Monitoring Report

CARBON OFFSET UNIT (CoU) PROJECT

Title: KCIL 4.2 MW Waste Heat to Power Project in Gujarat, India

Version 1.2

Date: 31/07/2025

First CoU Issuance Period: 10 years and 5 months

Monitoring Period: 01/01/2013 to 31/05/2023

© Universal CO2 Emission And Offset Registry Private Ltd

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

Monitoring Report	
Title of the project activity	KCIL 4.2 MW Waste Heat to Power Project in Gujarat, India
UCR Project Registration Number	454
Version	1.2
Completion date of the MR	31/07/2025
Monitoring period number and duration of this monitoring period	Monitoring Period Number: 01 Duration of this monitoring Period: 10 years and 5 months (first and last days included) (01/01/2013 to 31/05/2023)
Project participants	**Representator** Advait Greenergy Private Limited **Developer** M/s. Kutch Chemical Industries Ltd.
Host Party	India
Applied methodologies and standardized baselines	Applied Methodologies: UNFCCC Approved Small Scale Consolidated Methodology "AMS-III.Q., Waste Energy Recovery", Version – 6.1 Standardized Baselines: N/A
Sectoral scopes	04 Manufacturing Industries
Annual amount of GHG emission reductions for this monitoring period in the registered PCN	2013: 2268 CoUs (2268 tCO_{2eq})
	2014: 1,833 CoUs (1,833 tCO_{2eq})
	2015: 66 CoUs (66 tCO_{2eq})
	2016: 619 CoUs (619 tCO_{2eq})
	2017: 1,354 CoUs (1,354 tCO_{2eq})
	2018: 1,264 CoUs (1,264 tCO_{2eq})
	2019: 1,751 CoUs (1,751 tCO_{2eq})
	2020: 1,034 CoUs (1,034 tCO_{2eq})
	2021: 1,067 CoUs (1,067 tCO_{2eq})
	2022: 9,302 CoUs (9,302 tCO_{2eq})
	2023: 1,465 CoUs (1,465 tCO_{2eq})
Total:	**22,023 CoUs (22,023 tCO_{2eq})**

SECTION A. Description of project activity

A.1. Purpose and general description of project activity >>

a) Purpose of the project activity and the measures taken for GHG emission reductions >>

The project activity is developed by M/s. Kutch Chemical Industries Ltd., involves the recovery of waste heat from the sulphuric acid production process for electricity generation. This initiative displaces a portion of grid electricity, which is predominantly sourced from fossil fuel-based power plants.

A Heat Recovery System (HRS) has been installed to capture waste heat, which is utilized to generate steam. The steam is then supplied to a turbine for power generation. The system has a generation capacity of 4.2 MW, during the first Crediting or Monitoring Period, the actual total emission reductions achieved amount to 22,023 tCO_2e, with an average yearly reduction of 1,835 tCO_2e. The gross electricity generation during this period stands at 25,106.29 MWh.

The waste heat recovery process is a clean technology, as it does not involve fossil fuel combustion or direct GHG emissions. Since the project generates electricity from waste heat, it has no adverse environmental impact and contributes to climate change mitigation by reducing dependence on fossil fuel-based power generation.

b) Brief description of the installed technology and equipment>>

The Waste Heat Recovery (WHR) based Captive Power Plant at the Kutch Chemical Industries Ltd. site has a total power generation capacity of 4.2 MW. The system consists of a boiler, steam turbine, and generator, where waste heat from the sulphuric acid production process is recovered using a Heat Recovery System (HRS) to generate steam. This steam is utilized to drive a Siemens Turbine Unit, which efficiently converts thermal energy into mechanical energy, subsequently generating electricity through a generator. In the project activity, the waste heat from sulphuric acid production processes will be recovered by HRS to generate steam for turbine.

The Siemens Turbine Units operate with high efficiency, extracting significant power from the steam, resulting in 10–20% water (condensed steam) in the exhaust, depending on load conditions and exhaust pressure. This is a standard feature of high efficiency condensing turbines, where partial condensation occurs due to substantial energy extraction before reaching the condenser. The installed technology is proven, reliable, and equipped with HRS systems, auxiliary equipment, and advanced monitoring instrumentation to ensure optimal performance and emission reduction.

c) Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.)>>

The duration of the crediting period corresponding to the monitoring period covered in this monitoring report.

UCR Project ID or Date of Authorization	: 454
Start Date of Crediting Period	: 01/01/2013
Project Commissioned	: 30/12/2006

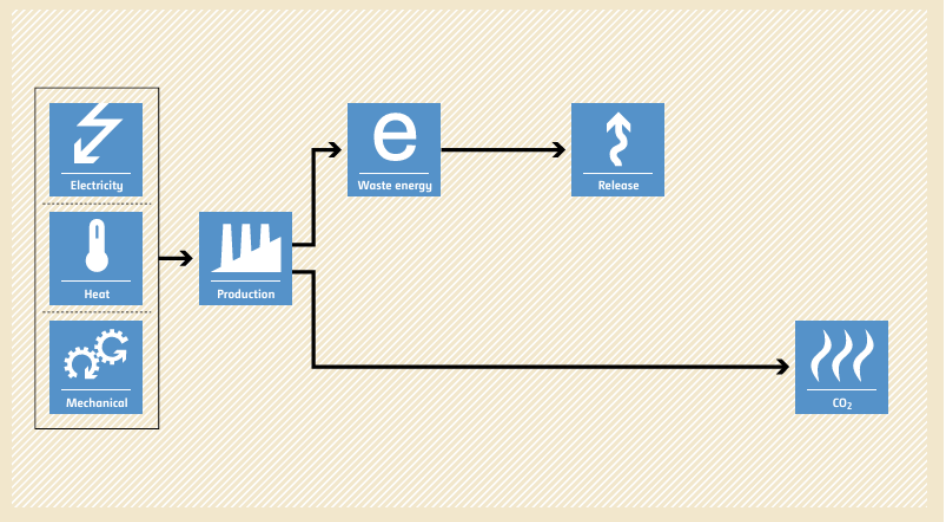
d) Total GHG emission reductions achieved or net anthropogenic GHG removals by sinks achieved in this monitoring period>>

The total GHG emission reductions achieved in this monitoring period is as follows:

ERs Generated for the Monitoring Period	
Start date of this Monitoring Period	01/01/2013
Carbon credits claimed up to	31/05/2023
Total ERs generated (tCO_{2eq})	22,023 tCO_{2eq}
Leakage	0 tCO_{2eq}

e) Baseline Scenario>>

In the absence of the project activity the equivalent amount of electricity would have been generated from the connected/ new power plants in the Indian grid, which are/ will be predominantly based on fossil fuels[1], hence baseline scenario of the project activity is the electricity obtained from the Indian grid. Since the project activity involves power generation from recovered waste heat, hence it does not emit any emissions in the atmosphere.



A.2. Location of project activity>>

Project Proponent	**M/s. Kutch Chemical Industries Limited**
Capacity	4.2 MW_{AC}
District	Kutch
Village	Padana
Taluka	Gandhidham
State	Gujarat
Country	India
Pin Code	370240
Latitude	22.333° N
Longitude	69.833° E

The representative location map is included below:

[1] http://www.cea.nic.in/installed_capacity.html

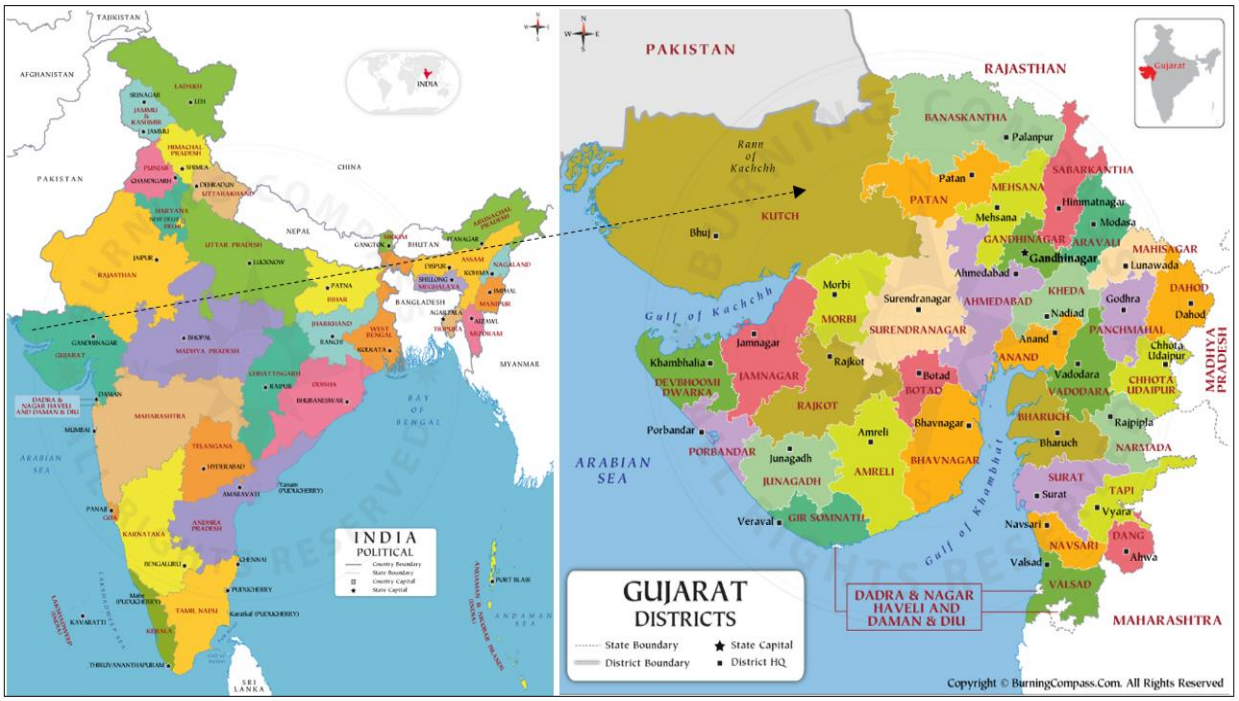


Figure 1: Project Location

(Courtesy: google images, www.burningcompass.com)

A.3. Parties and project participants >>

Party (Host)	Participants
Government of India	**Representor** Advait Greenergy Private Limited **Project Proponent (Developer)** M/s. Kutch Chemical Industries Ltd.

A.4. References to methodologies and standardized baselines >>

SECTORAL SCOPE: 04, Manufacturing Industries

TYPE: III – Energy Efficiency

CATEGORY: AMS-III.Q.: Waste energy recovery --- Version 6.1[2]

A.5. Crediting period of project activity >>

This monitoring report covers 1st monitoring period.

Length of the crediting period corresponding to this monitoring period: 10 years and 5 months 01/01/2013 to 31/05/2023

[2] AMS-III.Q.

A.6. Contact information of responsible persons/entities >>

Representator	
Name	Advait Greenergy Private Limited
Contact Person	Ms. Avantika Gupta
Mobile	+91 9079765066
E-mail	avantika.gupta@advaitgroup.co.in
Address	Advait Energy Transitions Limited, 1st Floor, KIFS Corporate House, Iskcon Ambli Road, Beside Hotel Planet Landmark, Near Ashok Vatika, Ambli, Ahmedabad – 380058
Project Proponent (Developer)	
Name	M/s. Kutch Chemical Industries Ltd.
Contact Person	Mr. Anupam Chaturvedi
Mobile	+91 9737586359
E-mail	anupam@kcil.co.in
Address	"Saraniwas" 20-21, Hari Nagar Co-Op - Society, Gotri Road, Vadodara - 390007, Gujarat, India.

SECTION B. Implementation of project activity

B.1. Description of implemented registered project activity >>

a) Provide information on the implementation status of the project activity during this monitoring period in accordance with UCR PCN>>

The project activity is of 4.2 MW of capacity and was installed & operated in Padana Village in Gandhidham Taluka of Kutch District in the Indian state of Gujarat. The details for the same are listed below:

Project Developer	Capacity (MW_{AC})	Commissioning Date	Location	Status
M/s. Kutch Chemical Industries Ltd.	4.2	30/12/2006	Village: Padana Taluka: Gandhidham District: Kutch State: Gujarat Country: India	Operational

The start date of the project activity is the commissioning date of WHRS, which is 30/12/2006. The power generated from the waste heat recovery system, displaces equivalent amount of power from the Indian grid. The project activity results in reduced carbon emissions by avoiding generation of this power in coal-based (fossil fuel based) grid connected power stations.

A repair was carried out in 2021 on the Superheater Assembly 4A of the Waste Heat Recovery boiler system. This maintenance activity was to ensure optimal thermal efficiency and the safe and reliable operation of the boiler.

Since the project activity generates electricity through waste heat recovery system, a clean renewable energy source it will not cause any negative impact on the environment and thereby contributes to climate change mitigation efforts.

b) For the description of the installed technology(ies), technical process and equipment, include diagrams, where appropriate>>

The Waste Heat Recovery (WHR) based Captive Power Plant is installed at KCIL site with a total capacity of 4.2 MW power generation. The process involved in the project activity includes a boiler and a turbine. The boiler generates steam at high pressure and high temperature. The steam turbine converts the heat energy of steam into mechanical energy. The generator then converts the mechanical energy into electric power.

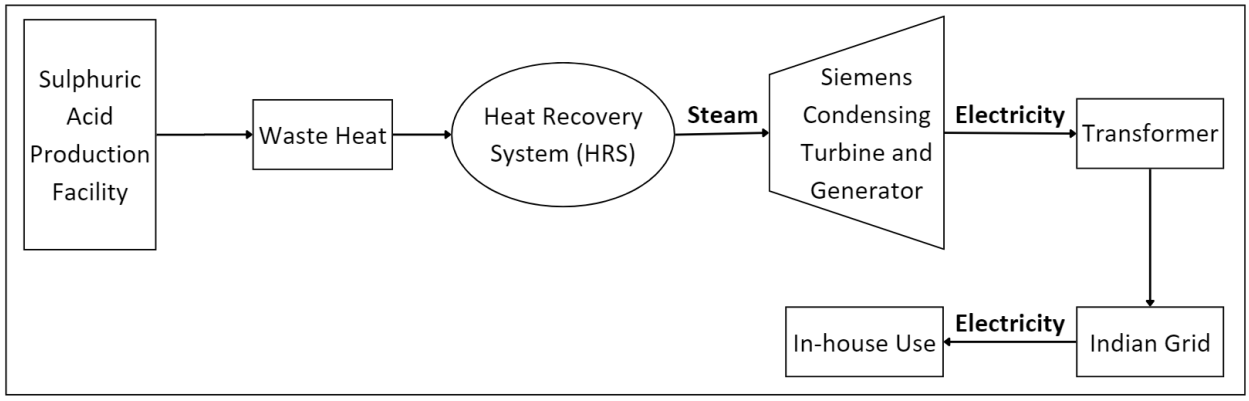


Figure 2: Technique Process

In the project activity, the waste heat from sulphuric acid production processes will be recovered by HRS to generate steam for turbine. The technology is proven to be reliable, which involved HRS systems and auxiliary equipment and the monitoring instrumentation.

Siemens Turbine Units can generate power with high efficiency. The turbine can turn steam's enthalpy to power so efficiently that the exhaust steam at the indicated exhaust pressures and temperatures may contain as much as 10-20% water (condensed steam) depending on partial or full load and exhaust pressure. For high efficiency condensing turbines like this kind, water content in the exhaust steam is typical. For a simple explanation, there is water entrained because the turbine has extracted enough power from the steam that some steam has condensed before being exhausted to the condenser.

In the project activity, monitoring equipment installed at the time of plant installation or plant commissioning.

A) Details of the installed 1×6200 KVA, 6.6KV CGP at 4.2 MW capacity plant are;

No.	Particular	Engine	Alternator
1	Make	KKK Germany	AVK DUTCHLAND GMBH & CO.
2	Sr. No.	4746142	8327450A101
3	Capacity	4392 KW	6200 KVA
4	RPM	1500	1500
5	Volts	-----	6600 V

B) Details of installed Energy Meter at 4.2 MW capacity plant are;

No.	Particular	Energy Meter
1	Make	AE
2	Sr. no.	01/06/1420337
3	Capacity (AMP)	3×600/5
4	Voltage	6.6KV/110V
5	CT Ratio	600/1
6	PT Ratio	6.6KV/110V
7	CTMF	1
	PTMF	1
8	Dial MF	100
9	Final MF	100
10	Reading	00182×MF

C) Details of the installed Transformer at 4.2 MW capacity plant are;

No.	Particular	Transformer
1	Make	Voltamp
2	Capacity	4500 KVA
3	Sr. No.	JN 8481
4	Volts in KV HV/LV	6.6/0.433 KVA
5	Ampere HV/LV	393.65/6000.18 A

D) Details of Installed Boiler are;

Boiler Specifications	4.2 MW CPP Boiler
Manufacturer	A.V.U. Engineers (P) Ltd., Hyderabad
Client	M/s. Kutch Chemical Industries Ltd
Maker's No.	21943
Year of Manufacture	2005
Type of Boiler	Waste Heat Recovery System (Water Tube Type)
Total Heating Surface	585 m^2
Maximum Working Pressure	48 kg/cm^2
Final Temperature of Steam	256 ℃
Maximum Continuous Rating of Boiler	19,700 kg/hr

E) Details of the installed HT Motor at 4.2 MW capacity plant are;

No.	Make	Capacity (KW)	Sr. No.	Voltage (KV)	Current (AMP)
1	CG	900	2054310101	6.6	90

B.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 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 PP will not import power from the grid.
- Reducing the difference between demand and supply of power locally.
- Sustainable –economic growth.

It has been envisaged that the project shall contribute to sustainable development using the following ways:

Social well-being:
There have been good employment opportunities created for the local workforce during the project construction phase. The project after implementation has also continued to provide employment opportunities for the local populace in a sustained manner and the same would be continued over the project lifetime. The employment opportunities created will contribute towards alleviation of poverty in the surrounding area throughout the lifetime of the project activity.

Economic well-being:
The project is a clean technology investment decided based on carbon revenue support, which signifies flows of clean energy investments into the host country. The project activity requires temporary and permanent, skilled and semi-skilled manpower at the project location; this will create additional employment opportunities in the region. In addition, success of these kind of project will provide new opportunities for industries and economic activities to be setup in the area. Apart from getting better employment opportunities, the local people will get better prices for their land, thereby resulting in overall economic development.

Technological well-being:
The successful operation of project activity would lead to promotion of waste heat recovery (WHR) based power generation and would encourage other entrepreneurs to participate in similar projects. Increased interest in WHR energy projects will further push R&D efforts by technology providers to develop more efficient and better machinery in future. The project activity leads to the promotion and demonstrates the success of WHR projects in the region which further motivate more investors to invest in these type of power projects. Hence, the project activity leads to technological well-being.

Environmental well-being:
The project activity will generate power using zero emissions WHR based power generation facility which helps to reduce GHG emissions and specific pollutants like SOx, NOx, and SPM associated with the conventional thermal power generation facilities. The project utilizes waste heat energy for generating electricity which is a clean source of energy. It reduces the dependence on fossil fuels and conserves natural resources which are on the verge of depletion. The impact on land, water, air and soil is negligible. Thus, the project causes no negative impact on the surrounding environment contributing to environmental well- being.

With regards to ESG credentials:
At present specific ESG credentials have not been evaluated, however, the project essentially contributes to various indicators which can be considered under ESG credentials. Some of the examples are as follows:

Under Environment:
Environmental criteria may include a company's energy use, waste, pollution, natural resource conservation, and treatment of waste & animals etc. For PP, energy use pattern is now based on clean energy due to the project and it also contributes to GHG emission reduction and conservation of depleting energy sources associated with the project baseline. Also, the criteria can be further evaluated based on any environmental risks which the company might face and how those risks are being managed by the company. Here, as the power generation will be based on waste heat recovery system, the risk of environmental concerns associated with non-renewable power generation and risk related to increasing cost of power etc. are now mitigated. Hence, project contributes to ESG credentials.

Under Social:
Social criteria reflect on the company's business relationships, qualitative employment, working conditions regarding its employees' health and safety, interests of other stakeholders' etc. With respect to this project, the PP has robust policies in place to ensure equitable employment, health & safety measures, local jobs creation etc. Also, the organizational CSR activities directly support local stakeholders to ensure social sustainability. Thus, the project contributes to ESG credentials.

Under Governance:
Governance criteria relate to overall operational practices and accounting procedure of the organization. With respect to this project, the Project Proponent practices a good governance practice with transparency, accountability and adherence to local and national rules & regulations etc. This can be further referred from the company's annual report. Also, the project activity is a waste heat recovery project owned and managed by the PP for which all required NOCs and approvals are received. The electricity generated from the project can be accurately monitored, recorded and further verified under the existing management practice of the company. Thus, the project and the proponent ensure good credentials under ESG.

It aligns with other contributions as:
- Reducing GHG emissions compared to a business-as-usual scenario;
- Reducing energy waste and facilitating the technology development of integrated resource utilization in sulfuric acid industry.
- Reducing the emission of other pollutants resulting from the power generation industry in India, compared to a business-as-usual scenario.

SDG	Relevant SDG Target	Project Contributions
SDG7: Affordable and Clean Energy 	Target 7.2: By 2030, increase substantially the share of renewable energy in the global energy mix.	The project supports Sustainable Development Goal 7 (Affordable and Clean Energy) by promoting clean energy generation through the conversion of industrial waste heat into electricity. The recovered energy is used to generate power with a capacity of 4.2 MW, which is

		supplied back to the manufacturing facility for captive consumption. This approach not only reduces dependence on fossil fuel-based grid electricity but also enhances overall energy efficiency by utilizing heat that would otherwise be wasted. During the monitoring period, the project generated 25,106.29 MWh of electricity, significantly contributing to sustainable and efficient energy use.
SDG13: Climate Action  	Target 13.2: Integrate climate change measures into national policies, strategies and planning.	By recovering and utilizing waste heat for power generation, the project significantly reduces greenhouse gas emissions that would otherwise result from conventional fossil-fuel-based electricity generation. Over the monitoring period, the project achieved a total GHG emission reduction of 22,023 tCO_2e. This directly supports Sustainable Development Goal 13 (Climate Action) by contributing to climate change mitigation and promoting the adoption of low-carbon industrial practices.

B.3. Baseline Emissions>>

The approved baseline methodology has been referred from the indicative simplified baseline and monitoring methodologies for selected small scale UNFCCC CDM project activities that involves utilization of waste energy for generation of electricity at the existing site.

Typical activities under AMS-III.Q. are utilization of waste energy at existing facilities which may be for cogeneration, generation of electricity, direct use as process heat, generation of heat in an element process or generation of mechanical energy

Project activity is the installation of waste heat recovery system for power generation of 4.2 MW capacity. Energy from waste heat 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 an existing equipment but with better efficiency of recovery.

Schematic diagram showing the baseline and project scenario:

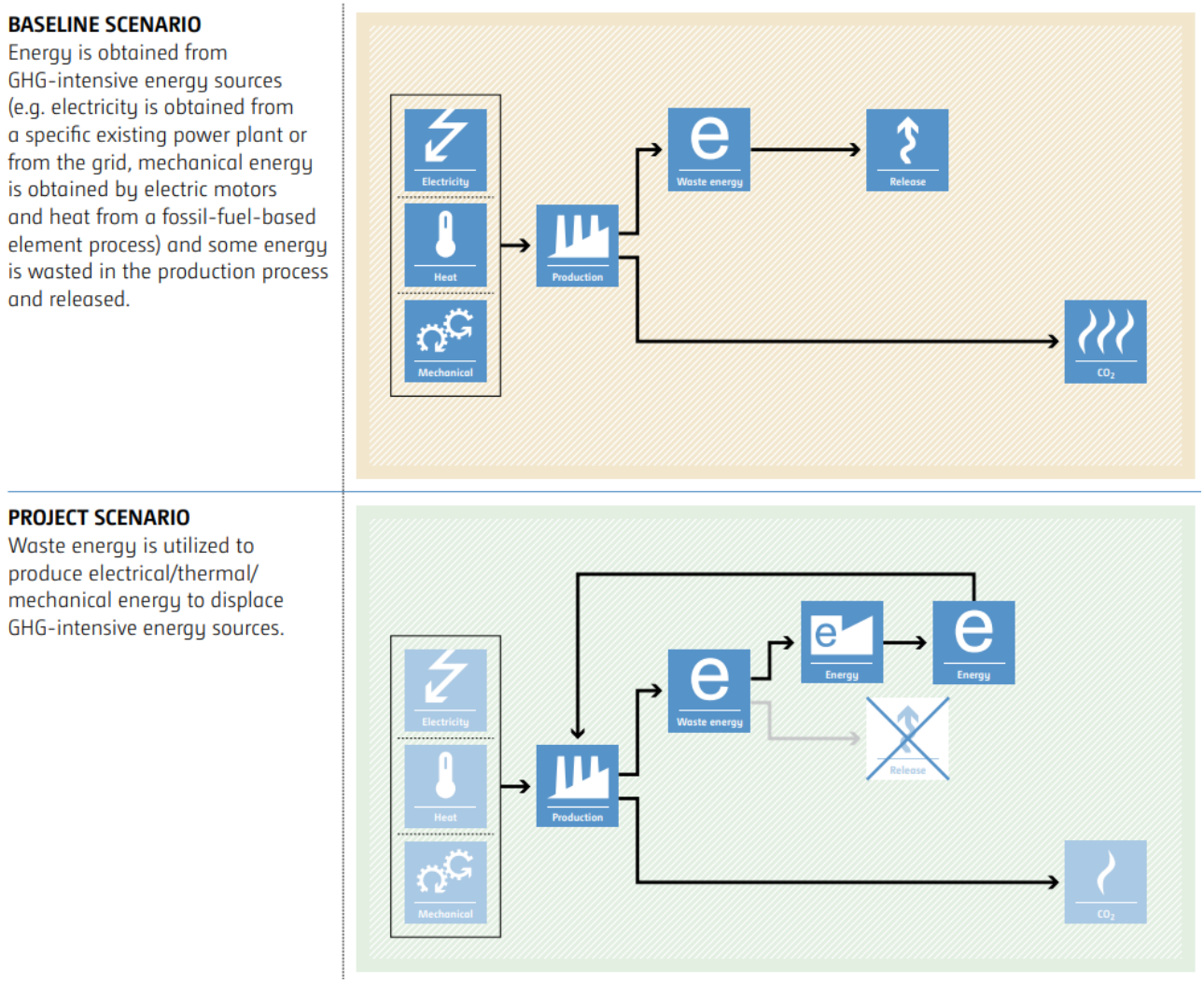


Figure 3: Baseline and Project Scenario

In the absence of the project activity the equivalent amount of electricity would have been generated from the connected/ new power plants in the Indian grid, which are/ will be predominantly based on fossil fuels[3], hence baseline scenario of the project activity is the electricity obtained from the Indian grid. Since the project activity involves power generation from recovered waste heat, hence it does not emit any emissions in the atmosphere.

This project activity was a voluntary investment which replaced equivalent amount of electricity from the Indian grid. The project proponent was not bound to incur this investment as it was not mandatory by national and sectoral policies. Thus, the continued operation of the project activity would continue to replace fossil fuel-based power plants and fight against the impacts of climate change. The Project Proponent hopes that carbon revenues from accumulated as a result of carbon credits generated will help repay the loans and help in the continued maintenance of this project activity.

B.4. Debundling>>

This project activity is not a debundled component of a larger project activity.

[3] http://www.cea.nic.in/installed_capacity.html

SECTION C. Application of methodologies and standardized baselines

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

SECTORAL SCOPE: 04, Manufacturing Industries

TYPE III: Energy Efficiency (Waste Energy Recovery)

CATEGORY: AMS-III.Q.: Waste energy recovery --- Version 6.1[4]

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

The chosen methodology 'AMS-III.Q., version 6.1' 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

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:

Applicability Condition	Justification
1. The methodology is applicable under the following conditions: (a) The recovery of waste energy shall be a new initiative (i.e. WECM was flared, vented or released into the atmosphere in the absence of the project activity). The DOEs during on-site visit as part of their validation activities shall confirm that no equipment for waste energy recovery and utilisation had been installed on the specific WECM stream(s) (that is recovered under the project activity) prior to the implementation of the project activity by using one of the following options: (i) By direct measurements of energy content and amount of the waste energy for at least three years prior to the start of the project activity; (ii) Energy balance of relevant sections of the plant to prove that the waste energy was not a source of energy before the implementation of the project activity. For the energy balance representative process parameters are required. The energy balance shall	(a) KCIL uses waste heat to generate electricity which is a new initiative. Prior to the installation of the project activity KCIL was not generating waste gas. Hence, this methodology is applicable. (b) Prior to the implementation of the project activity KCIL 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. (c) The waste gas that will be released under abnormal operation of the plant

[4] https://cdm.unfccc.int/UserManagement/FileStorage/M3V5CSLB06DTGUXIFH9Y82WRZEN4J7

demonstrate that the waste energy was not used and also provide conservative estimations of the energy content and amount of waste energy released; (iii) Energy bills (electricity, fossil fuel) to demonstrate that all the energy required for the process (e.g. based on specific energy consumption specified by the manufacturer) has been procured commercially. Project participants are required to demonstrate through the financial documents (e.g. balance sheets, profit and loss statement) that no energy was generated by waste energy and sold to other facilities and/or the grid. The bills and financial statements should be audited by competent authorities; (iv) Process plant manufacturer's original specification/information, schemes and diagrams from the construction of the facility could be used as an estimate of quantity and energy content of waste energy produced for rated plant capacity per unit of product produced; (b) Regulations do not require the WEG facility to recover and/or utilize the waste energy prior to the implementation of the project activity; (c) A WECM stream that is released under abnormal operations (for example: emergencies, shutdown etc.) of the WEG facility shall not be included in the emission reduction calculations; (d) Energy (i.e. electricity or thermal heat) produced in the project activity may be exported to a grid or other industrial facilities (included in the project boundary), a contractual agreement exists between the owners of the WEG facility and the recipient facility(ies) to avoid the potential double counting of emission reductions. These procedures shall be described in the CDM Project Design Document; (e) For project activities that use waste pressure to generate electricity the electricity generated from waste pressure shall be measurable.	(emergencies) will not be accounted as emission. (d) The project activity is a captive power plant. Hence, no electricity is exported. (e) The project activity will utilise the sensible heat content of the waste gas to generate electricity.
2. The methodology is not applicable to project activities implemented in a single-cycle power plant (e.g. gas turbine or diesel generator) where waste energy generated on-site is not utilizable for any other purposes on-site except to generate electricity. Such project activities shall consider "AMS-III.AL.: Conversion from single cycle to combined cycle power generation". However, project activities recovering waste energy from such power plants for the purpose of generation of heat can apply this	The project activity uses waste gas and produces more heat and utilises waste heat for generation of electricity.

methodology.	
3. For a project activity that recovers waste energy for power generation from multiple sources (e.g. a kiln and a single-cycle power plant), this methodology should be used in combination with AMS-III.AL. provided that: (a) It is possible to distinguish two distinct waste energy sources within the project activity such that: (i) Waste energy source-I (e.g. the kiln) belongs to waste heat sources which are eligible under AMS-III.Q.; (ii) Waste energy source-II (e.g. the single-cycle power unit) belongs to waste heat sources which are eligible under AMS-III.AL.; (b) For waste energy source-II eligible under AMS-III.AL., all requirements under "AMS-III.AL.: Conversion from single cycle to combined cycle power generation" that relate to baseline, project emissions and monitoring shall apply; (c) It is possible to determine the baseline for each waste energy source, according to the specific methodology being used; (d) It is possible to objectively allocate the electricity produced in the project activity to each waste energy source, by means of one of the following methods: (i) Through separate measurements of the electricity produced by utilizing waste energy from each waste energy source; or (ii) Through separate measurements of the energy content of the WECM streams used for electricity production; or (iii) Through separate measurements of the energy content of the WECM streams that are associated with each waste energy source and used for electricity production or for the WECM generation in a common waste heat recovery system (e.g. if steam is generated by waste heat from a kiln and waste heat from an internal combustion engine in a common waste heat recovery boiler).	The project activity is not recovering waste energy for power generation from multiple sources. The entire waste gas would be used for power generation and it does not have any other source.
4. Emission reductions cannot be claimed at and beyond the end of the lifetime of the waste energy generation equipment at the WEG facility or on-site captive unit at the recipient facility. The end of the lifetime of the equipment shall be determined as per the requirements mentioned in "Tool to determine remaining lifetime of equipment".	As per guidelines of the UCR emission reductions are calculated till end of the equipment lifetime.
5. The project activity shall result in emission reductions less than or equal to 60 kt CO_2 equivalent annually.	The project activity's emission reduction is less than 60 ktCO_2 equivalent annually.

Hence, it is concluded that the project activity satisfies all the above-mentioned conditions of the

selected Approved Consolidated Methodology AMS-III.Q., Version 6.1 under Sectoral scope: 04.

C.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.

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

According to the baseline methodology AMS-III.Q., Version 6.1, 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, in the project activity 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, etc. and the unit where generated electricity will be consumed.

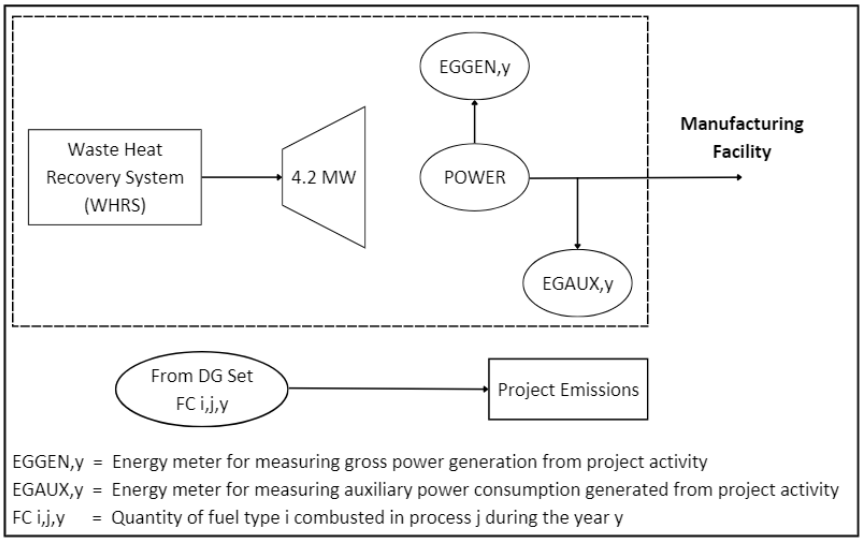


Figure 4: Project Boundary

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 thermal energy	CO_2	Excluded	Project activity does not involve production of thermal energy
		CH_4	Excluded	
		N_2O	Excluded	
	Fossil fuel consumption in cogeneration plant	CO_2	Excluded	Project activity does not involve cogeneration
		CH_4	Excluded	
		N_2O	Excluded	
	Fossil fuel consumption for generation of steam used in the flaring process, if any	CO_2	Excluded	Flaring is not being done in the baseline
		CH_4	Excluded	
		N_2O	Excluded	
Project activity	Fossil fuel consumption for supply of process heat and/or reaction heat	CO_2	Excluded	Project activity does not involve production of process heat
		CH_4	Excluded	
		N_2O	Excluded	
	Supplemental fossil fuel consumption at the project plant	CO_2	Excluded	No supplemental fossil fuel is being used
		CH_4	Excluded	
		N_2O	Excluded	
	Supplemental electricity consumption	CO_2	Excluded	No supplemental electricity is being consumed in the project activity
		CH_4	Excluded	
		N_2O	Excluded	
	Electricity import to replace captive electricity, which was generated using waste energy in absence of project activity[5]	CO_2	Excluded	In the absence of project activity, waste energy was not being used for electricity generation
		CH_4	Excluded	
		N_2O	Excluded	
	Energy consumption for gas cleaning	CO_2	Excluded	No gas cleaning is being done in the project activity
		CH_4	Excluded	
		N_2O	Excluded	

C.5. Establishment and description of baseline scenario (UCR Protocol) >>

As per applied approved methodology, the baseline scenario is identified as the most plausible

[5] Applicable in the scenario where the facility captures and utilizes a portion of waste gas produced at the site for captive power generation in the absence of the project activity.

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 AMS-III.Q., Version 6.1.

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

- The project activity is an existing recipient facility, so as per para 23, page no.8 of AMS-III.Q. version 6.1, the baseline scenario shall be based on relevant operational data from immediately prior three years to the start date of the project activity (or the start date of validation with due justification). For existing facilities, which has three years of operation history but do not have sufficient operational data for the purpose of determining baseline, all historic information shall be available (a minimum of one-year operational data is required).
- As per para 24, page no.8 of AMS-III.Q., version 6.1, all options for demonstrating the use of waste energy in the absence of a CDM project activity shall be based on historic information and not on a hypothetical scenario.
- The project activity is a greenfield WEG facility, so as per paragraph 25, page no.8 of AMS-III.Q., version 6.1, the baseline scenario shall be determined in accordance with the procedure prescribed in most recent version of "ACM0012, Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects" or as per the relevant requirements related to determination of baseline scenario provided in the "General guidelines for SSC CDM methodologies" for Type-II and Type-III Greenfield/capacity expansion project activities.

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 project activity involves generation of electricity from waste gas. Electricity is obtained from an identified existing plant or from the grid. As per para 28, page no. 10 of AMS-III.Q., version 6.1, baseline emissions of electricity are as follows:

$$BE_{elec,y} = f_{cap} \times f_{wcm} \times \sum_{j} \sum_{i} (EG_{i,j,y} \times EF_{Elec,i,j,y}) \qquad \text{Equation (1)}$$

Where;

$\boldsymbol{BE_{elec,y}}$ = Baseline emissions due to displacement of electricity during the year y in tons of CO_2

$\boldsymbol{F_{cap}}$ = The ratio of waste energy generated at a historical level, expressed as a fraction of the total waste energy used in the project activity for producing useful energy in year y. The ratio is 1 if the waste energy generated in project year y is the same or less than that generated at a historical level.
Capping factor is to exclude increased waste energy utilization in the project year y due to increased level of activity of the plant, relative to the level of activity in the base years before project start. The value of f_{cap} f shall be estimated using one of the applicable methods that applies to the situation of the project activity prescribed in the most recent version of "ACM0012: Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects". Where the method requires historical data, the

project proponents shall follow the requirement stipulated in paragraph 23 above (Here, value of f_{cap} is 0).

F_{wcm} = Fraction of total electricity generated by the project activity using waste energy. This fraction is 1 if the electricity generation is purely from use of waste energy.
The value of f_{wcm} shall be estimated using applicable procedures that apply to the situation of the project activity prescribed in the most recent version of "ACM0012: Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects". Where the method requires historical information, the project proponents shall follow the requirement stipulated in paragraph 23 above.
In cases where auxiliary fossil fuel is used to supplement the waste energy directly in the waste heat recovery combustion systems and the energy output cannot be demonstrably apportioned due to technical constraints (e.g. waste gas measurement and its quality) between fossil fuels and the waste energy, a value of 1 for f_{wcm} can be used and consider the emissions resulting from the combustion of fossil fuel as project emissions using "Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion".
Note: for a project activity using waste pressure to generate electricity this fraction is 1.

$EG_{i,j,y}$ = The quantity of electricity supplied to the recipient *j* by generator, that in the absence of the project activity would have been sourced from i^{th} source (*i* can be either grid or identified existing source) during the year y in MWh.

$EF_{Elec,i,j,y}$ = The CO_2 emission factor for the electricity source *i* (grid or identified existing source), displaced due to the project activity, during the year *y* in tons CO_2/MWh.

In this project activity, two emission factors are considered. For the period up to the year 2020, an emission factor of 0.9 tCO_2/MWh is applied in accordance with UCR guidelines. For the calculation of emission reductions post-2020, the emission factor is selected as the more conservative value between the dataset published by the national electricity or power authority and the default emission factor provided by UCR. Based on calculations using the most recent dataset from the Central Electricity Authority (CEA), Version 20.0, an emission factor of 0.8612 tCO_2/MWh has been adopted.

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

Parameter	Value	Nomenclature	Source
$EF_{grid,CM,y}$	0.8612 (latest) tCO_2/MWh	Combined margin CO_2 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 CO_2[6] Emission Database, Version 20.0 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,OM,y}$	0.9643 (latest) tCO_2/MWh	Operating margin CO_2 emission factor for the project electricity system in year y	Calculated as the last 3 years (2021-22, 2022-23 and 2023-24) generation-weighted average, sourced from Baseline CO_2 Emission Database, Version 20.0 published by Central Electricity Authority (CEA), Government of India

[6] https://cea.nic.in/wp-content/uploads/2021/03/User_Guide_Version_20.0.pdf

$EF_{grid, BM, y}$	0.5522 (latest) tCO_2/MWh	Build margin CO_2 emission factor for the project electricity system in year y	Build Margin for the year 2023-24 is taken. sourced from Baseline CO_2 Emission Database, Version 20.0 published by Central Electricity Authority (CEA), Government of India, December 2024

Baseline Emissions table based on actual generation

Baseline Emissions Table	
Year	**(tCO2e)**
2013	2,268
2014	1,833
2015	66
2016	619
2017	1,354
2018	1,264
2019	1,751
2020	1,034
2021	1,067
2022	9,302
2023	1,465

Project emissions:

As per paragraph 38, page no. 15 of AMS-III.Q., version 6.1, project emissions due to the project activity (PE_y) include emissions due to:

(i) Combustion of auxiliary fuel to supplement waste gas/heat ($PE_{AF,y}$); and

(ii) Emissions due to consumption of electricity for cleaning of gas before being used for generation of electricity or other supplementary electricity consumption by the project activity ($PE_{EL,y}$).

$$PE_y = PE_{AF,y} + PE_{EL,y} \quad \text{Equation (7)}$$

As per paragraph 39, page no. 15 of AMS-III.Q., version 6.1, $PE_{AF,y}$ and $PE_{EL,y}$ shall be estimated following the procedure provided in the relevant section of the most recent version of "ACM0012, Consolidated baseline methodology for GHG emission reductions from waste energy recovery projects".

According to ACM0012, Project Emissions include emissions due to (1) combustion of auxiliary fuel to 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 project activity, project activity emissions are not applicable. 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 EG_j 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 power plant (BE_y) and project emissions (PE_y), as follows:

$$\boldsymbol{ER_y = BE_y - PE_y}$$

Where;
$\boldsymbol{ER_y}$ = Emission reductions of the project activity during the year y in tonnes of CO_2
$\boldsymbol{BE_y}$ = Baseline emissions due to the displacement of electricity during the year y in tonnes of CO_2
$\boldsymbol{PE_y}$ = 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)

$$\boldsymbol{ER_y = BE_y}$$

Total Emission reduction by the project for the current monitoring period is calculated as below:

Emission Reduction table based on actual generation

Year	Baseline Emissions (tCO_2e)	Project Emissions (tCO_2e)	Leakage Emissions (tCO_2e)	Emission Reduction (tCO_2e)
2013	2,268	0	0	2,268
2014	1,833	0	0	1,833
2015	66	0	0	66
2016	619	0	0	619
2017	1,354	0	0	1,354
2018	1,264	0	0	1,264
2019	1,751	0	0	1,751
2020	1,034	0	0	1,034
2021	1,067	0	0	1,067
2022	9,302	0	0	9,302
2023	1,465	0	0	1,465
Total	**22,023**	**0**	**0**	**22,023**

C.6. Prior History>>

The project activity has never been applied under any other GHG mechanism prior to this registration with UCR. Also, the total project as a whole has not been applied for any other environmental crediting or certification mechanism. Hence project will not cause double accounting of carbon credits (i.e., CoUs).

C.7. Monitoring period number and duration>>

First Monitoring Period: 10 years and 5 months – 01/01/2013 to 31/05/2023

C.8. Changes to start date of crediting period >>

There is no change in start date of the crediting period. Crediting period start date is 01/01/2013.

C.9. 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.

C.10. Monitoring plan>>

Various departments at KCIL 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 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 and recording as well as archiving data and all relevant documents. The data is monitored on a daily basis and is submitted to PPs on a daily basis.

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

1. Monitoring Plan Objective and Organization

PP is the project implementer and monitors the electricity generated from the turbines within the project activity. The data is already archived electronically and is stored since 2018.

Director is responsible for the overall functioning of the plant. KCIL 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 monthly.

- 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 daily.
- 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. 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.

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

Data and Parameters available at validation (ex-ante values):

Data/Parameter	**$EF_{CO2, GRID}$**
Data unit	tCO_2 /MWh
Description	CO2 emission factor per unit of energy of the fossil fuel used in the baseline generation source (Grid) displaced due to the project activity, during the year y
Source of data	Emission Factor (Till 2020) - The UCR recommends an emission factor of 0.9 tCO_2/MWh for the 2013-2020 years as a fairly conservative estimate for Indian projects not previously verified under any GHG program. Emission factors for the post 2020 period are to be selected as the most conservative estimate between the national electricity/power authority published dataset and the UCR default of 0.9 tCO2/MWh. Source: UCR Standard (Conservative Estimate) Emission Factor (Post 2020) - Calculated as the weighted average of the operating margin (0.75) & build margin (0.25) values, sourced from Baseline CO2 Emission Database, Version 20.0 published by Central Electricity Authority (CEA), Government of India. Source: CEA CO2 Baseline Database v20.0
Value(s) applied	Emission Factor (Till 2020): 0.9 Emission Factor (Post 2020): 0.8612
Measurement methods and procedures	-
Monitoring frequency	Yearly
Purpose of data	Calculation of baseline emissions

Data and Parameters to be monitored (ex-post monitoring values):

Data / Parameter:	**EGy**
Data unit:	MWh
Description:	Net power supplied to manufacturing facility due to waste heat recovery
Source of data:	Measured
Measurement procedures (if any):	Gross power generation is directly measured using an energy meter installed at the site.
Monitoring frequency:	Recording frequency: Monthly Calculated based on daily gross power generation and auxiliary power consumption in the power generation plant.
Value applied	22,595.66
QA/QC procedures:	As per Section C.10
Purpose of data:	Calculation of baseline emissions
Any comment:	Data will be archived electronically for a period of 36 months beyond the end of crediting period.

Data / Parameter:	**$EG_{GEN,y}$**
Data unit:	MWh
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. **Meter No.** X1458813
Monitoring frequency:	Frequency of measurement – Continuous
Value applied	25,106.29
QA/QC procedures:	As per Section C.10
Purpose of data:	Calculation of baseline emissions
Any comment:	Data will be archived electronically for a period of 36 months beyond the end of crediting period.

Data / Parameter:	**$EG_{AUX,y}$**
Data unit:	MWh
Description:	Auxiliary power consumption in project activity
Source of data:	Measured
Measurement procedures (if any):	Plant operation data on power generation in project activity
Monitoring frequency:	Frequency of measurement – Continuous
Value applied	2,510.63
QA/QC procedures:	As per Section C.10
Purpose of data:	Calculation of baseline emissions
Any comment:	Data will be archived electronically for a period of 36 months beyond the end of crediting period.