent treatment plant and after treatment is utilized for green belt development and water spraying on raw material stacks / roads.

There is no reported negative impact on the groundwater table or adverse impacts on the surrounding villages of the project activity.

United Nations Sustainable Development Goals:

The project activity displaces CSEB grid power, part of WR grid, which is predominantly fossil fuel based. In the absence of the project activity equivalent amount of power generation would have taken place through fossil fuel dominated power generating stations. Positive contribution of the project to the following Sustainable Development Goals:

- SDG13: Climate Action
- SDG 7: Affordable and Clean Energy
- SDG 8: Decent Work and Economic Growth

Development Goals	Targeted SDG	Target Indicator (SDG Indicator)
 SDG 13: Climate Action	13.2: Integrate climate change measures into national policies, strategies and planning	13.2.1: Number of countries that have communicated establishment or operationalization of an integrated policy/ strategy/ plan which increases their ability to adapt to the adverse impacts of climate change, and foster climate resilience and low greenhouse gas emissions development in a manner that does not threaten food production (including a national adaptation plan, nationally determined contribution, national communication, biennial update report or other)
 SDG 7: Affordable and Clean Energy	By 2030, increase substantially the share of non fossil energy in the global energy mix	The project activity helps reducing GHG emission in power generation in the grid, which is primarily fossil fuel based
 SDG 8: Decent Work and Economic Growth	8.5: By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value Target: Training, O&M staff	8.5.1: Average hourly earnings of female and male employees, by occupation, age and persons with disabilities The project activity provides direct employment to over 2150 people. The employment involves tribal people also who are more than 40% in population and also are now well qualified as well as competent to take the employment in the steel industry

A.3. Location of project activity >>

Urla Industrial Area,
Village: Borjhara,
District: Raipur,
State: Chhattisgarh,
Country: India.

Physical/ Geographical location:
Latitude: 21º18’30.8” N (21.3085) and Longitude: 81º35’6.8”E (81.5852)

A.4. Technologies/measures >>

In the project activity two turbo Generators (TG) having a combined capacity of 18 MW were linked with two WHRBs attached to each sponge iron kiln. Due to inadequate steam generation in WHRBs the full capacity of the WHR project as envisaged could not be utilised. After the implementation of the AFBC boiler, the excess steam available from the same is being diverted to the WHR project to achieve full generation capacity of **18 MW** turbine. Electricity generated from this diverted steam on account of the AFBC boiler is however not claimed as emission reductions (CoUs) in the current project activity.

The majority of sponge iron in India is manufactured through the direct reduction process. This process involves passing coal and iron ore through a rotary kiln at high temperatures (over 1000^{o}C) to reduce the iron ore to sponge iron. The reduction process yields carbon dioxide and carbon monoxide. These gases leave the kiln at high temperature (950^{o}C) and may be utilised to generate power. After leaving the kiln the hot gases are passed through an after burner chamber where further oxidation of the gases occurs, i.e. carbon monoxide to carbon dioxide. The gases are then fed to waste heat recovery boilers and then drawn through electrostatic precipitators and ultimately released via the stack.

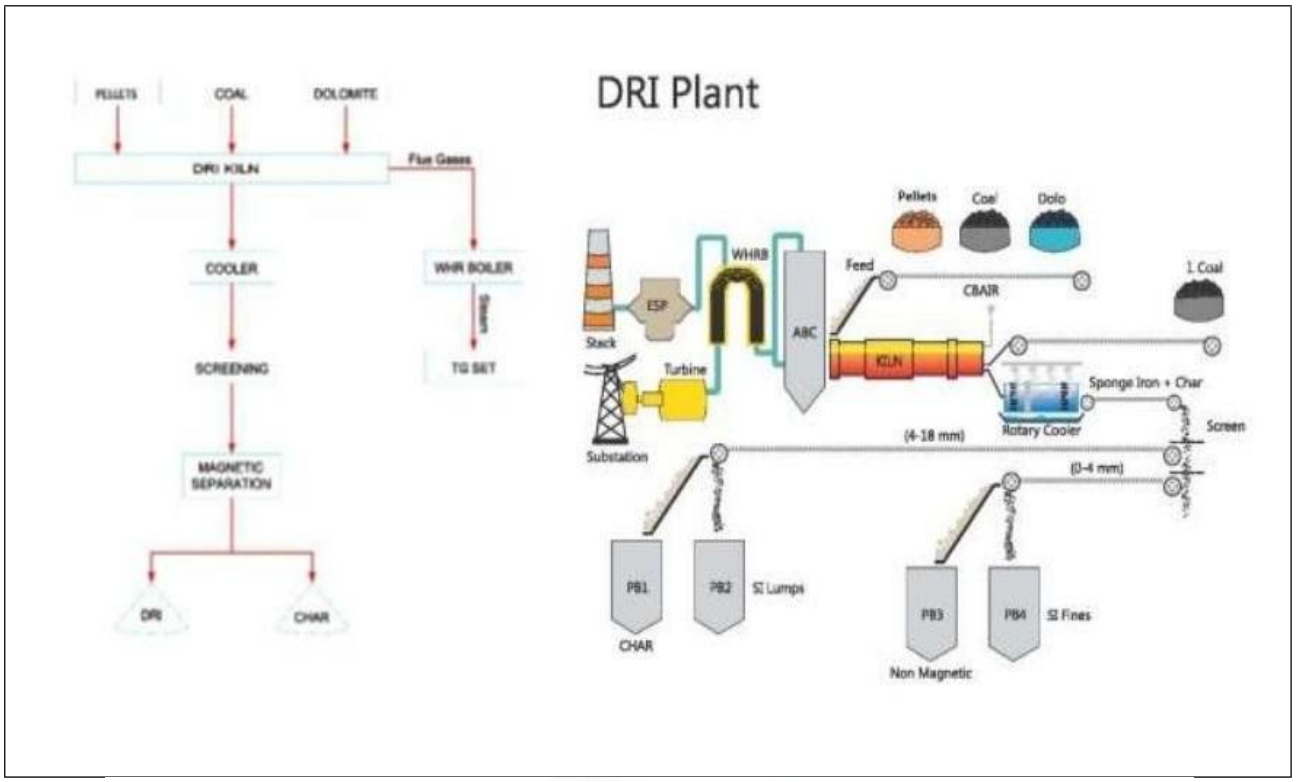
Sr. No	Turbine Details	Make	Date Commissioned
1.	8 MW condensing TG -1	Triveni, India	12/07/2005
2.	10 MW condensing TG-2	Triveni, India	31/08/2005

Sr. No	Boiler Details	Make
1	2 x 38 TPH, 66 Kg/cm2, 490 ± 5^{0} C	Thermax India

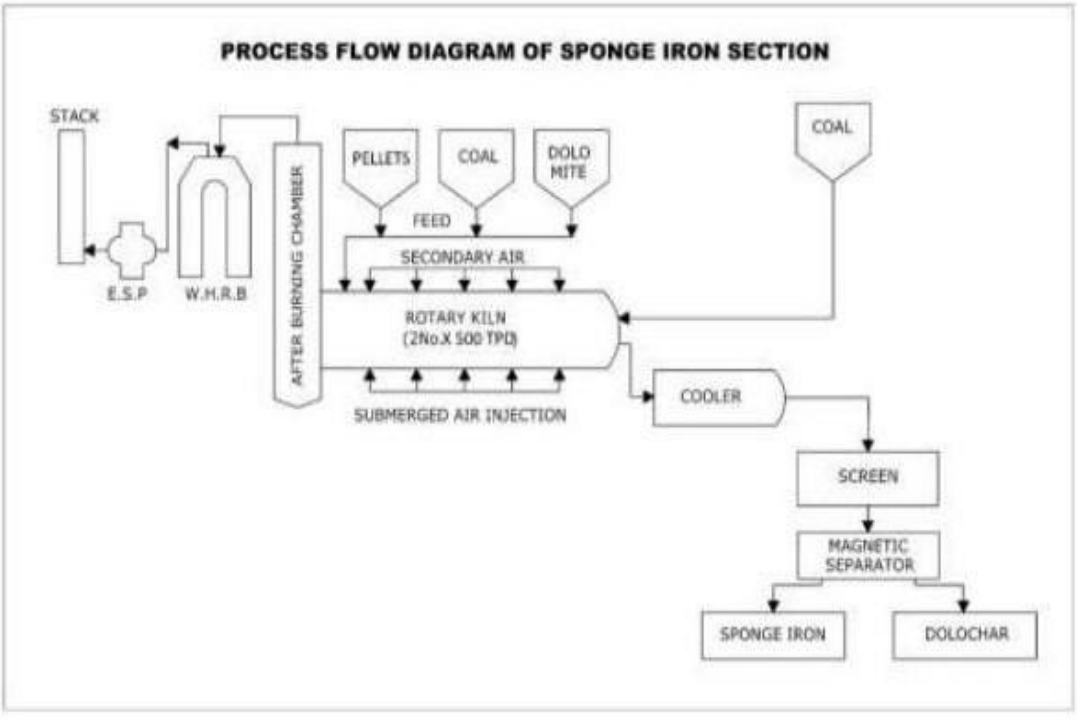
The project activity (also known as Unit I within the group of facilities operated and owned by the PP) comprises of two WHRBs, one compatible for 38TPH of steam generation installed at the tail end of second number 350TPD DRI Kiln and another WHRB of 38TPH capacity at the tail end of

first number of 350 TPD Kiln along with one AFBC Boiler of 60 TPH steam generation capacity equipped with Water Cooled Condenser.

Flue gases temp and pressure: 950 ^{o}C, -1 to -5 mmWC (Inlet)
Steam generated pressure and temp: 66 **ATA, 490 ± 5 ^{o}C**



Process Flow of Sponge Iron Plant

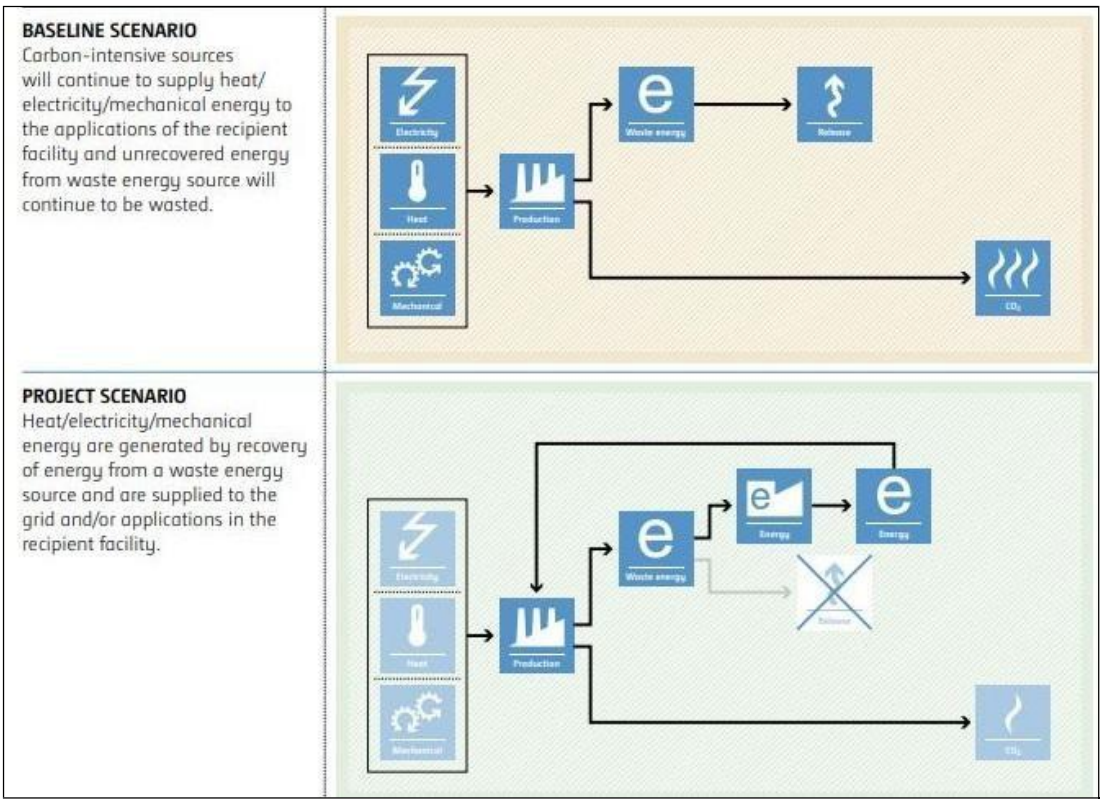


Heat that is extracted from the hot gas is utilized in the transforming water to high temperature to high pressure steam, to run conventional condensing type Steam Turbo Generator for generation of electricity as a part of forward and backward integration process.

A.5. Parties and project participants >>

Party (Host)	Participants
India	**Project Proponent**: Shri Bajrang Power and Ispat Limited (SBPIL) **Aggregator**: Carbon Equalizers, KATNI **UCR ID** : 660687753 **Contact:** Mr Vikas Chamadia **Email**: vikaschamadia@rediffmail.com

A.6. Baseline Emissions>>



UNFCCC CDM (CLEAN DEVELOPMENT MECHANISM) approved methodology ***ACM0012*** *Large-scale Consolidated Methodology* **Waste energy recovery** *Version 06.0*

Typical projects

Energy from waste heat, waste gas or waste pressure in an existing or new industrial facility is recovered and used for in-house consumption or for export, by installation of a new power and/or heat and/or mechanical energy generation equipment, by installation of a more-efficient useful energy generation equipment than already existing, or by upgrade of existing equipment but with better efficiency of recovery.

Type of GHG emissions mitigation action

Energy efficiency: Waste energy recovery in order to displace more-carbon intensive energy/technology.

In the absence of the project activity, the equivalent amount of electricity would have been imported from the regional grid (which is connected to the unified Indian Grid system). Hence, baseline scenario of the project activity is

"(a) the electricity obtained from the grid."

Baseline emissions from electricity ($BE_{Elec,y}$)

The baseline emissions corresponding to electricity supplied by the project activity to recipient facilities shall be estimated for each recipient facility in accordance with the case it belongs to as follows:

(a) Case 1a: recipients whose project level electricity consumption is less than or up to the maximum capacity of the existing pre-project equipment at the recipient facility to use Equation 4

$$BE_{EL,j,y} = \sum_{i} \left(EG_{i,j,y} \times EF_{Elec,i,j,y} \right)$$ Equation (4)

Where:

$EG_{i,j,y}$	=	The power supplied by the project activity to the recipient facility *j*, which in the absence of the project activity would have been sourced from baseline source *i* (e.g. '*gr*' for the grid or '*is*' for an identified source) during the year *y* as per the identified baseline scenario for recipient facility *j* (MWh)
$EF_{Elec,i,j,y}$		The CO_2 emission factor for the baseline electricity source *i* (e.g. '*gr*' for the grid, and '*is*' for an identified source), corresponding to baseline scenario for the recipient facility *j*, during the year *y* (t CO_2/MWh)

Since extra steam has been added in the project activity from one AFBC based boiler, Thus fraction of total electricity generated by the project activity using waste gas has been multiplied with the total electricity generation by the project activity and that electricity has been considered for baseline emission.

Thus *equation 4* is as follows:

$$BE_{EL,j,y} = f_{WCM} \sum_{i} \left(EG_{i,j,y} \times EF_{Elec,i,j,y} \right)$$

Where:

$EG_{i,j,y}$	=	The power supplied by the project activity to the recipient facility *j*, which in the absence of the project activity would have been sourced from baseline source *i* (e.g. '*gr*' for the grid or '*is*' for an identified source) during the year *y* as per the identified baseline scenario for recipient facility *j* (MWh)
$EF_{Elec,i,j,y}$		The CO_2 emission factor for the baseline electricity source *i* (e.g. '*gr*' for the grid, and '*is*' for an identified source), corresponding to baseline scenario for the recipient facility *j*, during the year *y* (t CO_2/MWh)
f_{WCM}	=	Fraction of total electricity generated by the project activity using waste gas.

A.7. Debundling>>

This project activity is not a debundled component of a larger carbon or GHG registered project activity.

SECTION B. Application of methodologies and standardized baselines

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

SECTORAL SCOPE - 01 Energy industries (Renewable/NonRenewable Sources)
04. Manufacturing industries

TYPE III – Energy Efficiency

CATEGORY- ***ACM0012*** Large-scale Consolidated Methodology
Waste energy recovery Version 06.0

The consolidated methodology is applicable to project activities implemented in an existing or Greenfield waste energy generation (WEG) facility converting waste energy carried in identified waste energy carrying medium (WECM) stream(s) into useful energy (i.e. power, mechanical or thermal) consumed in an existing or Greenfield recipient facility(ies) and/or supplied to the grid in the case of electricity generation. The WEG facility may be one of the recipient facilities.

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

This project is included under this methodology since it applies to project activities that generate electricity from waste heat or the combustion of waste gases in industrial facilities. It's also included within the UCR Standard Positive List of technologies (updated) and is within the large -scale CDM thresholds under the applied methodology
Project activity involves power generation with installed capacity of 18 MW (8 MW+10 MW). Regulations do not require the project activity to recover and/or utilize the waste energy prior to the implementation of the project activity; The methodology is applicable where waste pressure is used to generate electricity only and the electricity generated from waste pressure is measurable;
The proposed project activity is a power generation project from waste heat from DRI kilns in a sponge iron plant. The project activity displaces Chhattisgarh State Electricity Board (CSEB) grid power, part of WR grid, which is predominantly fossil fuel based.
The methodology allows for the recipient facility to be same as the waste energy generation facility. The project site is the waste energy generation facility and the facility itself receives useful energy generated using waste energy under the project activity.

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:

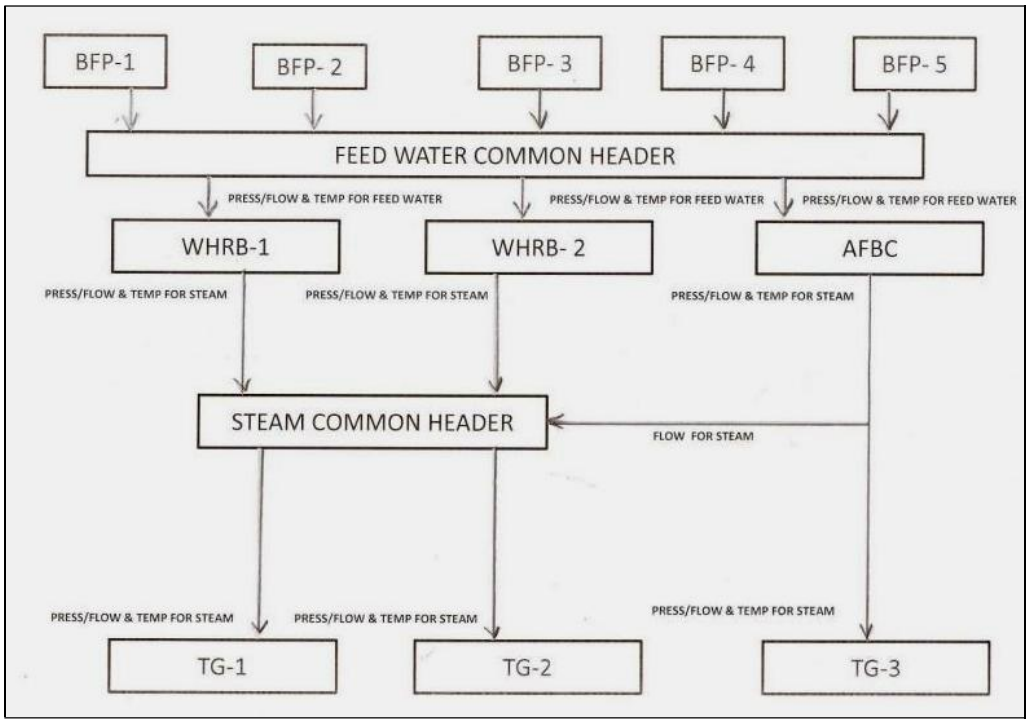
- Project is uniquely identifiable based on its location coordinates,
- Project has dedicated commissioning certificate and connection point and plant operation data on power generation in project activity is taken from energy meters installed at project site
- Project is associated with distinct and unique energy meters which are dedicated to the consumption point for PP.

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

The spatial extent of the project boundary comprises the waste heat or gas sources, captive power generating equipment, any equipment used to provide auxiliary heat to the waste heat recovery process, and the power plants connected physically to the electricity grid that the proposed project activity will affect. In line with the methodology the project boundary encompasses emissions of the project activity associated with the CO_2 emissions from the combustion of auxiliary fossil fuels

and baseline emissions associated with the CO_2 emissions from fossil fuel fired power plants connected to the electricity system. At the project site there is captive power generating equipment but there is no injection of fuel into the after burning chamber to provide auxiliary heat. The project boundary is hence the spatial extent to the captive power generating equipments and the power plants connected to the grid.

	Source	GHG	Included?	Justification/Explanation
Baseline	Grid-connected electricity	CO_2	**Included**	Major source of emission
		CH_4	Excluded	Excluded for simplification. This is conservative
		N_2O	Excluded	Excluded for simplification. This is conservative
Project Activity	On-site fossil fuel consumption due to project activity Combustion of waste gas for electricity generation	CO_2	Excluded	Project activity entails use of waste heat of the flue gases from DRI kilns for power generation. Project activity does not entail use of fossil fuels in the project activity. The emissions from on site diesel consumption negligible and are excluded for simplification. This is conservative and will be monitored at verification.
		CH_4	Excluded	Excluded for simplification. This is conservative
		N_2O	Excluded	Excluded for simplification. This is conservative



From the above boundary diagram the steam source from the AFBC boiler has not been considered within the boundary as the steam from this source will be apportioned in line with the methodology so that the CoUs are claimed only for the electricity produced from the steam generated by the

waste heat recovery boilers. The monitoring of the project activity will ensure that this is implemented in line with the monitoring methodology. The back up diesel generators only have the capacity to rotate the kiln. The system is not designed to operate the sponge iron plant.

PE_y = Project emissions in year y (tCO2/y)

The project emissions, if any, due to the usage of fossil fuel (diesel) are calculated as follows:
$PE_y = Q_i \cdot CO_{EFi} \cdot NCV_i \cdot OXID$

Where:
PE_y = project emissions in year y, tCO2e
Q_i = mass of fossil fuel combusted, t
CO_{EFi} = emissions factor of fossil fuel combusted, tCO2/TJ
NCV_i = net calorific value of fossil fuel combusted, TJ/t
OXID = oxidation factor, %
PEy = 0 tCO2

Thus, ERy = BEy – PEy – LEy

Where:

ERy = Emission reductions in year y (tCO2/y)

BEy = Baseline Emissions in year y (t CO2/y)

LEy = Leakage emissions in year y (tCO2/y)

B.5. Establishment and description of baseline scenario (Adapted CDM Methodology using UCR Protocol) >>

Baseline emissions include only CO_2 emissions from electricity generation in power plants that are displaced due to the project activity. The case established for the power required by the project activity, since it requires **1.8 MW_h for its auxiliary use**, is less than the installed capacity of the equipment as per the methodology and its associated emissions quantification formula to be selected. The baseline emissions corresponding to electricity supplied by the project activity to recipient facilities is estimated for each recipient facility in accordance with the case established as above and in the case of the project activity is as follows:

(a) Case 1a: recipients whose project level electricity consumption is less than or up to the maximum capacity of the existing pre-project equipment at the recipient facility to use the following modified Equation

$$BE_{EL,j,y} = f_{WCM} \sum_{i} (EG_{i,j,y} \times EF_{Elec,i,j,y})$$

Where:

$EG_{i,j,y}$	=	The power supplied by the project activity to the recipient facility *j*, which in the absence of the project activity would have been sourced from baseline source *i* (e.g. '*gr*' for the grid or '*is*' for an identified source) during the year *y* as per the identified baseline scenario for recipient facility *j* (MWh)
$EF_{Elec,i,j,y}$		The CO_2 emission factor for the baseline electricity source *i* (e.g. '*gr*' for the grid, and '*is*' for an identified source), corresponding to baseline scenario for the recipient facility *j*, during the year *y* (t CO_2/MWh)

f_{WCM} = Fraction of total electricity generated by the project activity using waste gas.

And

$$f_{WCM} = \frac{ST_{whr,y}}{ST_{whr,y} + ST_{other,y}}$$

Where:
$ST_{whr,y}$ = Energy content of the steam generated in waste heat recovery boiler fed to turbine via common steam header
$ST_{other,y}$ = Energy content of steam generated in other boiler (AFBC) fed to turbine via common steam header

(b) If the electricity displaced by the project activity in the recipient facility is supplied by a connected grid system, the CO_2 emission factor of the electricity is modified from the UNFCCC CDM methodology and instead shall be determined following the guidance provided by the UCR CoU protocol for conservativeness.

Power Gen Cap Capacity	MW	18
Auxiliary Power Consumption	%	10%

Estimated Annual Baseline Emission Reductions: $BE_{EL,j,y} = f_{WCM} (EG_{BL,y} \times EF_{,CO2,GRID,y})$

$BE_{EL,j,y}$ = Baseline emission reductions in a year y at project site/recipient plant (j).

where:

$EG_{BL,y}$ is calculated based on daily gross power generation and auxiliary power consumption in the power generation plant (recipient plant)

$EG_{BL,y} = EG_{GEN,y} - EG_{AUX,y}$.
where,
$EG_{BL,y}$ = Net power generation from turbine in year y (MWh/yr)
$EG_{GEN,y}$= Gross power generation from turbine in year y (MWh/yr)
$EG_{AUX,y}$= Auxiliary power consumption in power generation plant in year y (MWh/yr)
f_{WCM} = Fraction of total electricity generated by the project activity using waste gas.

$EF_{Grid,CO2,y}$ = CO_2 emission factor of the grid in year y (t CO_2/MWh) as determined by the UCR Standard for the 2015-2022 period.

A "grid emission factor" refers to a CO_2 emission factor (tCO2/MWh) which will be associated with each unit of electricity provided by an electricity system. The UCR recommends an emission factor of 0.9 tCO_2/MW_h for the 2015-2021 years as a fairly conservative estimate for Indian projects not previously verified under any GHG program. Also, for the vintage 2021-22, the combined margin emission factor calculated from CEA database in India results into same emission factors as that of the default value. Hence, the same emission factor has been considered to calculate the emission reduction.

No leakage is applicable under this methodology, hence, LEy= 0

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

Year	Total WHR steam	Enthalpy (Steam of WHR)	Feedwater Enthalpy	Enthalpy gain	STwhr (steam* Enthalpy* 1000)
	Tonnes	kcal/kg	kcal/kg	kcal/kg	kcal
Year	362699.80	805.81	110.75	695.06	252183604536

Year	AFBC Steam (Diff. to CH Total)	Enthalpy (Steam of AFBC)	Feedwater Enthalpy	Enthalpy gain	STother (steam* Enthalpy* 1000)
	Tonnes	kcal/kg	kcal/kg	kcal/kg	kcal
Year	127597.63	809.71	109.30	700.41	89407179567

Year	Total electricity generated	Auxiliary electricity	Net electricity supplied	Total electricity generated	Auxiliary electricity	Net electricity supplied	f_{WCM} (Avg over the year)
	kWh	kWh	kWh	MWh	MWh	MWh	
	EG_{Gen}	EG_{Aux}	EG_y	EG_{Gen}	EG_{Aux}	EG_y	
Year	103686774	10408378	93278396	103686.774	10408.378	93278.396	0.7528

Estimated annual Emission Reductions (ER_y) = **63194** CoUs/yr (**63194** tCO_{2eq}/yr)

B.6. Prior History>>

The project activity has **been** registered as a UNFCCC **CDM** and other elements as **VCS** project activity in the past as follows:

Title	**Shri Bajrang WHR CDM Project**
UNFCCC reference No	0528
Sectoral scopes	1 : Energy industries (renewable - / non-renewable sources)
Activity Scale	LARGE
Methodologies Used	ACM0004 ver. 2 - Consolidated methodology for waste gas and/or heat for power generation
Registration Date	08/10/2006
Crediting Period	01/09/2005 – 31/08/2015 (Fixed)
CERs Issuance History	**Monitoring Period: 01/09/2005 – 31/08/2006** CERs Issued Quantity: 74674 tCO2 **Monitoring Period: 01/09/2006 – 31/05/2007**

	CERs Issued Quantity: 66885 tCO2 **Monitoring report: 01/06/2007 – 31/10/2007** CERs Issued Quantity 40283 **Monitoring report: 01/11/2007 – 30/04/2008** CERs Issued Quantity 44063 **Monitoring report: 01/05/2008 – 31/08/2008** CERs Issued Quantity 33322 **Monitoring report: 01/09/2008 – 31/01/2011** CERs Issued Quantity 157929 **Monitoring report: 01/02/2011 – 30/09/2011 (** CERs Issued Quantity 44515 **Monitoring report: 01/10/2011 – 31/08/2012** CERs Issued Quantity 60387 **Monitoring report: 01/09/2012 – 31/08/2013** CERs Issued Quantity 63841 **Monitoring report: 01/09/2013 – 31/08/2014** CERs Issued Quantity 74340 **Monitoring report: 01/09/2014 – 31/08/2015** CERs Issued Quantity 65729

As noted earlier, from 01/09/2008 onwards, steam generated from adjacent CDM project (UNFCCC #2128) is fed into a common header to which the steam from the **UCR project activity is currently fed.**

Title	**Shri Bajrang RE Project**
UNFCCC reference No	2128
Sectoral scopes	1 : Energy industries (renewable - / non-renewable sources)
Activity Scale	Small Scale
Methodologies Used	AMS-I.D. ver. 18 - Grid connected renewable electricity generation
Registration Date	30/09/2016
Crediting Period	**27/02/2016 to 30/06/2019 (Awaiting Issuance)**
Last MR Date	22/07/2019
Type of crediting period	07 Years Renewable
Length of the Crediting Period	07 Years
Crediting period from	2702/2016-26/02/2023 (Renewable)

The biomass based boiler/turbine has also been registered for carbon credits (UNFCCC CDM#2128) next to the existing UCR project activity. This biomass project activity generates power by utilizing the steam generated by using renewable biomass, rice husk as fuel in the boiler. Dolochar has also been co fired with rice husk. The electricity generated by this biomass (RE) project has been used for captive purpose and the surplus electricity exported to the CSEB grid. **Emission reductions have been claimed for the electricity displaced by the RE project activity only.** The RE project has been registered as a CDM project on 27/02/2009. Some months in 2008-2009 were also registered for carbon credits under the **VCS** program as follows:

Title	**Shri Bajrang RE Project**
VCS Reference No	1167

Sectoral scopes	1 : Energy industries (renewable - / non-renewable sources)
Activity Scale	Small Scale
Methodologies Used	AMS-I.D.
Crediting Period	01/09/2008-31/12/2008
VCUs issued	13459 tCO2
Crediting Period	01/01/2009-26/02/2009
VCUs issued	6543 tCO2
MR Date	23/08/2010

The project activity is seeking CoUs under the UCR CoU Standard for the period **01/09/2015-31/12/2022** and hence there is no double counting issue of carbon credits for the said vintage period.

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

There is no change in the start date of crediting period. The start date of crediting under UCR is considered as 01/09/2015.

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. UCR Monitoring period number and duration>>

UCR Monitored Period: 01
1st UCR Monitoring Period: 01/09/2015-31/12/2022 (07 years 04 months)
1st UCR Crediting Period: 01/09/2015-31/12/2022 (07 years 04 months)

B.10. Monitoring plan>>

Various departments at SBPIL are headed by respective HOD (Head of Department) supported by shift- in-charges & support staff. Departments are mainly divided into projects, mechanical, electrical & instrumentation, production, QC and administration. Mechanical & electrical department are responsible for the overall upkeep of plant, plant machinery and instruments.

To ensure that the data is reliable and transparent, the PP has established Quality Assurance and Quality Control (QA&QC) measures to effectively control and manage data reading, recording, auditing as well as archiving data and all relevant documents. The data is monitored on a daily basis and is submitted to PPs on a daily basis.

Key Data Monitored: • Net power supplied to manufacturing facility due to waste heat recovery

1. **Monitoring Plan Objective and Organization**

PP is the project implementer and monitors the electricity generated from the turbines within the project activity. The data is already archived electronically and is stored since 2015.

Director is responsible for the overall functioning of the sponge iron plant. SBPIL has adopted the following procedures to assure the completeness and correctness of the data needed to be monitored for the UCR project activity.

On a monthly basis, the monitoring reports are checked and discussed by the senior project activity team members. In case of any irregularity observed by any of the team members, it is informed to the concerned person for necessary actions. Further these reports are then forwarded to the management on a monthly basis.

• Unit Head: Overall responsibility of compliance with the project activity monitoring plan.
• Power plant In-charge: Responsibility for completeness of data, reliability of data (calibration of meters), and monthly report generation
• Shift In-charge: Responsibility of data monitoring & recording day to day data collection and record keeping:

Plant data collected on operation under the supervision of the respective Shift-in-charge and records are kept in daily logs.

Reliability of data collected

Documents pertaining to testing of meters are maintained. PPs have implemented QA&QC measures to calibrate and ensure the accuracy of metering and safety aspects of the project operation. The metering devices are calibrated and inspected properly and periodically, according to state electricity board's specifications and requirements to ensure accuracy in the readings.

Calibration of instruments: SBPIL procedures defined for the calibration of instruments. A log of calibration records is maintained. Electrical & Instrumentation department in the company is responsible for the upkeep of instruments in the plant. Maintenance of instruments and equipment's used in data monitoring: The process department is responsible for the proper functioning of the equipment's/ instruments and informs the concerned department for corrective action if found not operating as required. Corrective action is taken by the concerned department and a report on corrective action taken is maintained as done time to time along with the details of problems rectified.

All the measured parameters will be monitored on daily basis. All the flow meters, temperature and pressure gauges will be calibrated annually. The accuracy classes of the temperature gauge and pressure gauge are $\pm 7^{o}$ C and ±0.075% respectively. The accuracy classes of the steam flow meters are ±0.075% and ±0.065% for WHRB and AFBC respectively.

Emergency preparedness

The project activity does not lead to any unintentional emissions. So, there is no need for any emergency preparedness in project activity.

In line with the monitoring plan the PP will make available all relevant data including, but not limited to, the following to the verifying UCR auditor:

• Monthly generation from the power plant
• Monthly auxiliary consumption of the power plant
• Monthly feedwater temperature to WHR boilers
• Monthly steam temperature of WHR boilers
• Monthly steam pressure of WHR boilers
• Monthly steam flow from WHR boilers
• Monthly feedwater temperature to AFBC boiler
• Monthly steam temperature of AFBC boiler
• Monthly steam pressure of AFBC boiler
• Monthly steam flow from AFBC boiler

• Monthly usage of fossil fuel
• Monthly steam flow from AFBC boiler to new 8 MW turbine
• Monthly steam temperature from AFBC boiler to new 8 MW turbine
• Monthly steam pressure from AFBC boiler to new 8 MW turbine

2 Data and Parameters to be monitored

Data / Parameter:	**Qi**
Data unit:	Tonnes
Description:	Mass of fossil fuel consumed (Diesel in DG sets)
Source of data:	Measured
Measurement procedures (if any):	Diesel stock register The fossil fuel consumed is measured in litres which are then converted to tonnes using the density of diesel as 0.00086 tonnes/litre Source of density: http://www.iocl.com/Products/DieselSpecifications.pdf
Monitoring frequency:	Recording frequency: Monthly litre*0.00086 tonnes/litre
QA/QC procedures:	Data is taken from purchase records, adjustments made for stock of fuel onsite
Purpose of Data	-Calculation of Project emissions

Data / Parameter:	**$Quantity_{other}$**
Data unit:	Tonnes
Description:	Quantity of steam from AFBC boiler
Source of data:	Measured
Measurement procedures (if any):	Plant Records
Monitoring frequency:	Type: Differential pressure transmitter, Calibration frequency: Annually
QA/QC procedures:	Taken from calibrated meters through the DCS system. DCS records actual temperature (for steam and feedwater) and pressure (for the steam only) every second and this data is archived for the verifier to test the results of the DCS
Purpose of Data	-Calculation of Baseline emissions

Data / Parameter:	**$Quantity_{whr}$**
Data unit:	Tonnes
Description:	Quantity of steam from waste heat boiler
Source of data:	Measured
Measurement procedures (if any):	Plant Records
Monitoring frequency:	Type: Differential pressure transmitter, Calibration frequency: Annually
QA/QC procedures:	Taken from calibrated meters through the DCS system. DCS records actual temperature (for steam and feedwater) and pressure (for the steam only) every second and this data is archived for the verifier to test the results of the DCS
Purpose of Data	-Calculation of Baseline emissions

Data / Parameter:	**$Quantity_{8MW}$**
Data unit:	Tonnes
Description:	Quantity of steam from AFBC boiler to 8MW boiler
Source of data:	Measured
Measurement procedures (if any):	Plant Records
Monitoring frequency:	Type: Differential pressure transmitter, Calibration frequency: Annually

QA/QC procedures:	Taken from calibrated meters through the DCS system. DCS records actual temperature (for steam and feedwater) and pressure (for the steam only) every second and this data is archived for the verifier to test the results of the DCS
Purpose of Data	-Calculation of Baseline emissions

Data / Parameter:	**$Quantity_{csh}$**
Data unit:	Tonnes
Description:	Quantity of steam entering the common steam header from AFBC boiler
Source of data:	Calculated
Measurement procedures (if any):	Plant Records
Monitoring frequency:	Monthly
QA/QC procedures:	Calculated as **$Quantity_{other}$ – $Quantity_{8MW}$**
Purpose of Data	-Calculation of Baseline emissions

Data / Parameter:	**CO_{EFi}**
Data unit:	tCO2/TJ
Description:	Emission factor of fossil fuel combusted (Diesel in DG sets)
Source of data:	Measured
Value/Measurement procedures (if any):	IPCC 2006 (Table 1.4, page 1.23) 74.80 20. 2 =20.2 * 44/12 =74.1 tCO2/TJ For calculation of project emission the upper value (95% confidence level) i.e. 74.80 is taken
Monitoring frequency:	Yearly
QA/QC procedures:	Data from IPCC
Purpose of Data	-Calculation of Project emissions

Data / Parameter:	**NCV_i**
Data unit:	TJ/kt
Description:	Net calorific value of fossil fuel combusted (Diesel in DG sets)
Source of data:	IPCC value has been used since Indian National communication refers to IPCC. . IPCC 2006 (Table 1.2, page 1.18)
Value/Measurement procedures (if any):	43.3
Monitoring frequency:	Monthly
QA/QC procedures:	Data from IPCC
Purpose of Data	-Calculation of Project emissions

Data / Parameter:	***$EG_{,y}$***
Data unit:	MWh
Description:	Net power supplied in project activity
Source of data:	Calculated
Measurement procedures (if any):	Plant operation data on power generation in project activity
Monitoring frequency:	Frequency of measurement - Continuous
QA/QC procedures:	Energy meter is calibrated as per schedule.
Purpose of Data	-Calculation of baseline emissions = **EG_{GEN}-EG AUX**

Data / Parameter:	***$EG_{AUX,y}$***
Data unit:	MWh
Description:	Auxiliary power consumption in project activity
Source of data:	Auxiliary power consumption in the project activity is measured directly.
Measurement	Plant operation data on power generation in project activity

procedures (if any):	
Monitoring frequency:	Frequency of measurement - Continuous
QA/QC procedures:	Energy meter is calibrated as per schedule.
Purpose of Data	-Calculation of baseline emissions

Data / Parameter:	$EG_{,GEN}$
Data unit:	MWh
Description:	Total power generated in project activity
Source of data:	Measured
Measurement procedures (if any):	Type: Energy Meter, Calibration Frequency: Annually Plant operation data on power generation in project activity
Monitoring frequency:	Frequency of measurement - Continuous
QA/QC procedures:	Energy meter is calibrated as per schedule.
Purpose of Data	-Calculation of baseline emissions

Data/Parameter	ST_{whr}
Data unit	kCal
Description	Energy content of steam from waste gas boilers fed to common steam header
of data Value(s) applied	Calculated
Measurement methods and procedures	Plants records
Monitoring frequency	Monthly (from the collation of the daily data)
QA/QC procedures:	Calculated parameter
Calculation method (if applicable):	Energy in the steam (using steam tables for the temperature and pressure of steam) multiplied by the measured amount of the steam from the waste heat recovery boilers
Purpose of data	To estimate baseline emissions

Data/Parameter	$ST_{\backslash other}$
Data unit	kCal
Description	Energy content of steam from AFBC boiler fed to common steam header
of data Value(s) applied	Calculated
Measurement methods and procedures	Plants records
Monitoring frequency	Monthly (from the collation of the daily data)
QA/QC procedures:	Calculated parameter
Calculation method (if applicable):	Energy in the steam (using steam tables for the temperature and pressure of steam) multiplied by the measured amount of the steam from the AFBC boiler.
Purpose of data	To estimate baseline emissions

Data/Parameter	$\mathbf{Temp}_{whr}$
Data unit	^0C
Description	Temperature of steam from waste heat boiler
of data Value(s) applied	Measured

Measurement methods and procedures	Plants records
Monitoring frequency	Monthly (from the collation of the daily data)
QA/QC procedures:	Type: Temperature transmitter with thermocouple, Calibration frequency: Annually
Calculation method (if applicable):	Taken from calibrated meters through the DCS system. DCS records actual temperature (for steam and feedwater) and pressure (for the steam only) every second and this data is archived for the verifier to test the results of the DCS.
Purpose of data	To estimate baseline emissions

Data/Parameter	**$Temp_{other}$**
Data unit	^0C
Description	Temperature of steam from AFBC boiler
of data Value(s) applied	Measured
Measurement methods and procedures	Plants records
Monitoring frequency	Monthly (from the collation of the daily data)
QA/QC procedures:	Type: Temperature transmitter with thermocouple, Calibration frequency: Annually
Calculation method (if applicable):	Taken from calibrated meters through the DCS system. DCS records actual temperature (for steam and feedwater) and pressure (for the steam only) every second and this data is archived for the verifier to test the results of the DCS.
Purpose of data	To estimate baseline emissions

Data/Parameter	**$Temp_{fw,whr}$**
Data unit	^0C
Description	Temperature of feedwater to waste heat boiler
of data Value(s) applied	Measured
Measurement methods and procedures	Plants records
Monitoring frequency	Monthly (from the collation of the daily data)
QA/QC procedures:	Type: Temperature transmitter with thermocouple, Calibration frequency: Annually
Calculation method (if applicable):	Taken from calibrated meters through the DCS system. DCS records actual temperature (for steam and feedwater) and pressure (for the steam only) every second and this data is archived for the verifier to test the results of the DCS.
Purpose of data	To estimate baseline emissions

Data/Parameter	**$Temp_{fw,otherr}$**
Data unit	^0C
Description	Temperature of feedwater to AFBC
of data Value(s) applied	Measured
Measurement methods and procedures	Plants records

Monitoring frequency	Monthly (from the collation of the daily data)
QA/QC procedures:	Type: Temperature transmitter with thermocouple, Calibration frequency: Annually
Calculation method (if applicable):	Taken from calibrated meters through the DCS system. DCS records actual temperature (for steam and feedwater) and pressure (for the steam only) every second and this data is archived for the verifier to test the results of the DCS.
Purpose of data	To estimate baseline emissions

Data/Parameter	**$Temp_{8MW}$**
Data unit	^0C
Description	Temperature of steam from AFBC boiler to new 8 MW turbine
of data Value(s) applied	Measured
Measurement methods and procedures	Plants records
Monitoring frequency	Monthly (from the collation of the daily data)
QA/QC procedures:	Type: Temperature transmitter with thermocouple, Calibration frequency: Annually
Calculation method (if applicable):	Taken from calibrated meters through the DCS system. DCS records actual temperature (for steam and feedwater) and pressure (for the steam only) every second and this data is archived for the verifier to test the results of the DCS.
Purpose of data	To estimate baseline emissions

Data/Parameter	**$Press_{8MW}$**
Data unit	kg/cm^2
Description	Pressure of steam from AFBC boiler to new 8 MW turbine
of data Value(s) applied	Measured
Measurement methods and procedures	Plants records
Monitoring frequency	Monthly (from the collation of the daily data)
QA/QC procedures:	Type: Pressure transmitter, Calibration frequency: Annually
Calculation method (if applicable):	Taken from calibrated meters through the DCS system. DCS records actual temperature (for steam and feed water) and pressure (for the steam only) every second and this data is archived for the verifier to test the results of the DCS.
Purpose of data	To estimate baseline emissions

Data/Parameter	**$Press_{other}$**
Data unit	kg/cm^2
Description	Pressure of steam from AFBC boiler
of data Value(s) applied	Measured
Measurement methods and procedures	Plants records
Monitoring frequency	Monthly (from the collation of the daily data)

QA/QC procedures:	Type: Pressure transmitter, Calibration frequency: Annually
Calculation method (if applicable):	Taken from calibrated meters through the DCS system. DCS records actual temperature (for steam and feed water) and pressure (for the steam only) every second and this data is archived for the verifier to test the results of the DCS.
Purpose of data	To estimate baseline emissions

Data/Parameter	$EF_{CO2, GRID, y}$
Data unit	tCO_2 /MWh
Description	Fixed Ex-Ante
of data Value(s) applied	UCR Standard Protocol As per Standard
Measurement methods and procedures	Fixed
Monitoring frequency	NA
Purpose of data	To estimate baseline emissions