MONITORING REPORT

CARBON OFFSET UNIT (CoU) PROJECT

Title: KIL Waste Heat to Power project, India

UCR PROJECT ID: 380

MR Version 1.0

MR Date: 11/12/2023

UCR Monitored Period: 01
UCR 1st CoU Issuance Period: 01/01//2018-31/12/2022 (05 years 00 months)
UCR 1st Monitoring Period: 01/01/2018-31/12/2022 (05 years 00 months))
UCR 1st Crediting Period: 01/01/2018-31/12/2022 (05 years 00 months))

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

BASIC INFORMATION

Title of the project activity	**KIL Waste Heat to Power project, India**
Scale of the project activity	Large Scale
UCR PROJECT ID	380
Completion date of the MR	11/12/2023
Project participants	**Project Proponent**: M/s Kamachi Industries Ltd (KIL) **UCR Aggregator**: M/s. Global Green Energy LLC
Host Party	India
Type	Type III (Energy Efficiency)
SDG Impacts:	SDG 7 Affordable and Clean energy SDG 8 Decent work and economic growth SDG 13 Climate Action
Applied methodologies and standardized baselines	**CLEAN DEVELOPMENT MECHANISM (CDM) UNFCCC Methodology** **ACM0012** *Waste energy recovery Version 6.0* **UCR CoU Standard for Baseline Grid Emission Factor**
Sectoral scopes	01 Energy industries (Renewable/NonRenewable Sources) 04. Manufacturing industries
Estimated total amount of average GHG emission reductions per year (Year: Quantity)	2018: 43592 tCO2 (39851 CoUs)
	2019: 42399 tCO2 (42399 CoUs)
	2020: 43129 tCO2 (43129 CoUs)
	2021: 43172 tCO2 (43172 CoUs)
	2022: 42338 tCO2 (42338 CoUs)
Estimated total amount of average GHG emission reductions for the entire monitoring period (2018-2022)	214630 tCO_2 (214630 CoUs)

SECTION A. Description of project activity

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

The project activity titled, **KIL Waste Heat to Power project, India** is located Plot No- 86, 116-119 & 123-125, in Village: Pappankuppam, Taluk: Gummudipundi, District: Tiruvallur, State: Tamil Nadu, Country: India.

Purpose of the project activity:

The project activity entails utilisation of waste heat of flue gases generated in DRI kilns of sponge iron plant of Kamachi Industries Ltd (KIL, formerly Kamachi Sponge & Power Corporation Limited, Project Proponent or PP hereafter) in power generation. The power produced is used actively at the sponge iron plant of KIL. 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 KIL which is within the same premises as the WHRB plant. The project activity started commercial production from **29/12/2007 (**contract date with AREVA, the technology supplier in the project activity.).

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 equivalent amount of power from the Tamil Nadu Electricity Board (TNEB) grid, which is part of Southern Region (SR) 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 SR grid is as the recommended UCR conservative estimate for the years 2018-2022.

KIL has set up 04 nos. DRI kilns of 100 TPD each at its sponge iron production unit. Annual sponge iron production is ~120000 TPA. Each of the kilns generates ~25000 Nm^3 /hr of high temperature flue gases. The temperature of flue gases from the kiln leaving After Burner Chamber (ABC) is at ~950-1000 ^{0}C. This waste heat of flue gases is utilised in the generation of steam in (WHRB), which is further expanded in a single bleed-condensing turbine of 10MW to generate power. Steam from 04 nos. WHRB is taken to the turbine through a common header.

In the absence of the project activity, KIL would draw power from TNEB grid, which in turn generates power from fossil fuel power plants. The project activity thus displaces equivalent amount of power generation in SR grid connected power stations. 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 registration of the proposed project activity as a UCR project would help in covering the risks involved with such projects. This will help in enhancing the viability of project which otherwise is affected by low PLF, unavailability of DRI gas due to shut-down or break-down and other factors. This will also encourage other sponge iron plants in Tamil Nadu and on national level to come up with similar power generation plants. The revenue from the sale of CoUs would provide the required impetus to technology providers to further their efforts towards better technology development for the use of DRI kiln gas energy in power generation.

The project activity is displacing an estimated total net electricity generation i.e., **238480 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 **214630 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.

UCR Monitoring Period Number	01
UCR Crediting Start Date for this Period	01/01/2018
UCR Crediting End Date for this Period	31/12/2022
Total Emission Reductions over the monitoring period	214630 **tCO_2**

Indian economy is highly dependent on "Coal" as fuel to generate energy and for production processes. The project activity is close to Singreni Colliery in Andhra Pradesh and coal can be easily imported as Chennai port is only 60 km from project boundary. Coal could also be procured for power generation. Char, a byproduct 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.

With regards to ESG credentials:

At present specific ESG credentials have not been evaluated, however, the project activity has implemented the Charter on Corporate Responsibility for Environment Protection (CREP) for the Steel Plants in India.

- The project activity helps reducing GHG emission in power generation in the grid, which is primarily fossil fuel based
- It helps in conservation of natural resources i.e. fossil fuels in power generation
- It generates employment for the operation & maintenance of the plant

- It provides the necessary impetus to other industries to come up with similar projects and become self-sustainable for their power needs
- With many projects 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.
- Reduced emissions of NOx and SOx in power generation.

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

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).

The existing project activity along with the facility was accorded environmental clearance vide file No. J11011/419/2008-IA-II (I) dated 19.10.2009. Consent to Operate was accorded by Tamil Nadu State pollution Control Board vide lr. No. TI/TNPCB/F.0040 TLR/RL/TLR/A/2017 & TI/TNPCB/F.0040 TLR/RL/TLR/W/2017 dated 30.08.2017. The total area of the facility is 35.82 hectares (88.5 Acres). The entire land area of 35.82 ha is owned by the PP. No forest land involved. Out of the total area 12.14 ha (33.89%) land is used for green belt development. The Pulicat Lake Bird Sanctuary is located at a distance of 10 KM from the project site. No national parks, biosphere reserve, tiger reserve, elephant reserve etc. are reported to be located in the core and buffer zone of the project activity (source).

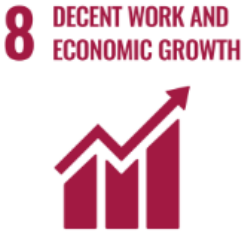
United Nations Sustainable Development Goals:

The project activity displaces Tamil Nadu Electricity Board (TNEB) power, part of SR 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: **<u>214630</u>** tCO_2 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: **<u>238480 MWh</u>** supplied per annum	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

A.2. Location of project activity >>

Plot No- 86, 116-119 & 123-125

Village: Pappankuppam

Taluk: Gummudipundi

District: Tiruvallur

State: Tamil Nadu,

Country: India

Longitude: 79.57 E

Latitude: 13.09 N.

A.3. Technologies/measures>>

The total installed capacity of the project activity is 10 MW and the auxiliary consumption as per the requirement of the auxiliary equipment at the WHRB plant is a maximum of 10% which is 1 MW. The balance of 7~8 MW of electricity generated by the WHRB plant is consumed by the adjoining steel plant owned by the PP which is within the same premises as the WHRB Plant.

KIL has installed 4X10 TPH Waste Heat Recovery Boilers (WHRBs) for utilising high temperature heat of flue gases from 4X100 TPD 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 in a reactor vessel, using reducing gases like hydrogen or carbon monoxide. The temperature of flue gases after 'After Burning Chamber' (ABC) is at 950-1000 ^{0}C.

Steam is generated at 67 kg/cm^2 and 485 ^{0}C and expanded in one single bleed-condensing turbine of 10MW to generate power. Each of the 04 kilns generates ~25000 Nm^3 /hr of high temperature flue gases. The temperature of flue gases from the kiln leaving After Burner Chamber (ABC) is at ~950-1000 ^{0}C.

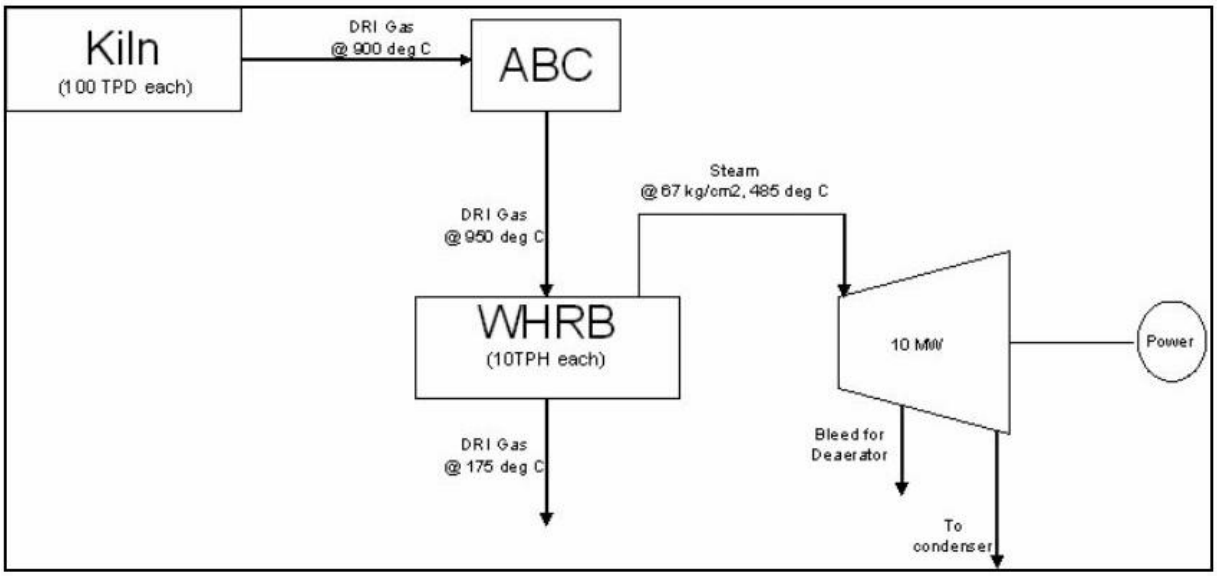
This waste heat of flue gases is utilised in generation of steam in (WHRB), which is further expanded in a single bleed-condensing turbine of 10MW to generate power. Steam from 04 nos. WHRB is taken to the turbine through a common header

Waste heat recovery boiler

Capacity	10 TPH
Steam Pressure	67 kg/cm^2
Steam Temperature	485 +- 5 deg C
Nos.	04 Nos.
Flue gas inlet temp.	950 deg C
Flue gas inlet to ESP	175 deg C

Turbine

Rated Capacity	10 MW
Steam Inlet Pressure	64 ata
Steam Inlet Temperature	480 deg C
Nos.	1 nos.
Bleed pressure for deaerator	4 ATA



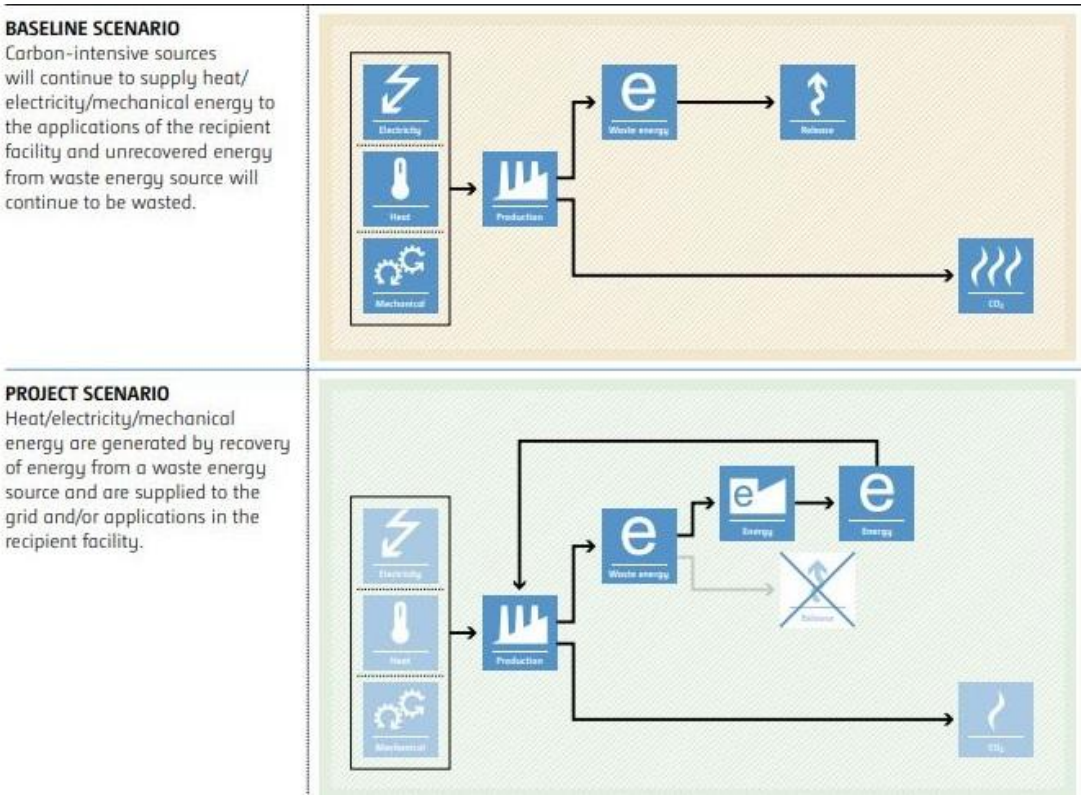
The plant is producing the electricity for captive use and would have purchased the same from the grid in absence of project activity.

A.4. Parties and project participants>>

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

Party (Host)	Participants
India	**Project Proponent**: M/ Kamachi Industries Ltd (KIL) **Aggregator**: M/s. Global Green Energy LLC

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 inhouse 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 (as per the UNFCCC Methodology)

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

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 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)

Emission coefficient of fuel used in the baseline scenario

The CO_2 emission factor for grid connected power generation in year y calculated using UCR Standard emission factor is 0.9 tCO2/MWh for the period 2018-2022.

There is no fossil fuel consumption for WHRB project to provide additional heat gain before entering the WHRB.

A.6. Debundling>>

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

SECTION B. Application of methodologies and standardized baselines

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

SECTORAL SCOPE - 01 Energy industries (Renewable/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 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 Tamil Nadu Electricity Board (TNEB) power, part of SR 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.

Use of electricity from the waste heat utilisation in the project activity displaces an equivalent amount of electricity that would have been generated (in the absence of the project activity), by grid connected fossil fuel fired power plants. The project activity therefore results in reductions of emissions that would have taken place in the baseline scenario, viz., non-utilisation of the waste heat of the flue gases from the DRI kilns.

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

The project activity has been registered as a CDM project activity (registration date of the project activity under CDM mechanism is 03/10/2007) in the past as follows:

<table>
<tr><td>UNFCCC CDM Title</td><td>KSPCL Waste Heat to Power project, India</td></tr>
<tr><td>CDM ID</td><td>1151</td></tr>
<tr><td>Host Parties</td><td>M/s Kamachi Sponge & Power Corporation Limited (KSPCL)</td></tr>
<tr><td>Sectoral Scopes</td><td>1 : Energy industries (renewable - / non-renewable sources)</td></tr>
<tr><td>Methodology</td><td>ACM0004 ver. 2- Consolidated methodology for waste gas and/or heat for power generation</td></tr>
<tr><td>Other Details</td><td><table><tr><td>CDM Registration Date</td><td>03/10/2007</td></tr><tr><td>Crediting Period</td><td>31/12/2007 – 30/12/2017 (Fixed)</td></tr></table></td></tr>
<tr><td rowspan="7">Prior Issuance of CDM credits</td><td>Monitoring Period: 31/12/2007-31/03/2008
CERs Issued: 3506</td></tr>
<tr><td>Monitoring Period: 01/04/2008-31/03/2009
CERs Issued: 16545</td></tr>
<tr><td>Monitoring Period: 01/04/2009-31/03/2010
CERs Issued: 22905</td></tr>
<tr><td>Monitoring Period: 01/04/2010-31/08/2011
CERs Issued: 31705</td></tr>
<tr><td>Monitoring Period: 01/09/2011-31/12/2012
Awaiting CERs Issuance</td></tr>
<tr><td>Monitoring Period: 01/01/2013-30/09/2016
CERs Issued: 153762</td></tr>
<tr><td>Last Known Issuance Status</td><td>Monitoring Period: 01/10/2016 to 30/12/2017
CERs Issued: 59193</td></tr>
</table>

The project activity was commissioned on 29/12/2007. It has undergone 05 CDM verifications for emission reductions achieved and has resulted in the issuance of CERs. The last CDM verification was for the seventh monitoring period 01/10/2016 to 30/12/2017 which is also the last in the CDM crediting period from 31/12/2007 to 30/12/2017, and has resulted in the issuance of CERs.

The project activity is seeking CoUs under the UCR CoU Standard/Program for the period **01/01/2018-31/12/2022** and hence there is no double counting issue of carbon credits for the said vintage period. Additionally, the same has been stated in the undertaking provided in the Double Counting Avoidance Assurance Document (DAA) by the PP.

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

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_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
		CH_4	Excluded	Excluded for simplification. This is conservative
		N_2O	Excluded	Excluded for simplification. This is conservative

Net GHG Emission Reductions and Removals

Thus, ERy = BEy – PEy – LEy

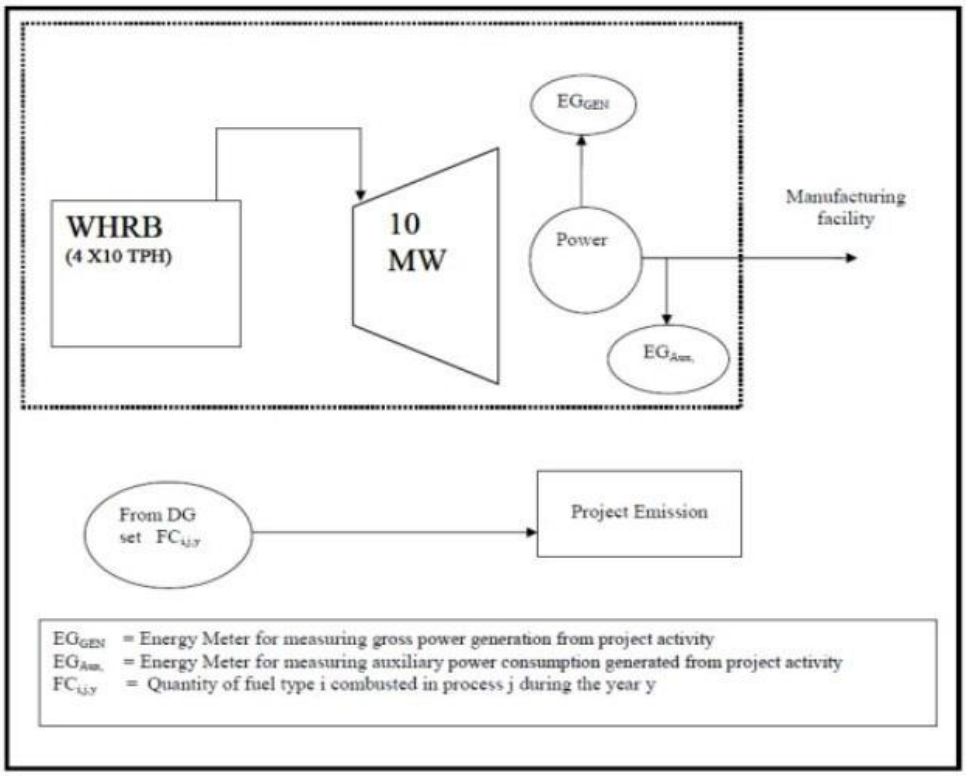
Where:

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

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

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

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



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

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 1~2 MW_h for its captive 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)*

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

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 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)

(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	10
Auxiliary Power Consumption	%	10%

Year	Total Generation (MWh) (EG_{gen})	Auxiliary Consumption (MWh) (EG_{aux})	Net Production (MWh) (EG_{BLY})
2018	54,192.62	(5,266.22)	48,436.57
2019	50,446.56	(4,829.78)	47,110.49
2020	28,171.78	(3,125.10)	47,921.32
2021	35,158.33	(3,349.77)	47,969.46
2022	35,416.36	(3,608.06)	47,042.55

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)

$EF_{Grid,CO2,y}$ = CO_2 emission factor of the grid in year y (t CO_2/MWh) as determined by the UCR Standard for the 2018-2022 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/MWh for the 2018-2020 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, LEy= 0

Year	Emission Reductions (tCO_2)
2018	43,592.00
2019	42,399.00
2020	43,129.00
2021	43,172.00
2022	42,338.00
Total	**2,14,630.00**

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:

B.6. PriorHistory>>

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

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

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

Not Applicable

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 a monitoring plan into the PCN.

B.9.Monitoring period number and duration>>

MR Version 1.0

The project was operational for entire monitoring period.

UCR Monitored Period: 01 (Monitored Period Duration: 05 Years, 00 Months
1st UCR Monitoring Period Dates: 01/01/2018 to 31/12/2022
1st UCR Crediting Period Vintages: 01/01/2018 to 31/12/2022

B.10.Monitoring plan>>

KIL procedure for monitoring and recording of data on operation & maintenance of the plant/ equipment's. The equipment's/ instruments used for the UCR project activity are also part of the procedures and records on maintenance and rectification done on all the equipment's are maintained. Various departments at KIL 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.

Director is responsible for the overall functioning of the sponge iron plant. KIL proposes adoption of following procedures to assure the completeness and correctness of the data needed to be monitored for the project activity.

A project team is constituted with participation from relevant sections. This team is responsible for data collection and archiving. This team periodically review the UCR project activity progress, checks data collected, emissions reduced etc.

On a monthly basis, the monitoring reports checked and discussed by the senior 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 then be forwarded to the management monthly basis.
• **Unit Head**: Overall responsibility of compliance with the 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 record is 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.

Frequency
The frequency for data monitoring is as per the monitoring details of PCN.

Archiving of data
Data is being kept for two years after the crediting period

Checking data for its correctness and completeness:
The data collected from daily logs is recorded after verification from respective departments.

Calibration of instruments:
KIL 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.

As per the Rule 4 of IER 1956 para 226 of the Madras Electricity Department Manual, the calibration frequency for the energy meters in Tamil Nadu State should be once a year. Hence, the Project Proponent has considered yearly.

Emergency preparedness

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

No.	Author	Title
1	KSPCL	Electricity generation & auxiliary consumption log book
2	State utility: Govt. of Tamil Nadu Government Electrical Standards Laboratory	Energy meter calibration report for main meter for gross generation (EG_{GEN})
3	Hi Tech Calibration Services	Energy meter calibration report for check meter for power plant auxiliary consumption (EG_{AUX})
4	KSPCL	10 MW power plant load list
5	Alfa Power Engineers Pvt. Ltd.	Electrical Schematic Diagram (HT & LT) for 1x10 MW WHRSG based captive power plant
6	KSPCL	Single Line Diagram illustrating power generation, auxiliary, export and location of energy meter
7	Chennai Engineering Services	Main electrical schematic diagram-2
8	KSPCL	Diesel consumption logbook
9	Excel Weighing & Gauging Services	Diesel flow meter calibration report
10	KSPCL	Calibration chart for diesel storage tank
11	Ekdant Enviro Services Pvt. Ltd.	Diesel N.C.V. (Net Calorific Value) reports

Documents Referenced and on File

Data/Parameter	EG_{GEN}
Data unit	MWh
Description	Gross power generation from project activity
Source of data Value(s) applied	Measured Plant operation data on power generation in project activity taken from energy meters installed at project site.

Measurement methods and procedures	Type of Meter: Energy Meter Accuracy Class: 0.2s Calibration Frequency: Yearly Meter serial no: 07022878 09142129 07022878
Monitoring frequency	Measuring frequency: Continuous Recording frequency: Hourly Continuous
Purpose of data	For baseline emission calculations
Quality control	Energy meter is calibrated as per schedule.

Data/Parameter	EG_{AUX}
Data unit	MWh
Description	Auxiliary power generation from project activity
Source of data Value(s) applied	Measured Plant operation data on power generation in project activity taken from energy meters installed at project site.
Measurement methods and procedures	Type of Meter: Energy Meter Accuracy Class: 0.2s Calibration Frequency: Yearly Meter serial no: 07022884 09141998
Monitoring frequency	Measuring frequency: Continuous Recording frequency: Monthly
Purpose of data	For baseline emission calculations
Quality control	Energy meter is calibrated as per schedule.

Data/Parameter	**$EF_{grid,y}$**
Data unit	Grid Emission Factor
Description	tCO_2/MW_h
Source of data Value(s) applied	UCR CoU Standard Default for Indian grid **0.9** tCO_2/MW_h for the period 2018-2022
Measurement methods and procedures	NA
Monitoring frequency	NA
QA/QC	The parameter is conservative.

Purpose of data	To estimate baseline emissions

Data/Parameter	FCi,j,y
Data unit	litre
Description	Quantity of diesel combusted in process j during the year y
Source of data	Onsite measurements
Measurement methods and procedures	The volume of auxiliary fuel type i consumed at plant site is measured via volumetric graduated container. The container used for storing the auxiliary fuel type i has volumetric graduations hence, the level difference before and after the usage provides quantity of fuel type i consumed in liters. The project proponent has also got flow meter installed at plant site in May 2010. Hence, from 1st June 2010 onwards the reading from the flow meter is utilized to measure the quantity of fuel type i consumed in the project activity.
Monitoring frequency	Frequency of monitoring: Continuously Frequency of recording: Daily
QA/QC procedures	The fuel type i consumption data can be cross checked with store slips provided against issuance of fuel type i. The volumetric container, used for storing the fuel type i, is a calibrated container and the flow meter would be calibrated annually
Purpose of data	For Project emission calculations, however, the emissions are negligible.
Additional comment	The data will be archived for crediting period + 2 years

Data/Parameter	NCVi,y
Data unit	TJ/ l
Description	Weighted average net calorific value of diesel in year y
Source of data	The value is measured as per the option (b) mentioned in the "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" version: 02, EB: 41 since, the values for NCV are not provided by the supplier in invoices as required by the preferred option (a) of the tool. The NCV of the diesel has been measured by Laboratory tests. The test reports of the same would be made available during the verification
Value(s) applied	0.000033813 TJ/ l (the weighted average NCV of the fuel type i i.e. diesel consumed during last verification)
Measurement methods and procedures	The measurement for Net Calorific Value of the auxiliary fuel type i would be in line with national or international fuel standard.
Monitoring frequency	Frequency of monitoring: The NCV would be obtained for each fuel delivery, from which weighted average annual values would be calculated.
QA/QC procedures	This parameter is measured via third party (Laboratory) tests and the test report for the same would be made available during the verification process.
Purpose of data	For Project emission calculations

Additional comment	The parameter would be monitored in the unit of kcal/l which would be converted to kJ/l by multiplying it with the conversion factor of calories to joule i.e. 4.1868

Data/Parameter	EFCO2,i,y
Data unit	tCO2/ TJ
Description	Weighted average CO2 emission factor of the diesel in year y.
Source of data	The option (d) of "Tool to calculate project or leakage CO2 emissions from fossil fuel combustion" version: 02, EB: 41 i.e IPCC default values at the upper limit of the uncertainty at a 95 % confidence interval as provided in table 1.4 of chapter 1 of Vol.2 (Energy) of the 2006 IPCC Guidelines on Nation GHG Inventories since, the fuel supplier does not provide the CO2 emission factor on the invoices as required by the preferred option (a) of the tool.
Value(s) applied	74.80
Measurement methods and procedures	Not Applicable since, the parameter is taken from IPCC default values as local data is not available
Monitoring frequency	Frequency of monitoring – Data would be reviewed annually and any future revision of the IPCC Guidelines would be taken into account
QA/QC procedures	IPCC default value
Purpose of data	For project emission calculations
Additional comment	PE is negligible as per prior historical CDM verifications conducted.-