



MONITORING REPORT

CARBON OFFSET UNIT (CoU) PROJECT



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

UCR PROJECT ID: 396

MR Version 1.0

MR Date: 26/01/2024

UCR Monitored Period: 01

UCR 1st Monitoring Period: 01/04/2013-31/12/2022 (09 years 09 months)

1st CoU Issuance Period: 01/04/2013-31/12/2022 (09 years 09 months)

1st Crediting Period: 01/04/2013-31/12/2022 (09 years 09 months)

8 DECENT WORK AND
ECONOMIC GROWTH



13 CLIMATE
ACTION



7 AFFORDABLE AND
CLEAN ENERGY





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

BASIC INFORMATION																							
Title of the project activity	SBPIL Waste Heat to Power Project, Tilda, India																						
Scale of the project activity	Large Scale																						
Completion date of the MR	26/01/2024																						
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																						
Calculated amount of total GHG emission reductions per year	<table border="1"> <thead> <tr> <th>DD/MM/YYYY- DD/MM/YYYY</th><th>tCO_{2eq} (CoUs)</th></tr> </thead> <tbody> <tr><td>01/04/2013-31/12/2013</td><td>27378</td></tr> <tr><td>01/01/2014-31/12/2014</td><td>57138</td></tr> <tr><td>01/01/2015-31/12/2015</td><td>65715</td></tr> <tr><td>01/01/2016-31/12/2016</td><td>57909</td></tr> <tr><td>01/01/2017-31/12/2017</td><td>56088</td></tr> <tr><td>01/01/2018-31/12/2018</td><td>59883</td></tr> <tr><td>01/01/2019-31/12/2019</td><td>98197</td></tr> <tr><td>01/01/2020-31/12/2020</td><td>119239</td></tr> <tr><td>01/01/2021-31/12/2021</td><td>124738</td></tr> <tr><td>01/01/2022-31/12/2022</td><td>163968</td></tr> </tbody> </table>	DD/MM/YYYY- DD/MM/YYYY	tCO _{2eq} (CoUs)	01/04/2013-31/12/2013	27378	01/01/2014-31/12/2014	57138	01/01/2015-31/12/2015	65715	01/01/2016-31/12/2016	57909	01/01/2017-31/12/2017	56088	01/01/2018-31/12/2018	59883	01/01/2019-31/12/2019	98197	01/01/2020-31/12/2020	119239	01/01/2021-31/12/2021	124738	01/01/2022-31/12/2022	163968
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Estimated total amount GHG emission reductions for the entire monitoring period (2013-2022)	830253 tCO₂ (830253 CoUs)																						

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, Tilda, India** is located in Village: Tandawa and Kundru, Tehsil: Tilda, 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 project activity 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 °C). The reduction process yields carbon di-oxide and carbon monoxide. The power produced is used actively at the sponge iron interconnected plants of the PP within the project boundary.

Apart from the utilization of the power at the sponge iron plant, the surplus power generated by the Waste Heat Recovery Boilers (WHRB) plant is consumed by the adjoining steel plant owned by SBPIL which is within the same boundary as the WHRB plant.

Commissioning dates of WHRBs (dd/mm/yyyy)	
WHRB-1	31/03/2013
WHRB-2	25/06/2019
WHRB-3	11/10/2023

The start date of the project activity is the commissioning date of the initial WHRB which is **31/03/2013**.

Type of GHG emissions mitigation action	Energy efficiency: Waste energy recovery in order to displace more-carbon intensive energy/technology.
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This power, from the WHRB plant, displaces 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 2013-2022.

SBPIL has set up **03 nos. WHRBs of 63 TPH** each at its sponge iron production unit. The DRI gas,

as it comes out after burning chamber, contains sufficient quantity of heat energy that if not recovered would be wasted. An 600 TPD DRI Kiln for sponge iron production emits normally around 1,45,000 Nm³ /hour of hot gas at a temperature of 950⁰C -1000⁰C.

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 **46 MW (16 MW+ 30 MW)** to generate power. Steam from 03 nos. WHRBs is taken to the turbines through a common header.

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.



The project activity has displaced **~922506 MW_h** in net electricity over the monitored period generation from the Indian grid system, which otherwise would have been generated by the operation of fossil fuel-based grid-connected power plant.

The calculated CO_{2e} emission reductions by the project activity is **830253 tCO_{2e}**, during the first CoU period.

UCR Monitoring Period Number	01
UCR Crediting Start Date for this Period	01/04/2013
UCR Crediting End Date for this Period	31/12/2022
Total Emission Reductions over the monitoring period	830253 tCO ₂

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.

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](#)).

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. 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](#)).

Water is sourced from Shivnath River, so no groundwater is abstracted for the project activities hence, natural recharge of groundwater level is not affected through project activity. 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.

Archaeological/Historically Important Site	None within the 10 km radius of the project activity
Water bodies	Bhatapara canal (3.5 km from the project activity) Kirna Tank (1.0 km) Kulhan Nallah (7.2 km)
Forest Area	Bilari Reserve Forest (10 km from the project activity)
Sanctuaries / National Parks	None within the 10 km radius of the from the project activity

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

Name of Solid Waste	Source	Waste generated (TPA)	Utilization/Disposal
Dolochar	Sponge Iron (3 x 600 TPD DRI Kilns)	150,000 TPA	Used in Power Plant
Fly Ash	Waste Heat Recovery Based Power Plant	307,200 TPA	As raw material for fly ash bricks manufacturing
Tailing	Iron Ore Beneficiation Plant	240,000 TPA	For re-beneficiation, sold to cement plant, bricks plant, tiles manufacturing unit,
Ash	AFBC Based Power Plant (35 TPH Boiler)	542,160 TPA	For cement plant/ bricks plant
Mn Slag	Ferro Alloys Plant with AOD for Medium Carbon	32,400 TPA	As raw material in Silico Manganese/Bricks Plant/ Road Filling.

EXISTING EC LETTER

F. No. J-11011/394/2009- IA II (I)
Government of India
Ministry of Environment and Forests
(I.A. Division)

Paryavaran Bhawan
CGO Complex, Lodhi Road
New Delhi – 110 003
E-mail: shuja.rao@nic.in
Tele/fax: 011 – 2436 3973
Dated: 23rd May, 2012

To,
The Director,
M/s Shri Bajrang Power and Ispat Ltd
Village Borjhara, Urla Gumma Road
Raipur- 493221, Chhattisgarh

Fax: 0771- 2232601 / 602

Sub: Expansion of Iron Ore Beneficiation Plant and Pelletization Plant (Integrated Steel Plant) at Villages Tandwa & Kundru, Tehsil Tilda, District Raipur, Chhattisgarh by M/s Shri Bajrang Power and Ispat Limited - regarding environmental clearance

Sir,

This has reference to your letter no. nil dated 11th January, 2012 along with copies of EIA/EMP and Public hearing reports and subsequent communication dated 7th March, 2012 seeking environmental clearance under the provisions of EIA Notification, 2006.

2. The Ministry of Environment and Forests has examined your application. It is noted that M/s Shri Bajrang Power & Ispat Ltd. have proposed to expand the Iron Ore Beneficiation Plant from 0.6 MTPA to 2.0 MTPA and Pelletization Plant from 0.6 MTPA to 1.4 MTPA within the integrated steel plant at Villages Tandwa & Kundru, Tehsil Tilda, District Raipur, Chhattisgarh for which environmental clearance was accorded on 6th October 2010. The land requirement for the pelletization plant is about 15 acres and beneficiation plant is about 21.6 acres. The expansion will be carried within the existing project area of 348.89 acres. No additional land is required for the proposed expansion. The existing plant is at the construction stage. Rivers Shivrath & Khanur are flowing at a distance of 13.5 km & 15 km respectively from the project site. Bilari Reserve Forest is at a distance of 10 km from the project site. No national park/wild life sanctuary is located within 10 km radius of the project site. The raw material requirement will be iron ore fines, coke breeze, dolomite, and limestone. The iron ore fines will be obtained from the NMDC/captive iron mine and open market. Other raw materials will be purchased from the open market. Total cost of the Integrated Steel Plant project is Rs.1,500.00 Crores. Rs. 6 Crores and Rs. 0.6 Crore are earmarked towards total capital cost and recurring cost/annum for environmental pollution control measures.

3. The details of the facilities and production capacities are given below:

Facilities	Environmental Clearance Obtained		Proposed Expansion	Total
	Phase-I	Phase-II		
Sponge Iron	4 X 0.15 MTPA	-	-	0.60 MTPA
Hot Re-rolling Mill	2 X 0.20 MTPA	-	-	0.40 MTPA
Coal Washery	2 X 1.20 MTPA	-	-	2.40 MTPA
Captive Power Plant (WHRB)	5 X 10 MW	25 MW using coke oven gas	-	75 MW
Power Plant (AFBC)	2 X 25 MW	-	-	50 MW
Steel Melting	2 X 0.25 MTPA	0.50 MTPA	-	1.00 MTPA

Environmental Clearance Letter



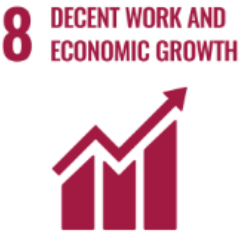
United Nations Sustainable Development Goals:

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 Target: 830253 tCO₂ for this monitored period	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 Target: 922506 MW_h supplied for this monitored period	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.2. Location of project activity >>

Village: Tandawa and Kundru,

Tehsil: Tilda,

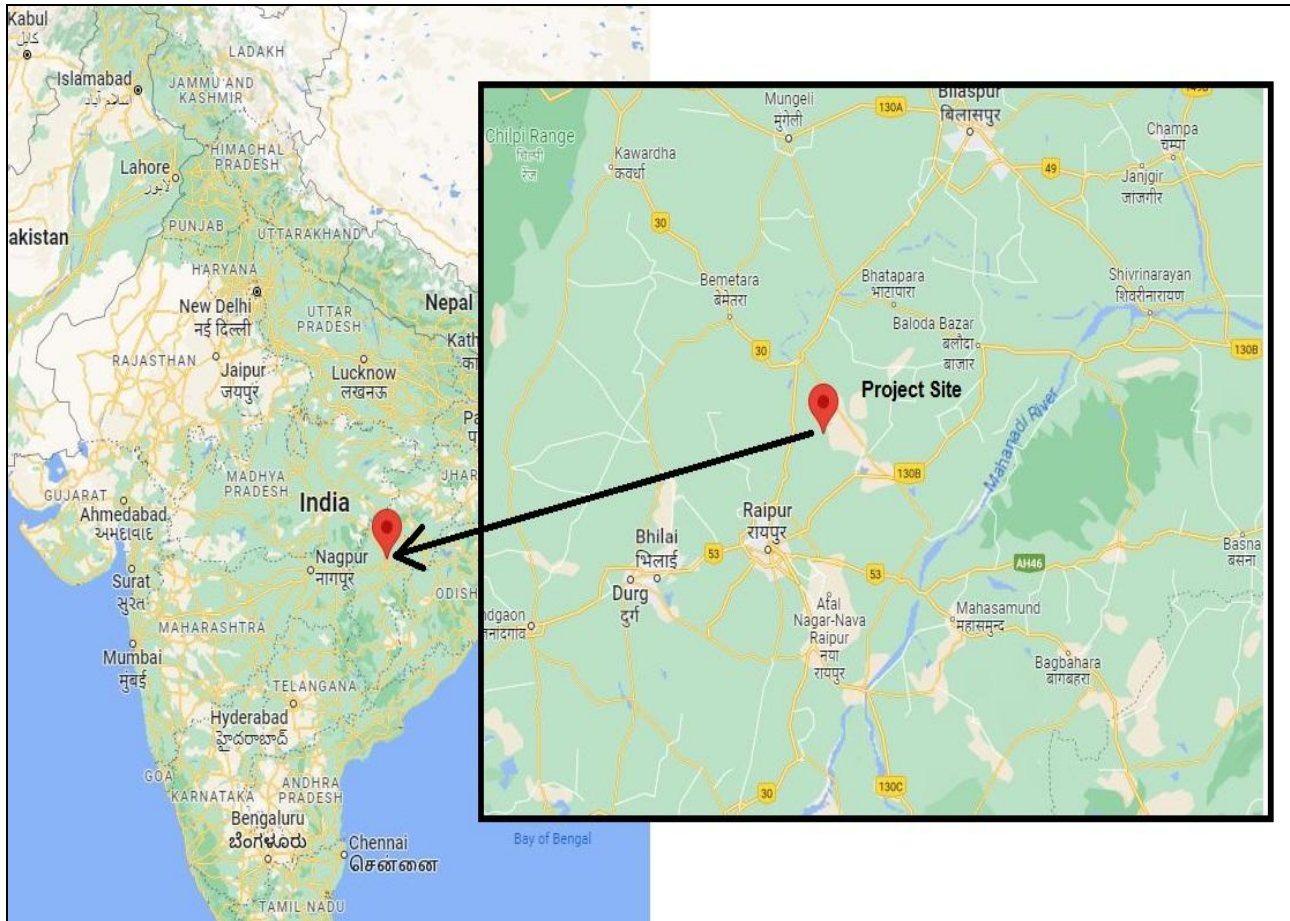
District: Raipur,

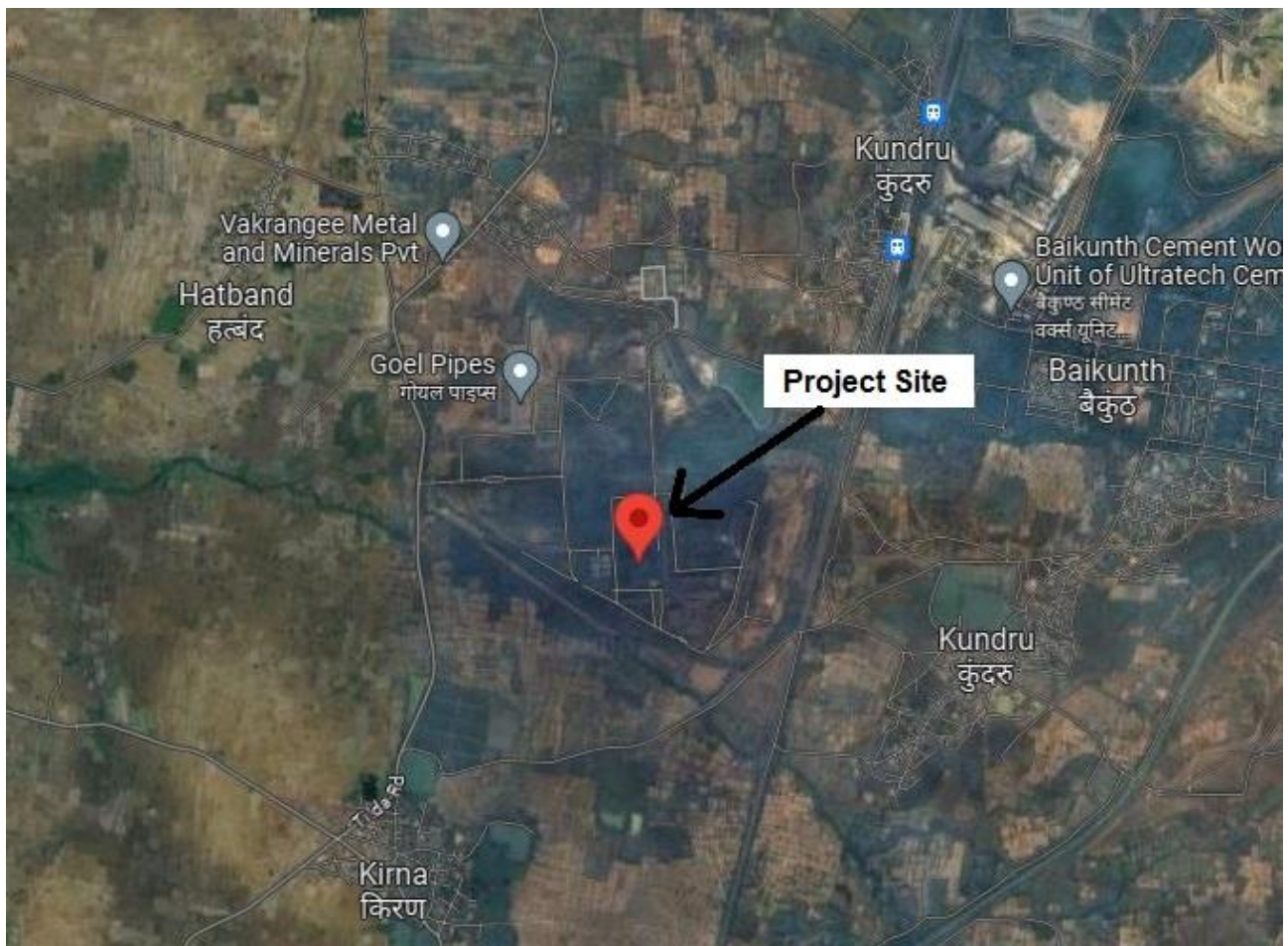
State: Chhattisgarh,

Country: India.

Latitude: **21°29'10.4"N**

Longitude: **81°46'11.5"E**





A.3. Technologies/measures >>

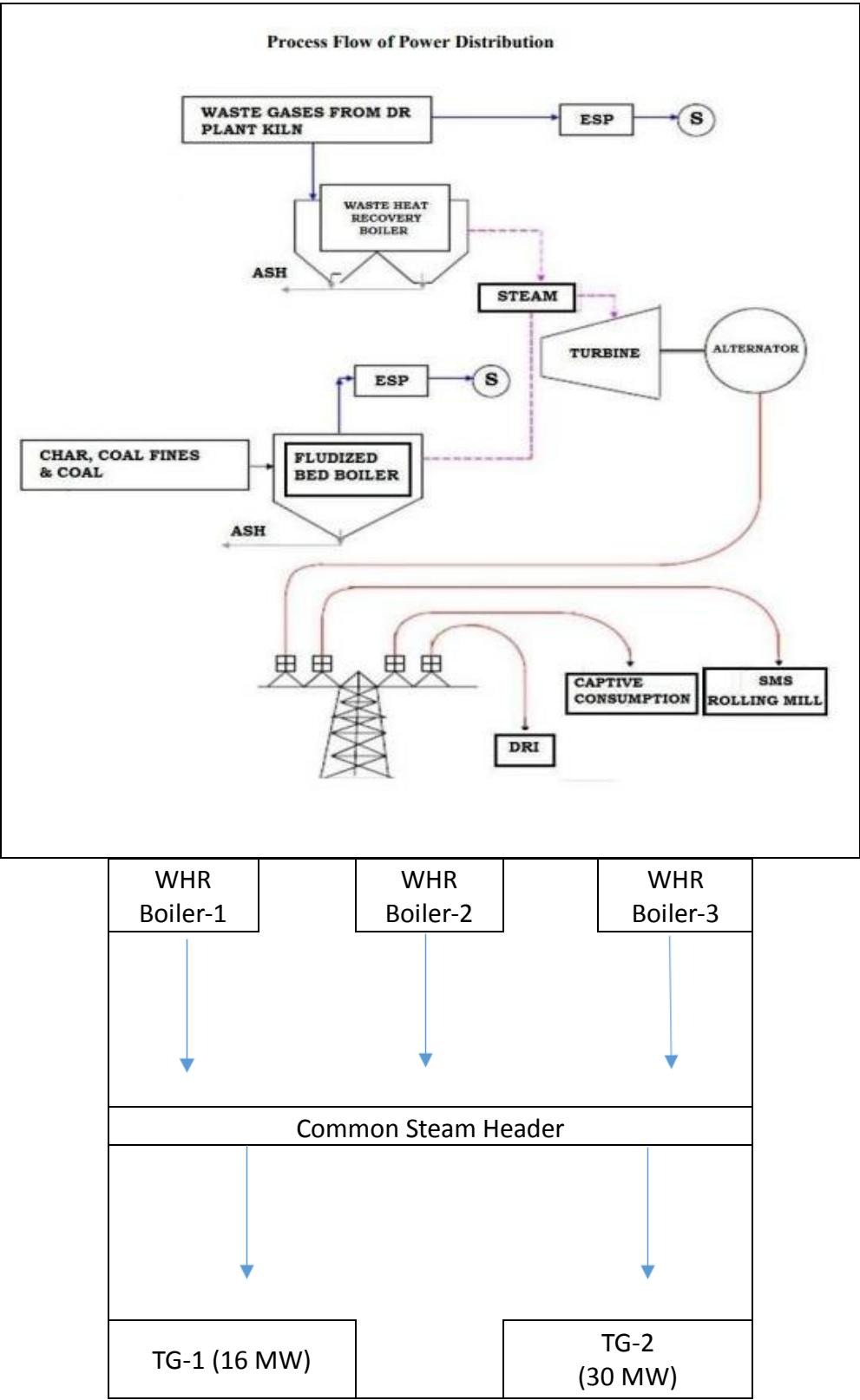
The project activity (also known as Unit III within the group of facilities operated and owned by the PP) comprises of iron ore beneficiation facility, pelletizing facility, sponge iron production facility, fly ash brick manufacturing facility and railway siding. Unit III has WHRB captive power generation facility utilizing the waste heat emanating from the kilns during the manufacturing process. Unit III converts low grade fines (Fe 55% and higher), into high grade green pellets (Fe 62% or higher), at its beneficiation facility which feeds into the pelletizing facility. The pelletizing facility utilizes a straight grate technology which decreases the time that is otherwise taken for the production of pellets and hence improves operational efficiencies.

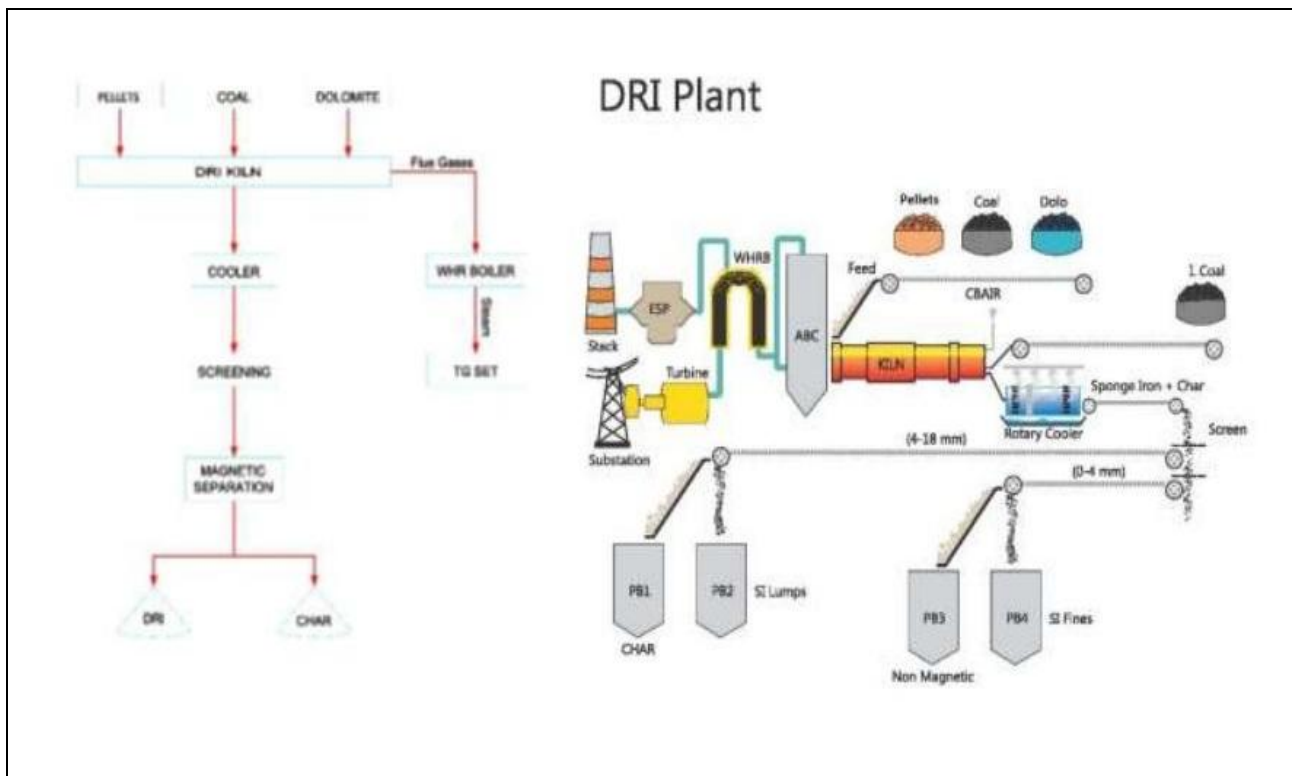
Flue gases temp and pressure: 950 °C, -1 to -5 mmWC (Inlet)
Steam generated pressure and temp: 70 ATA, 490 ± 5 °C

Unit III is also supported by a total 46 MW WHRB captive power generation facility utilizing the waste heat emanating from the kilns during the manufacturing process.

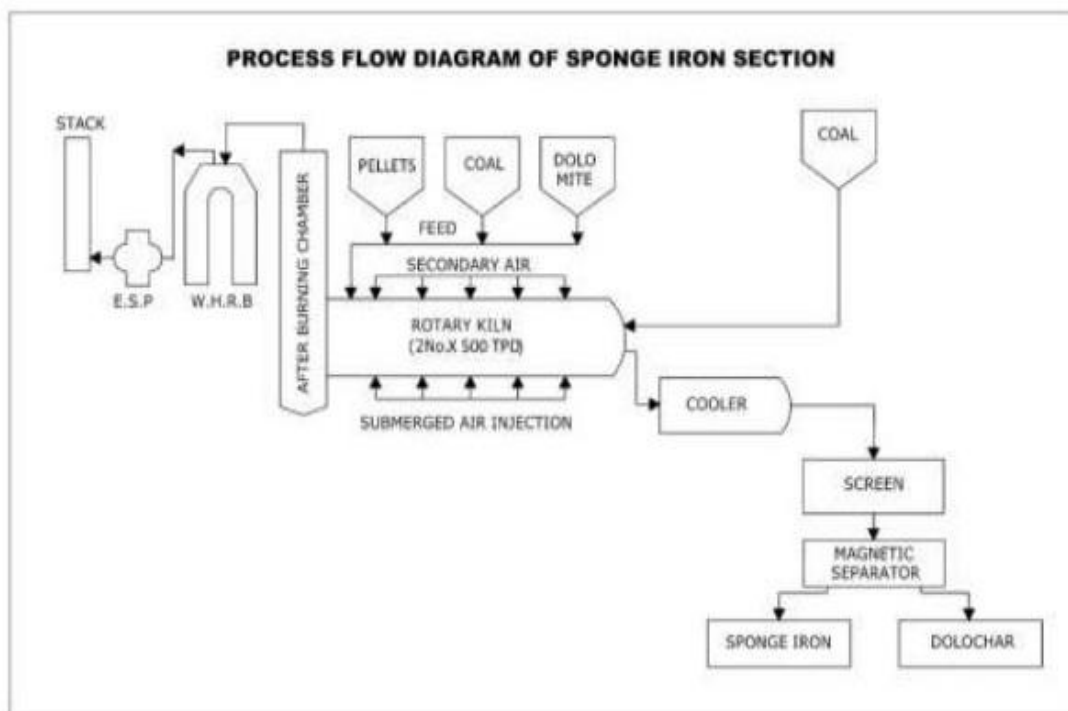
The total installed capacity of the project activity is 46 MW and the auxiliary consumption as per the requirement of the auxiliary equipment at the WHRB plant is a maximum of 10% which is 4.6 MW. The balance of electricity generated by the WHRB plant is captively consumed by the adjoining steel plant owned by the PP which is within the same premises as the WHRB Plant. SBPIL has installed 3X63 TPH Waste Heat Recovery Boilers (WHRBs) for utilising high temperature heat of flue gases from DRI kilns. DRI kilns, known as Direct Reduced Iron kilns by thermal systems, is a type of kiln used in the production of sponge iron wherein iron ore is reduced

to iron through a rotary kiln at high temperatures (1000⁰C). The reduction process yields carbon dioxide and carbon monoxide. These gases leaves the kiln at high temperature and utilize to generate power. Direct reduction refers to processes which reduce iron oxides to metallic iron at temperatures below the melting point of iron. The product of such solid-state processes is called direct reduced iron or sponge iron.





Process Flow of Sponge Iron Plant

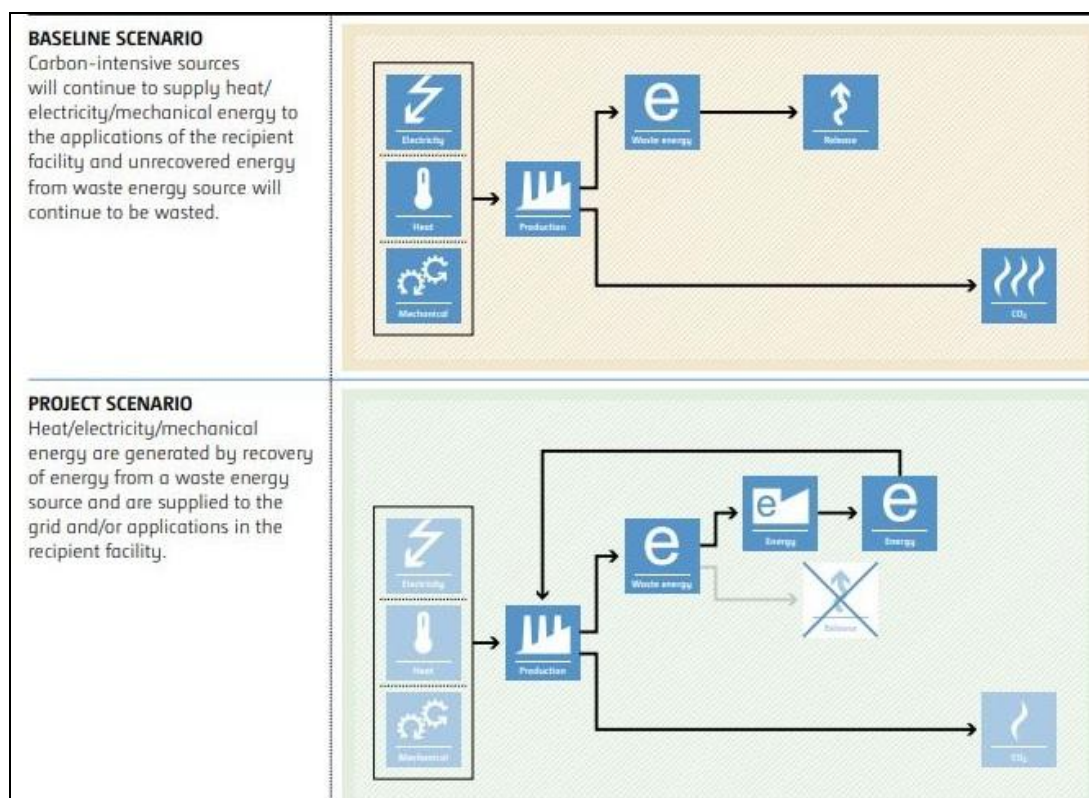


Heat that is extracted from the hot gas is utilized in the transforming water to high temperature to high pressure steam, to run conventional condensing type Steam Turbo Generator for generation of electricity as a part of forward and backward integration process.

A.4. Parties and project participants >>

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

A.5. 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

$$BE_{EL,j,y} = \sum_i (EG_{i,j,y} \times EF_{Elec,i,j,y}) \quad \text{Equation (4)}$$

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 CO₂ 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 CO₂/MWh)

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 46 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 >>

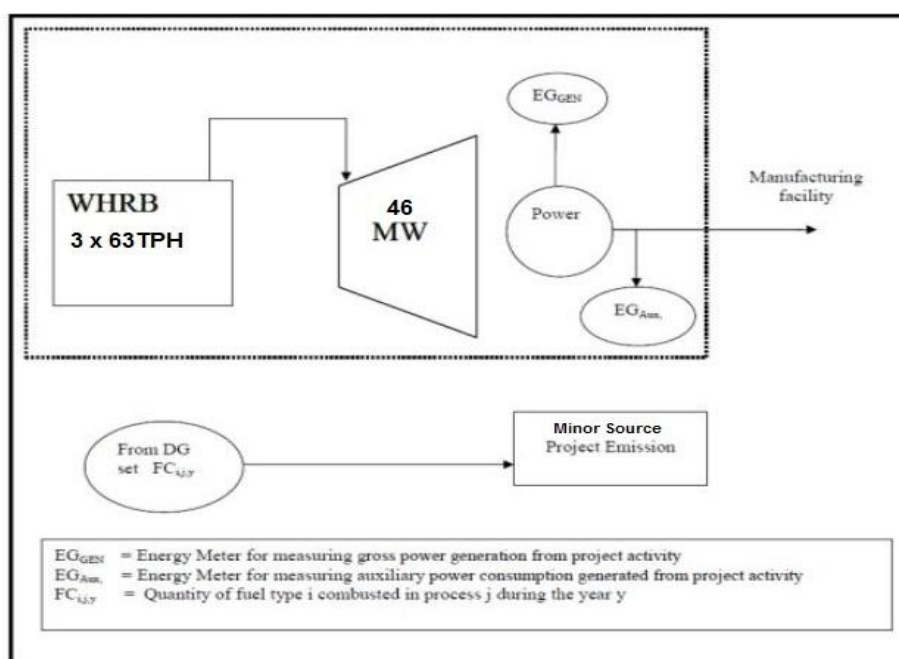
There is no double accounting of emission reductions in the project activity due to the following reasons:

- 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.

	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 ₂ O	Excluded	Excluded for simplification. This is conservative
Project Activity	On-site fossil fuel consumption due to project activity	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
	Combustion of waste gas for electricity generation	CH ₄	Excluded	Excluded for simplification. This is conservative
		N ₂ O	Excluded	Excluded for simplification. This is conservative



Net GHG Emission Reductions and Removals

Thus, $ERY = BE_y - PE_y - LE_y$ Where:

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

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

PE_y = Project emissions in year y (tCO₂/y) = 0

LE_y = Leakage emissions in year y (tCO₂/y) = 0

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

Baseline emissions include only CO₂ 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 4~4.6 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 Equation (4)*

$$BE_{EL,j,y} = \sum_i (EG_{i,j,y} \times EF_{Elec,i,j,y}) \quad \text{Equation (4)}$$

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 CO₂ 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 CO₂/MWh)

- (b) If the electricity displaced by the project activity in the recipient facility is supplied by a connected grid system, the CO₂ 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	46
Auxiliary Power Consumption	%	10%

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

$BE_{EL,j,y}$ = 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)

$EF_{Grid,CO_2,y}$ = CO₂ emission factor of the grid in year y (t CO₂/MWh) as determined by the UCR Standard for the 2013-2022 period.

A "grid emission factor" refers to a CO₂ 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 tCO₂/MW_h for the 2013-2020 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, LE_y= 0

<i>Month/Year</i>	<i>TG-1 Generation (In KWh)</i>	<i>TG-2 Generation (In KWh)</i>	<i>Total Generation (In KWh)</i>	<i>PP Auxiliary Consumption (In KWh)</i>	<i>Net Generation (In KWh)</i>
<i>Apr-13</i>	2,92,800		2,92,800	1,06,900	1,85,900
<i>May-13</i>	48,12,000		48,12,000	8,00,500	40,11,500
<i>Jun-13</i>	59,80,000		59,80,000	7,75,300	52,04,700
<i>Jul-13</i>	37,65,000		37,65,000	7,19,700	30,45,300
<i>Aug-13</i>	31,76,000		31,76,000	5,05,600	26,70,400
<i>Sep-13</i>	34,32,000		34,32,000	5,81,000	28,51,000
<i>Oct-13</i>	57,12,000		57,12,000	7,34,100	49,77,900
<i>Nov-13</i>	31,45,000		31,45,000	5,49,800	25,95,200
<i>Dec-13</i>	55,51,000		55,51,000	6,72,700	48,78,300
TOTAL	3,58,65,800		3,58,65,800	54,45,600	3,04,20,200
<i>Jan-14</i>	41,20,000		41,20,000	5,77,600	35,42,400
<i>Feb-14</i>	71,24,000		71,24,000	7,15,900	64,08,100
<i>Mar-14</i>	75,90,000		75,90,000	8,31,600	67,58,400
<i>Apr-14</i>	75,44,000		75,44,000	8,47,900	66,96,100
<i>May-14</i>	72,49,000		72,49,000	8,66,900	63,82,100
<i>Jun-14</i>	66,49,000		66,49,000	8,17,800	58,31,200
<i>Jul-14</i>	63,65,000		63,65,000	8,51,700	55,13,300
<i>Aug-14</i>	53,07,000		53,07,000	7,67,200	45,39,800
<i>Sep-14</i>	70,29,000		70,29,000	8,38,600	61,90,400
<i>Oct-14</i>	43,74,000		43,74,000	7,07,300	36,66,700
<i>Nov-14</i>	36,56,000		36,56,000	4,51,200	32,04,800
<i>Dec-14</i>	53,67,000		53,67,000	6,13,100	47,53,900
TOTAL	7,23,74,000		7,23,74,000	88,86,800	6,34,87,200
<i>Jan-15</i>	83,36,000		83,36,000	8,83,400	74,52,600
<i>Feb-15</i>	61,08,000		61,08,000	7,25,400	53,82,600
<i>Mar-15</i>	74,26,000		74,26,000	8,01,400	66,24,600
<i>Apr-15</i>	75,72,000		75,72,000	8,49,700	67,22,300
<i>May-15</i>	84,36,000		84,36,000	9,15,200	75,20,800
<i>Jun-15</i>	74,69,000		74,69,000	5,75,800	68,93,200
<i>Jul-15</i>	55,70,000		55,70,000	6,62,600	49,07,400

Aug-15	71,57,000		71,57,000	7,07,700	64,49,300
Sep-15	73,79,000		73,79,000	7,50,400	66,28,600
Oct-15	35,76,000		35,76,000	4,23,600	31,52,400
Nov-15	47,14,000		47,14,000	4,67,100	42,46,900
Dec-15	76,79,000		76,79,000	6,43,000	70,36,000
TOTAL	8,14,22,000		8,14,22,000	84,05,300	7,30,16,700
Jan-16	74,24,000		74,24,000	5,86,100	68,37,900
Feb-16	36,28,000		36,28,000	3,44,800	32,83,200
Mar-16	81,97,000		81,97,000	6,26,000	75,71,000
Apr-16	25,44,000		25,44,000	2,98,200	22,45,800
May-16	70,85,000		70,85,000	6,16,500	64,68,500
Jun-16	56,85,000		56,85,000	5,90,400	50,94,600
Jul-16	58,29,000		58,29,000	5,67,800	52,61,200
Aug-16	62,03,000		62,03,000	5,91,100	56,11,900
Sep-16	60,73,000		60,73,000	5,60,700	55,12,300
Oct-16	43,45,000		43,45,000	4,02,300	39,42,700
Nov-16	67,17,000		67,17,000	5,53,900	61,63,100
Dec-16	69,06,000		69,06,000	5,54,400	63,51,600
TOTAL	7,06,36,000		7,06,36,000	62,92,200	6,43,43,800
Jan-17	69,54,000		69,54,000	5,37,800	64,16,200
Feb-17	62,96,000		62,96,000	5,18,400	57,77,600
Mar-17	70,32,000		70,32,000	5,98,600	64,33,400
Apr-17	43,43,000		43,43,000	4,39,900	39,03,100
May-17	59,68,000		59,68,000	6,27,300	53,40,700
Jun-17	64,45,000		64,45,000	6,63,000	57,82,000
Jul-17	42,48,000		42,48,000	4,95,300	37,52,700
Aug-17	60,85,000		60,85,000	6,15,400	54,69,600
Sep-17	67,35,000		67,35,000	6,58,600	60,76,400
Oct-17	11,29,000		11,29,000	1,62,600	9,66,400
Nov-17	67,01,000		67,01,000	5,29,700	61,71,300
Dec-17	67,76,000		67,76,000	5,45,300	62,30,700
TOTAL	6,87,12,000		6,87,12,000	63,91,900	6,23,20,100
Jan-18	64,34,000		64,34,000	4,97,400	59,36,600
Feb-18	60,29,000		60,29,000	4,86,900	55,42,100
Mar-18	72,92,000		72,92,000	5,76,700	67,15,300
Apr-18	56,76,000		56,76,000	5,81,200	50,94,800
May-18	71,51,000		71,51,000	6,76,600	64,74,400
Jun-18	74,27,000		74,27,000	7,05,700	67,21,300
Jul-18	73,49,000		73,49,000	6,31,300	67,17,700
Aug-18	66,51,000		66,51,000	5,84,700	60,66,300
Sep-18	59,29,000		59,29,000	5,56,500	53,72,500
Oct-18	63,14,000		63,14,000	5,75,800	57,38,200
Nov-18	65,74,000		65,74,000	5,49,000	60,25,000
Dec-18	2,69,000		2,69,000	1,36,200	1,32,800
TOTAL	7,30,95,000		7,30,95,000	65,58,000	6,65,37,000
Jan-19	76,20,000		76,20,000	6,71,900	69,48,100
Feb-19	84,02,000		84,02,000	6,54,800	77,47,200

Mar-19	92,42,000		92,42,000	7,43,800	84,98,200
Apr-19	49,79,000	0	49,79,000	4,81,900	44,97,100
May-19	68,03,000	0	68,03,000	6,68,600	61,34,400
Jun-19	87,81,000	0	87,81,000	7,52,100	80,28,900
Jul-19	1,04,03,000	0	1,04,03,000	7,48,500	96,54,500
Aug-19	92,55,000	11,17,000	1,03,72,000	11,03,100	92,68,900
Sep-19	54,05,000	56,59,000	1,10,64,000	10,18,200	1,00,45,800
Oct-19	47,14,000	92,24,000	1,39,38,000	10,63,100	1,28,74,900
Nov-19	48,23,600	88,86,400	1,37,10,000	9,85,800	1,27,24,200
Dec-19	46,17,000	90,78,000	1,36,95,000	10,09,000	1,26,86,000
TOTAL	8,50,44,600	3,39,64,400	11,90,09,000	99,00,800	10,91,08,200
Jan-20	46,23,100	83,96,900	1,30,20,000	9,75,900	1,20,44,100
Feb-20	41,23,800	99,04,200	1,40,28,000	9,53,300	1,30,74,700
Mar-20	39,07,240	78,29,760	1,17,37,000	8,86,400	1,08,50,600
Apr-20	0	0	0	0	0
May-20	25,06,000	39,10,000	64,16,000	7,29,000	56,87,000
Jun-20	45,01,000	71,10,000	1,16,11,000	8,81,900	1,07,29,100
Jul-20	60,01,000	91,64,000	1,51,65,000	10,87,600	1,40,77,400
Aug-20	61,01,000	89,43,000	1,50,44,000	11,06,500	1,39,37,500
Sep-20	55,65,000	83,57,000	1,39,22,000	10,84,100	1,28,37,900
Oct-20	61,00,000	89,49,000	1,50,49,000	11,04,400	1,39,44,600
Nov-20	47,45,000	81,15,000	1,28,60,000	9,66,500	1,18,93,500
Dec-20	58,74,000	86,42,000	1,45,16,000	11,04,400	1,34,11,600
TOTAL	5,40,47,140	8,93,20,860	14,33,68,000	1,08,80,000	13,24,88,000
Jan-21	63,36,000	93,21,000	1,56,57,000	11,22,200	1,45,34,800
Feb-21	48,04,000	68,69,000	1,16,73,000	10,11,300	1,06,61,700
Mar-21	1,08,02,000	7,05,000	1,15,07,000	9,64,200	1,05,42,800
Apr-21	1,12,57,000	0	1,12,57,000	10,43,900	1,02,13,100
May-21	1,19,52,000	0	1,19,52,000	11,70,900	1,07,81,100
Jun-21	1,15,55,000	0	1,15,55,000	11,09,900	1,04,45,100
Jul-21	1,17,58,000	0	1,17,58,000	11,15,900	1,06,42,100
Aug-21	1,08,43,000	12,49,000	1,20,92,000	11,39,300	1,09,52,700
Sep-21	90,03,000	53,78,000	1,43,81,000	11,10,300	1,32,70,700
Oct-21	96,99,000	62,99,000	1,59,98,000	11,85,000	1,48,13,000
Nov-21	98,28,000	61,14,000	1,59,42,000	11,61,100	1,47,80,900
Dec-21	46,19,000	30,66,000	76,85,000	7,25,200	69,59,800
TOTAL	11,24,56,000	3,90,01,000	15,14,57,000	1,28,59,200	13,85,97,800
Jan-22	1,15,20,000	76,92,000	1,92,12,000	17,06,600	1,75,05,400
Feb-22	1,14,01,000	76,40,000	1,90,41,000	16,99,200	1,73,41,800
Mar-22	1,17,50,000	96,03,433	2,13,53,433	16,85,600	1,96,67,833
Apr-22	14,81,188	1,40,59,000	1,55,40,188	14,20,300	1,41,19,888
May-22	0	1,75,34,000	1,75,34,000	15,67,900	1,59,66,100
Jun-22	0	1,55,85,000	1,55,85,000	12,49,100	1,43,35,900
Jul-22	0	1,38,71,000	1,38,71,000	11,60,900	1,27,10,100
Aug-22	0	1,44,90,000	1,44,90,000	11,96,400	1,32,93,600
Sep-22	0	1,44,23,000	1,44,23,000	11,78,300	1,32,44,700
Oct-22	0	1,42,87,000	1,42,87,000	11,61,900	1,31,25,100

Nov-22	0	1,65,96,000	1,65,96,000	12,09,400	1,53,86,600
Dec-22	0	1,65,38,000	1,65,38,000	10,47,300	1,54,90,700
TOTAL	3,61,52,188	16,23,18,433	19,84,70,621	1,62,82,900	18,21,87,721

Year	Gross Generation Power MWh	Auxiliary Consumption (In MWh)	Net Generation (In MWh)	Baseline Emission Reductions (In tCO _{2eq})
2013	35,865.80	5,445.60	30,420.20	27,378.00
2014	72,374.00	8,886.80	63,487.20	57,138.00
2015	81,422.00	8,405.30	73,016.70	65,715.00
2016	70,636.00	6,292.20	64,343.80	57,909.00
2017	68,712.00	6,391.90	62,320.10	56,088.00
2018	73,095.00	6,558.00	66,537.00	59,883.00
2019	1,19,009.00	9,900.80	1,09,108.20	98,197.00
2020	1,43,368.00	10,880.00	1,32,488.00	1,19,239.00
2021	1,51,457.00	12,859.20	1,38,597.80	1,24,738.00
2022	1,98,470.62	16,282.90	1,82,187.72	1,63,968.00
Total	10,14,409.42	91,902.70	9,22,506.72	8,30,253.00

Total Emission Reductions (ER_y) over the entire monitored period = 830253 CoUs (830253 tCO_{2eq})

B.6. Prior History>>

The project activity has **never been** registered as a voluntary carbon or CDM project activity in the past, nor has been issued carbon offsets for the 2013-2022 period. The project activity is seeking CoUs under the UCR CoU Standard for the period **01/04/2013-31/12/2022** 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 01/04/2013.

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

There are no temporary deviations from the registered monitoring plan, the applied methodologies, the applied standardized baselines or the other applied methodological regulatory documents during this monitoring period. There is no UCR post-registration change to include in this monitoring plan.

B.9. UCR Monitoring period number and duration>>

UCR Monitored Period: 01

1st UCR Monitoring Period: 01/04/2013-31/12/2022 (09 years 09 months)

1st UCR Crediting Period: 01/04/2013-31/12/2022 (09 years 09 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 implementers and monitors the electricity generated from the turbines within the project activity. The data is already archived electronically and is stored since 2013.

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

The reliability of the meters is checked by testing the meters on yearly basis. Documents pertaining to testing of meters are maintained and provided to the verifier. 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.

Emergency preparedness

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

2 Data and Parameters to be monitored

S.No.	Description	TG-1	TG-2
1.	Current Meter Sr.No.	X1250408	X1389773
2.	Make	SECURE	SECURE
3.	Class	0.2S	0.2S
4.	Capacity	16 MW	30 MW

Data / Parameter:	EGy																						
Data unit:	MWh																						
	<table><tr><th>Year</th><th>MWh</th></tr><tr><td>2013</td><td>30,420.20</td></tr><tr><td>2014</td><td>63,487.20</td></tr><tr><td>2015</td><td>73,016.70</td></tr><tr><td>2016</td><td>64,343.80</td></tr><tr><td>2017</td><td>62,320.10</td></tr><tr><td>2018</td><td>66,537.00</td></tr><tr><td>2019</td><td>1,09,108.20</td></tr><tr><td>2020</td><td>1,32,488.00</td></tr><tr><td>2021</td><td>1,38,597.80</td></tr><tr><td>2022</td><td>1,82,187.72</td></tr></table>	Year	MWh	2013	30,420.20	2014	63,487.20	2015	73,016.70	2016	64,343.80	2017	62,320.10	2018	66,537.00	2019	1,09,108.20	2020	1,32,488.00	2021	1,38,597.80	2022	1,82,187.72
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2022	1,82,187.72																						
Description:	Net power supplied to manufacturing facility due to waste heat recovery																						
Source of data:	Calculated																						
Measurement procedures (if any):	Plant operation data on power generation in project activity																						
Monitoring frequency:	Recording frequency: Monthly																						

QA/QC procedures: Purpose of Data	Calculated based on daily gross power generation and auxiliary power consumption in the power generation plant.
	As per B.10
	- Energy meter is calibrated as per schedule

Data / Parameter:	<i>EG_{GEN,y}</i>																						
Data unit:	MWh <table border="1"> <thead> <tr> <th>Year</th><th>MWh</th></tr> </thead> <tbody> <tr><td>2013</td><td>35,865.80</td></tr> <tr><td>2014</td><td>72,374.00</td></tr> <tr><td>2015</td><td>81,422.00</td></tr> <tr><td>2016</td><td>70,636.00</td></tr> <tr><td>2017</td><td>68,712.00</td></tr> <tr><td>2018</td><td>73,095.00</td></tr> <tr><td>2019</td><td>1,19,009.00</td></tr> <tr><td>2020</td><td>1,43,368.00</td></tr> <tr><td>2021</td><td>1,51,457.00</td></tr> <tr><td>2022</td><td>1,98,470.62</td></tr> </tbody> </table>	Year	MWh	2013	35,865.80	2014	72,374.00	2015	81,422.00	2016	70,636.00	2017	68,712.00	2018	73,095.00	2019	1,19,009.00	2020	1,43,368.00	2021	1,51,457.00	2022	1,98,470.62
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2020	1,43,368.00																						
2021	1,51,457.00																						
2022	1,98,470.62																						
Description:	Gross power generation from project activity																						
Source of data:	Measured																						
Measurement procedures (if any):	Gross power generation is measured directly using energy meter installed at the site.																						
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 AUX,y		
Data unit:	MWh		
	Year	MWh	
	2013	5,445.60	
	2014	8,886.80	
	2015	8,405.30	
	2016	6,292.20	
	2017	6,391.90	
	2018	6,558.00	
	2019	9,900.80	
	2020	10,880.00	
	2021	12,859.20	
	2022	16,282.90	
Description:	Auxiliary power consumption in project activity		
Source of data:	Auxiliary power consumption in the project activity is measured directly.		
	PP Aux -1 (16 MW) Make: Schneider	PP Aux -2 (30 MW) Make: Schneider	Combustor Aux -3 Make: Schneider
	Energy Meter S.No. - 34122740210	Energy Meter S.No. - 540180064526	Energy Meter S.No. - 34124432828

		Meter Accuracy Class - 0.5	Meter Accuracy Class - 0.5	Meter Accuracy Class - 0.5	
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				

Data/Parameter	<i>EF_{CO2, GRID, y}</i>
Data unit	0.9 tCO ₂ /MWh
Description	Fixed
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

