PROJECT CONCEPT NOTE

CARBON OFFSET UNIT (CoU) PROJECT

Title: 7.1 MW Captive Power Plant At M/S Prakash Sponge Iron & Private Ltd. (PSIPL)
Version 1.0
Date 07/05/2023
First CoU Issuance Period: 25 years, 00 months
Crediting Period: 01/12/2021 to 30/11/2046

[1] Crediting Period is considered referring to UCR CoU Standard August 2022, Version 6.0, Page no.6

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

BASIC INFORMATION	
Title of the project activity	7.1 MW Captive Power Plant At M/S Prakash Sponge Iron & Private Ltd. (PSIPL)
Scale of the project activity	Small scale
Completion date of the PCN	07/05/2023
Project participants	M/S Prakash Sponge Iron & Private Ltd. (PSIPL)
Host Party	India
Applied methodologies and standardized baselines	CDM UNFCCC Methodology ACM0012: Waste Energy Recovery, version 6.0 Standardized baselines: Not applicable
Sectoral scopes	01 Energy industries (Renewable/Non-Renewable Sources) 04 Manufacturing Industries
Estimated amount of total GHG emission reductions per year	43,029 CoUs (43,029 tCO_2e)
Estimated total amount of average GHG emission reductions for the entire monitoring period (2021-2046)	1,075,725 CoUs (1,075,725 tCO_2e)

SECTION A. Description of project activity

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

7.1 MW Captive Power Plant At M/S Prakash Sponge Iron & Private Ltd. (PSIPL) is located in Heggere Village of Chitradurga District in the state of Karnataka, India. PSIPL has installed a 7.1 MW waste heat recovery boiler (WHRB) captive power plant (CPP).

The details of the project are as follows:

Purpose of the project activity:

Power is the basic infrastructure required for growth of any developing economy. Consumption of electrical energy is a universally accepted indicator of progress in the agricultural, industrial and commercial sectors, as also of the wellbeing of the people of the state. No major economic activity can be sustained without adequate and reliable supply of power. It plays a critical role in employment generation, regional development and poverty eradication.

But there is a raising power crisis due to the increased use of power by different sections of the society and it becomes difficult to draw power from the grid and depend on the supply. Due to the above crisis, industries need to be self-contained by producing their own power required to run the industry and other auxiliary requirements.

The primary purpose of the project is to recover the sensible heat content of the waste gases generated from Rotary Kilns using Waste Heat Recovery Boiler (WHRB) to generate cleaner power and thus contribute to the energy security of the nation by conserving natural resources. The generated power substitutes grid power to meet the requirements of the power consumed inside the plant by Sponge iron kilns and Induction furnace.
The project activity results in greenhouse gas emission reductions by generating cleaner power.
The CPP will operate in isolation from grid (standalone mode) and supply power to the PSIPL's facility (sponge iron kilns and induction furnace). All the power produced in the CPP will be consumed internally.

The project activity will also achieve,

- Improvement of local environment through particulate emission reduction
- Technological up - gradation
- Fulfilling power requirement without adding to the transmission and distribution losses of the grid, as the power will be consumed at the place where it will be generated and PSIPL will not import power from the grid.
- Reducing the difference between demand and supply of power locally.
- Sustainable –economic growth

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

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

Social benefits:

- The project activity contributes to employment generation in the local area for both skilled & unskilled people for operation and maintenance of the equipments.
- It has created steady higher value jobs and skilled workers at the facility. The project activity is contributing to the national energy security by reducing consumption of fossil fuels.
- The technology being used in the project is proven and safe for power generation. An increase in such kind of projects shall enable all the technology suppliers to continuously innovate and

modernize on the technology front. The local people will know the technological advancement and will help in capacity building.

Environmental benefits:

- The project activity is a renewable energy project, which utilizes waste heat as a fuel for power generation, a move that is voluntary and not mandated under current environmental laws of India. Since this project activity generates green energy in the form of power, it has positively contributed towards the reduction in (demand) use of finite natural resources like coal and oil, minimizing depletion and in turn increasing its availability to other important purposes. Therefore, this project activity helps to environment sustainability by reducing GHG emission in the atmosphere.
- Avoids global and local environmental pollution, leading to reduction of GHG emissions.
- Enabling local electricity grid to divert the electricity displaced by the project activity to the nearby needy areas.
- Indirect capacity building by providing a case example to other sponge iron plants in the region for switching to high capacity cogeneration configuration, for electricity generation. In addition to the reduction in carbon dioxide (CO2) emissions the project implementation will result in reduction of other harmful gases (NOx and SOx) that arise from the combustion of coal used in power generation. The project will also mitigate air and land pollution by avoiding ash generation from coal based power generation in grid and disposal of ash for land filling.

Economic benefits:

- The project activity creates employment opportunities during the project stage and operation and maintenance of the boiler and turbines.
- The project activity helps in conservation of fast depleting natural resources like coal and oil thereby contributing to the economic well being of country as a whole.
- The various other benefits due to the project activity ensure that the project is contributing to the sustainable development of the region by bringing in green technologies and processes to a backward region. The technology is indigenous and by implementing such projects the country is showcasing its GHG mitigation actions in its efforts to combat climate change.

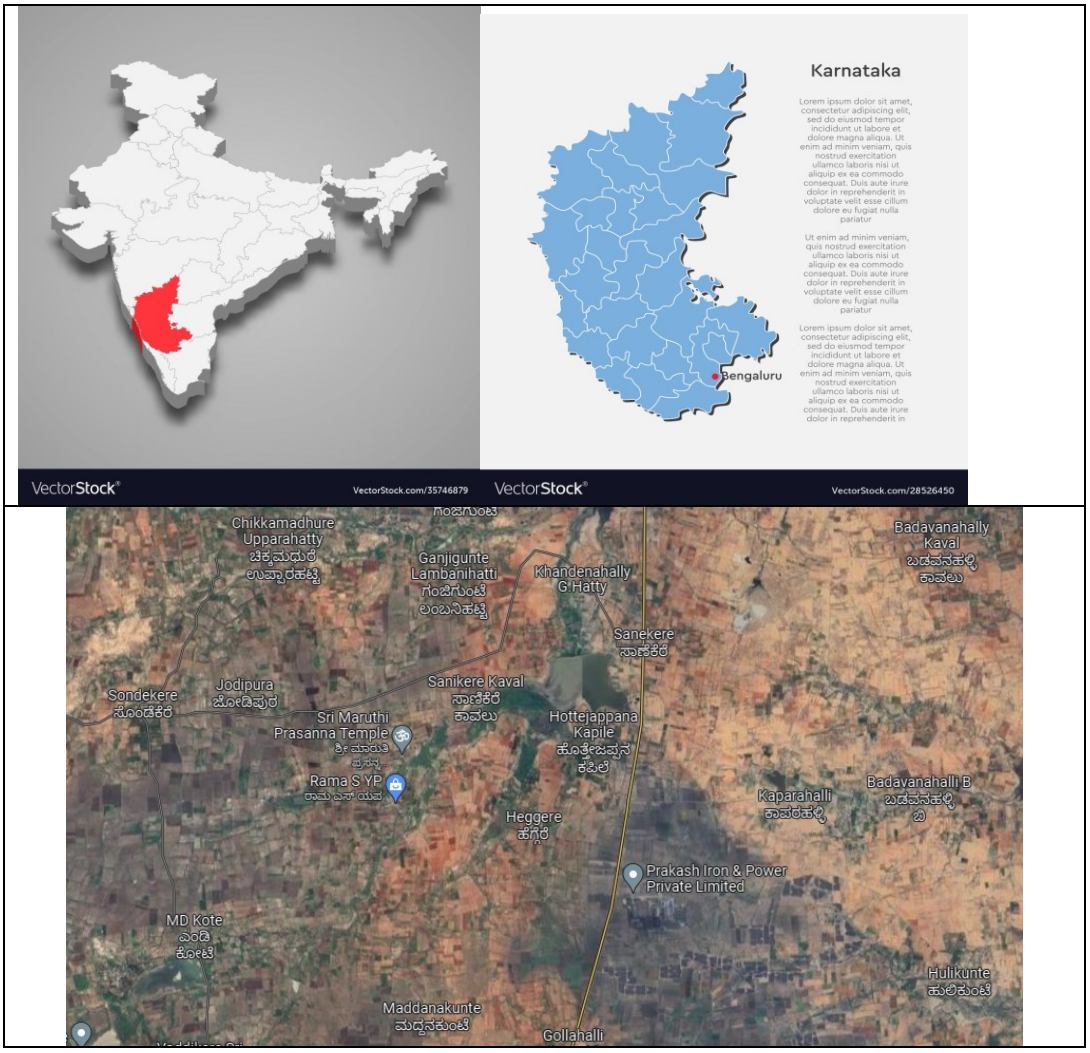
A.3. Location of project activity >>

Country: India
District: Chitradurga
Village: Heggere
State: Karnataka
Code: 577522

The project is located at Heggere village and is located in Chitradurga district of Karnataka state, India. The project location is well connected by road and rail. The nearest railway station is Challakere, the nearest airport is Bangalore International Airport and seaport is Mangalore.

The geographical coordinates of the project site are 76.66818°E and 14.15321°N that is 76°40’5.448” E and 14°09’11.556” N. The location of the site is shown in the following maps.

Physical location address of the project:
M/S Prakash Sponge Iron & Private Limited
Village: Heggere – 577522
District- Chitradurga, State – Karnataka, India.



A.4. Technologies/measures >>

PSIPL has installed three nos. each of 11.5 TPH WHRB to utilize sensible heat of flue gases emitting from Rotary Kiln along with one 7.1 MW turbo generator to fulfil the captive requirement of the plant.

The proposed 7.1MW Captive Power Plant (CPP) will be of 3 boilers – one steam turbine arrangement. The condenser shall be Air cooled condenser. Power generated from the generator at 11kV will be connected to the Iron & Steel plant, after drawl for the CPP's auxiliary power requirements.

The plant will have three numbers of 11.5TPH WHR boiler and one 7.1MW turbo generator. Besides the above, the plant will have Air cooled condenser, Ash handling system, auxiliary Cooling tower, Pumps, Water treatment plant, Fire protection system, Air compressors, Air conditioning and Ventilation system, Electrical system. and instrumentation & controls.

Waste Heat Recovery Boiler
The Waste Heat Recovery (WHR) based Captive Power Plant is installed at PSIPL site to utilize the heat content of flue gases coming out of Rotary Kiln. There are three 11.5 TPH WHR Boiler for 7.1 MW power generation. Each boiler will be a vertical, 3 pass, natural circulation, fully drainable, gas tight membrane casing, water tube boiler for continuous operation and out-door installation.
The details of WHR boiler are:

Description	Technical Particulars
Fuel to be burned/utilised	Flue gas from Rotary Kiln

Steam pressure at super-heater outlet	67 kg/cm^2
Steam temperature at super-heater outlet	490^{o}C
Steaming capacity	11.5 TPH
Gas outlet temperature	169^{o}C

Steam Turbine

The proposed CPP will have one no. 7.1MW turbo generator. The turbine will be a bleed cum condensing type and running at high speed. The generator speed will be 1500 rpm. Hence, the turbine will be coupled with the generator through a reduction gear unit.

Steam is admitted into the turbine through an emergency stop valve actuated by hydraulic cylinders. The turbine speed is controlled by an electronic governing system. The bleed pressures are arrived at based on the regenerative feed water requirements. Accordingly, bleeds will be provided for Deaerator. All the bleeds will be uncontrolled. The turbine exhaust pressure will be 0.18 kg/cm^2 (a).

The turbine will be preferably single cylinder, single exhaust, single bleed, condensing type. All casing will be horizontally split and the design will be such as to permit examination of the blades without disturbing shaft alignment or causing damage to the blades. The design of the casing and the supports will be such as to permit free thermal expansion in all directions.

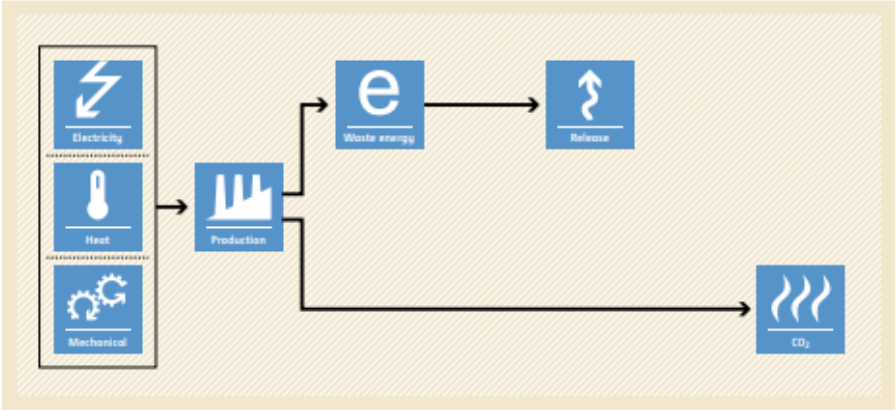
The glands will preferably be of labyrinth type and sealed with steam. A vacuum system required by the design will be provided. All piping and components of shaft seal and vacuum system will be sized for 300 percent of the calculated leakage. Steam leaving the glands will be condensed in gland steam condenser.

A.5. Parties and project participants >>

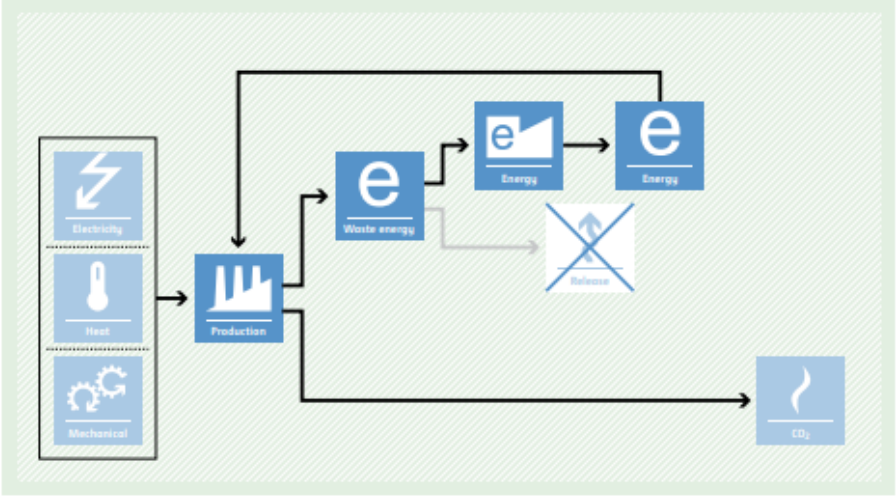
Party (Host)	Participants
India	M/S Prakash Sponge Iron & Private Ltd. Village Heggere – 577522 District Chitradurga State – Karnataka, India

A.6. Baseline Emissions>>

BASELINE SCENARIO
Carbon-intensive sources will continue to supply heat/ electricity/mechanical energy to the applications of the recipient facility and unrecovered energy from waste energy source will continue to be wasted.



PROJECT SCENARIO
Heat/electricity/mechanical energy are generated by recovery of energy from a waste energy source and are supplied to the grid and/or applications in the recipient facility.



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

Typical activities under ACM0012 are new plants, capacity expansions, energy efficiency improvements or fuel switch projects.

A.7. Debundling>>

This "7.1 MW Captive Power Plant At M/S Prakash Sponge Iron & Private Ltd.(PSIPL)." project is not a debundled component of a larger registered carbon offset project activity.

SECTION B. Application of methodologies and standardized baselines

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

SECTORAL SCOPE – 01, Energy industries (Renewable/Non-renewable sources)
04, Manufacturing Industries

TYPE I - Renewable Energy Projects (Small Scale)

CATEGORY- ACM0012: Waste Energy Recovery, version 6.0

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

The chosen methodology 'ACM0012, version 06' is applicable to project activities that utilize waste gas and/or waste heat as an energy source for:

- Generation of electricity;

- Cogeneration;
- Direct use as process heat source in as unit process/chemical reactor;
- Generation of heat in element process;
- Generation of mechanical energy; or
- Supply of heat of reaction with or without process heating.

The project activity under consideration will utilize the heat content of waste gases emitted from the Rotary kilns in WHRBs to produce steam which will be further used to generate electricity. Hence, the methodology is applicable to the project activity.

The methodology is applicable under the following conditions:

For project activities which recover waste pressure, the methodology is applicable where waste pressure is used to generate electricity only and the electricity generated from waste pressure is measurable. PSIPL uses waste heat from Rotary kilns to generate electricity. Hence, this methodology is applicable.
Regulations do not require the project facility to recover and/or utilize the waste energy prior to the implementation of the project activity; Prior to the implementation of the project activity PSIPL was not generating waste gas in their industrial facility as it's a new industry which is set-up. There are no such regulations which constrain the industrial facility to generate waste gas from using the fossil fuels.
The methodology is applicable to both Greenfield and existing waste energy generation facilities. If the production capacity of the project facility is expanded as a result of the project activity, the added production capacity must be treated as a Greenfield facility; The project activity a Green-Field power generation facility.
Waste energy that is released under abnormal operation (for example, emergencies, shut down) of the project facility shall not be included in the emission reduction calculations. The waste gas that will be released under abnormal operation of the plant (emergencies) will not be accounted as emission.
If multiple waste gas streams are available in the project facility and can be used interchangeably for various applications as part of the energy sources in the facility, the recovery of any waste gas stream, which would be totally or partially recovered in the absence of the project activity, shall not be reduced due to the implementation of CDM project activity. For such situations, the guidance provided in Annex 3 shall be followed. The project activity will utilise the sensible heat content of the waste gas to generate electricity.
The methodology is not applicable to the cases where a WECM stream is partially recovered in the absence of the CDM project activity to supply the heat of reaction, and the recovery of this WECM stream is increased under the project activity to replace fossil fuels used for the purpose of supplying heat of reaction. The project activity a Green-Field power generation facility.
This methodology is also not applicable to project activities where the waste gas/heat recovery project is implemented in a single-cycle power plant (e.g. gas turbine or diesel generator) to generate power. However, the projects recovering waste energy from single cycle and/or combined cycle power plants for the purpose of generation of heat only can apply this methodology. The project activity utilises waste heat for generation of electricity.

Hence, it is concluded that the project activity satisfies all the above-mentioned conditions of the selected Approved Consolidated Methodology ACM0012 / Version 06 under Sectoral scope: 01 & 04.

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

The waste heat recovery boiler and turbine are within the project boundary i.e., PSIPL plant. The waste heat recovery-based boiler and turbine have unique serial numbers which are visible on the units. The generated electricity is measured using energy meters who also has unique serial numbers. The Monitoring Report will have the details of the same and will be provided to the UCR verifier during the verification process.

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

According to the baseline methodology ACM0012, Version 06, the geographical extent of the project boundary shall comprise of

- The industrial facility where waste gas/ heat/ pressure is generated (generator of waste energy),
- The facility where process heat in element process/steam/electricity are generated (generator of process heat/steam/electricity).
- The facility/s where the process heat in element process/steam/electricity is used (the recipient plant(s)) and/or grid where electricity is exported, if applicable.

As per the methodology, the project boundary encompasses Rotart Kiln, where the waste gas is generated, waste heat recovery boiler and other related accessories, captive power generating equipment such as turbine, generator etc, auxiliary equipment, power synchronizing system, steam flow piping, flue gas ducts, etc and the unit where generated electricity will be consumed.

Following table illustrates gases and emissions sources which will be included in the project boundary:

	Source	Gas	Included?	Justification/Explanation
Baseline	Electricity generation, grid or captive source	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification. This is conservative
		N_2O	Excluded	Excluded for simplification. This is conservative
	Fossil fuel consumption in element process for thermalenergy	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification. This is conservative
		N_2O	Excluded	Excluded for simplification. This is conservative
	Fossil fuel consumption in cogeneration plant	CO_2	Included	Main emission source.
		CH_4	Excluded	Excluded for simplification. This is conservative
		N_2O	Excluded	Excluded for simplification. This is conservative
	Generation of steam	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification. This is conservative

	used in theflaring process, if any	N_2O	Excluded	Excluded for simplification. This is conservative
	Fossil fuel consumption for supply of process heat and/orreaction heat	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification. This is conservative
		N_2O	Excluded	Excluded for simplification. This is conservative

	Source	Gas	Included?	Justification/Explanation
Project Activity	Supplemental fossil fuel consumption at the project plant	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification
		N_2O	Excluded	Excluded for simplification
	Supplemental electricity consumption	CO_2	Included	Main emission source
		CH_4	Excluded	Excluded for simplification
		N_2O	Excluded	Excluded for simplification
	Electricity imports to replace captive electricity, which was generated using waste energy in absence of project activity[4]	CO_2	Included	Only if captive electricity in the baseline is replaced by import electricity
		CH_4	Excluded	Excluded for simplification
		N_2O	Excluded	Excluded for simplification
	Energy consumption for gascleaning	CO_2	Included	Only if waste gas cleaning is required and leads to emissions related to the energy requirement of the cleaning
		CH_4	Excluded	Excluded for simplification
		N_2O	Excluded	Excluded for simplification

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

As per applied approved methodology, the baseline scenario is identified as the most plausible scenario among all realistic and credible alternative(s) and shall be identified for, both, the fate of the waste energy at the WEG facility and the generation of energy consumed by the recipient facility(ies) in the absence of the project activity.

The baseline scenario for the project activity is identified through the following steps as described in the methodology ACM0012 (version 06.0, EB 87):

The methodology requires the realistic and credible baseline scenarios to be determined for:

- Waste energy use in the absence of the project activity at WEG facility;
- Power generation in the absence of the project activity for each recipient facility if the project activity involves electricity generation for that recipient facility;

- Heat generation (process heat and/or heat of reaction) in the absence of the project activity, for each recipient facility if the project activity involves generation of useful heat for that recipient facility; and
- Mechanical energy generation in the absence of the project activity, for each recipient facility if the project activity involves generation of useful mechanical energy for that recipient facility.

The generation and recipient facility are same in this case, also neither heat generation nor mechanical energy generation is involved in the project activity, so in this section, realistic and credible alternatives will only be determined for:
Waste energy use in the absence of the project activity; and
Power generation in the absence of the project activity for each recipient facility if the project activity involves electricity generation for that recipient facility;

The baseline identification in these cases should cover both, the type of fuel(s) used and the associated energy generation technologies;
In cases where the project activity chooses to supply excess electricity and/or mechanical energy beyond the maximum capacity of the pre-project equipment of existing recipient facilities, the baseline scenario of electricity and/or mechanical energy could be a combination of the "P" and/or "M" scenarios.

The project activity is electricity generation using waste heat recovery from boilers. Hence, the methodology ACM0012(version 06.0, EB87) is applicable. Following reasons are considered for calculation of baseline emission:

1. Baseline scenario is identified with reference to Table No. 3, pg.no. 18 of EB87. According to this table
    - W1: WECM is directly vented to atmosphere without incineration

    The WECM carrying from clinker production line, in absence of proposed project activity would have been vented to atmosphere without incineration or utilization, as there is no regulation/ mandate to recover and use this waste heat in Host country, however it passed through cooling tower and ESP before venting to atmosphere to reduce the temperature of waste gas.

    Hence, W1 is found to be realistic and credible alternative.

    - P1: Proposed project activity not undertaken as a CDM project activity

    This is a plausible baseline scenario. However, this is not an economically attractive option compared

    with other alternatives (fossil fuel-based power generation).

    Hence, P1 is found to be realistic and credible baseline alternative.

    - P10: Sourced from Grid-connected power plants

    The project activity is currently meeting its power demand from grid, however in longer term the grid electricity is not a viable option given significant power requirement by cement plant, which cannot be met if anyinterruption in grid supply.

    Hence, P10 considered as plausible baseline scenario.

1. With reference to Table No.4 pg.no.21 of EB87, this project activity comes under 5.4.1.1.1.1 (Electricity) Case 1b(i) which mentions that "Recipient facility *j* is a new standalone captive power plant to supply the entire electricity received from the project activity". Hence. Equation 5 mentioned on pg.no.25 of EB87 is applicable.

Case 1b(i): Where in the baseline scenario the recipient facility *j* is a new standalone captive power plant to supply the entire electricity received by the recipient facility *j* from the project activity:

$$BE_{EL,j,y} = EG_{i,j,y} \times EF_{NEW,EL,j} \quad \text{Equation (5)}$$

Where:

$EG_{i,j,y}$ = The power supplied by the project activity to recipient facility *j* during the year *y* (MWh)

$EF_{NEW,EL,j}$ = The CO_2 emission factor for the new standalone power plant that would have been built in the baseline scenario by the recipient facility *j* (t CO_2/MWh)

$EF_{NEW,EL,j}$ is the emission factor which is determined with reference to section 5.4.1.1.1.2 on pg.no.29 of EB87.

Determination of $EF_{NEW,EL,j,y}$

1. $EF_{NEW,EL,j,y}$ is the emission factor of source *i* of electricity for case 1b(i) where the applicable baseline scenario is a new standalone power plant that substitutes the existing pre-project equipment up to its maximum capacity and the incremental capacity beyond the existing maximum pre-project capacity.
2. $EF_{NEW,EL,j,y}$ should be calculated based on the design data or manufacturer's information of reference energy generation facility that would have been implemented in absence of the project activity.
3. The emission factor for the baseline energy source shall be determined as follows:

$$EF_{NEW,EL,j} = \frac{EF_{CO2,New,j}}{\eta_{Plant,New,j}} \times 3.6 \times 10^{-3} \quad \text{Equation (11)}$$

Where:

$EF_{CO2,NEW,j}$ = The CO_2 emission factor per unit of energy of the fossil fuel(s) used in the new reference baseline generation source (t CO_2/TJ), obtained from reliable local or national data if available, otherwise, taken from the country specific IPCC default emission factors

$\eta_{Plant,NEW,j}$ = The overall efficiency of the new captive power plant that would be used by j^{th} recipient in the absence of the project activity

In the determination of efficiency $\eta_{Plant,New,j}$ refer to the definition of "reference energy generation facility" for the identification of the reference captive power plant. The efficiency of the reference power plant $(\eta_{plant,New,j})$ shall be determined as:

a) Highest of the efficiency values provided by two or more manufacturers for the technology of the reference power plant; or

b) Assume a captive power generation efficiency of 60 per cent based on the net calorific values as a conservative approach.

In this project activity, the emission factor is considered as 0.9096 which is the grid emission factor. The entire project activity is for captive use. In the absence of this project activity PSIPL was dependent on state electricity grid for the need of power. As the project does not sell any electricity generated, the emission factor is considered in line with the state electricity grid.

The combined margin (EFCO2, y) is the result of a weighted average of two emission factor pertaining to the electricity system: the operating margin (OM) (having weightage 75%) and build margin (BM) (having weightage 25%). Calculations for this combined margin must be based on data from an official source of CEA database (where available) and made publicly available.

The combined margin of the Indian National Grid used for the project activity is as follows:

Parameter	**Value**	**Nomenclature**	**Source**
EFgrid,CM,y	0.9310tCO2/MWh	Combined margin CO2 emission factor for the project electricity system in year y	Calculated as the weighted average of the operating margin (0.75) & build margin (0.25) values, sourced from Baseline CO2 Emission Database, Version 18.0 December - 2022 published by Central Electricity Authority (CEA), Government of India

EFgrid,OM,y	0.9518tCO2/MWh	Operating margin CO2 emission factor for the project electricity system in year y	Calculated as the last 3-year (2019-20, 2020-21, 2021-22) generation-weighted average, sourced from Baseline CO2 Emission Database, Version 18.0 December - 2022 published by Central Electricity Authority
EFgrid,BM,y	0.8687tCO2/MWh	Build margin CO2 emission factor for the project electricity system in year y	Baseline CO2 Emission Database, Version 18.0 December - 2022 published by Central Electricity Authority (CEA), Government of India

Project emissions:
According to ACM0012, Project Emissions include emissions due to (1) combustion of auxiliary fuelto supplement waste gas/heat and (2) electricity emissions due to consumption of electricity for cleaning of gas before being used for generation of energy or other supplementary electricity consumption.

Since no auxiliary fuels will be fired in the proposed project activity, project activity emissions are notapplicable. Also, there is no additional cleaning of gas for the project activity.

Further, the electricity consumption of the project activity will be accounted for in EGj and hence no separate calculation of project emissions due to electricity consumption is required.

Leakage:
No leakage is applicable under this methodology.

Emission Reductions:

The emission reduction ER_y by the project activity during a given year y is the difference between the baseline emissions through substitution of electricity generation by captive coal based thermal

powerplant (BE_y) and project emissions (PE_y), as follows:

$ER_y = BE_y – PE_y$

Where:

ER_y = emission reductions of the project activity during the year y in tonnes of CO_2

BE_y = baseline emissions due to the displacement of electricity during the year y in tonnesof CO_2

PE_y = project emissions during the year y in tonnes of CO_2

Since the project emissions are non-existent in the project activity so the emission reductions (ER_y)is equal to the baseline emissions due to the displacement of electricity (BE_y)

$ER_y = BE_y$

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 calculation has been submitted:

Estimated annual baseline emission reductions (BE_y) = 47,304 MWh/year *0.9096 tCO2/MWh = 43,029 tCO2e/year (i.e. 43,029 CoUs /year)

B.6. Prior History>>

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

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

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

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

There are no permanent changes from registered PCN monitoring plan and applied methodology.

B.9. Monitoring period number and duration>>

First Issuance Period: 25 years, 00 months – 01/12/2021 to 30/11/2046

B.8. Monitoring plan>>

All data collected as part of monitoring plan should be archived electronically and be kept at least for 2 years after the end of the last crediting period. 100% of the data should be monitored if not indicated otherwise in the comments in the tables below. The following main data shall be monitored.

Project emissions:

- Quantity of fossil fuels used as supplementary fuel;
- Net calorific value of fossil fuel;
- CO2 emission factor of the fossil fuel;
- Quantity of electricity consumed by the project operations;
- CO2 emissions factor of electricity consumed by the project operations.
- Abnormal operation of the plant.

While the quantities of fossil fuels fired are measured using calibrated flow meters, other data items are only factors obtained from reliable local or national data. If local data is not available, the project participant may use default factors published by IPCC.

Baseline emissions:
Depending on the baseline scenario, the following data items need monitoring:
The heat/power/mechanical energy supplied by the project facility to recipient facility(ies) by recovering waste energy from WECM stream(s);

- Energy generation using WECM, in absence of project activity;
- Quantity and energy content of WECM;
- CO2 emission factor of electricity or heat that would have been consumed by the recipient facility(ies) in the absence of the project activity;
- Properties of heat (e.g., pressure and temperature of the inlet and outlet of the streams, concentrations of the reactant/product mix etc.) supplied to the recipient facility(s);
- Properties of heat return to the element process (e.g., pressure and temperature of the condensate return) supplied by the recipient facility(s) to the project facility;
- Efficiencies of element process, power plant, cogeneration plant or mechanical conversion equipment that would have been used in the absence of the project activity.

In addition, the relevant variables of applicable tools shall be included in the monitoring plan by the project participants.

Data and parameters monitored

Data / Parameter:	$EG_{i,,j,y}$
Data unit:	MWh
Description:	Quantity of electricity supplied to the recipient *j* by the generator, which in the absence of the project activity would have sourced from i^{th} source (*i* can be eithergrid or identified source) during the year *y* in MWh
Source of data:	Recipient facility(ies) and generation plant measurement records
Measurement procedures (if any):	
Monitoring frequency:	Monthly
QA/QC procedures:	**The energy meters will undergo maintenance/calibration to the industry standards. Sales records and purchase receipts are used to ensure the consistency**
Any comment:	**Data shall be measured at the recipient facility(ies) and at the project facility for cross check. Sales receipts shall be used for verification. DOEs shall verify thattotal energy supplied by the generator is equal to total electricity received by recipient facility(ies)**

United Nations Sustainable Development Goals:

The project activity generates electrical power from Waste Heat Recovery Boiler, there by displacing non-

renewable fossil resources resulting to sustainable, economic and environmental development. In the absence of the project activity equivalent amount of power generation would have taken place through fossil fuel dominated power generating stations. Thus, the renewable energy generation from project activity will result in reduction of the greenhouse gas emissions.

Positive contribution of the project to the following Sustainable Development Goals

SDG13: Climate Action: The project would lead to reduction of approx. 43,029 tCO2 per annum due to implementation of project activity.

SDG 7: Affordable and Clean Energy: The project is generating approx. 47,304 MWh of clean energy per annum.

SDG 8: Decent Work and Economic Growth: The project is providing direct employment to around 05 persons. The project leads to Trainings & workshops which are conducted for the O&M staff of the PP.

Sustainable Development Goals (SDG) outcomes

Development Goals Targeted	**SDG Target**	**Indicator (SDG Indicator)**
SDG 7: Affordable and Clean Energy	7.2: By 2030, increase substantially the share of renewable energy in the global energy mix Target: 47,304 MWh per annum	7.2.1: Renewable energy share in the total final energy consumption
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: 1 no. annually Employment of 05 staff	8.5.1: Average hourly earnings of female and male employees, by occupation, age and persons with disabilities
SDG 13: Climate Action	13.2: Integrate climate change measures into national policies, strategies and planning Target: 43,029 tCO2 per annum	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)