PROJECT CONCEPT NOTE

CARBON OFFSET UNIT (CoU) PROJECT

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

Version 1.0

Date 29/07/2024

First CoU Issuance Period: 11 Years, 06 Months

Date: 01/01/2013 to 30/06/2024

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

BASIC INFORMATION	
Title of the project activity	KCIL 4.2 MW Waste Heat to Power Project in Gujarat, India
Scale of the project activity	Small Scale
Completion date of the PCN	29/07/2024
Project participants	Advait Greenergy Private Limited (Represntator) M/s. Kutchh Chemical Industries Ltd. (Developer)
Host Party	India
Applied methodologies and standardized baselines	Applied Methodologies: UNFCCC Approved Small Scale Consolidated Methodology "AMS-III.Q, Waste Energy Recovery", Version – 06.1 Standardized Baselines: N/A
Sectoral scopes	04 Manufacturing Industries
Estimated amount of total GHG emission reductions	16,556 CoUs/Year (16,556 tCO_2e/Year)

SECTION A. Description of project activity

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

The project activity titled, "KCIL 4.2 MW Waste Heat to Power Project in Gujarat, India", is in Padana Village in Gandhidham Taluka of Kutch District of Gujarat State of India. The project is an operational activity with continuous reduction of GHG, currently being applied under "Universal Carbon Registry" (UCR).

Purpose of the project activity:
The project activity is developed by M/s. Kutchh Chemical Industries Ltd., which will recover waste heat from sulphuric acid production process to produce electricity, displacing part of electricity supplied by the Indian Grid which predominantly relies on fossil fuel-fired power plants for power generation.

A Heat Recovery System (HRS) will be installed to recover the waste heat, and the steam generated by HRS will be exported to turbine to generate electricity. The power generation capacity is 4.2 MW, and 18,396 MWh/yr electricity is generated, and it is expected to reduce the GHG emissions about 16,556 tCO_2e over the full crediting period of the project activity by avoiding CO_2 emissions from electricity generation in fossil fuel power plants connected into the Indian Grid.

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
M/s. Kutchh Chemical Industries Ltd.	4.2	30/12/2006	Padana Village, Gandhidham Taluka, Kutch District

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.

The generation of power from waste heat recovery system is a clean technology as there is no fossil fuel fired or no GHG gases are emitted during the process. Thus, project activity leads to reduce the GHG emissions. As per the ex-ante estimate, the project will generate approximately 18,396 MWh of electricity per annum. The estimated annual average and the total CO_2e emission reduction by the project activity is expected to be 16,556 tCO_2e per annum for the full crediting period of the project activity, whereas actual emission reduction achieved during the first CoU period shall be submitted as a part of first monitoring and verification.

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.

Project's Contribution to Sustainable Development
This project is a greenfield activity where grid power is the baseline. Indian grid system has been

predominantly dependent on power from fossil fuel powered plants. The renewable power generation is gradually contributing to the share of clean & green power in the grid; however, grid emission factor is still on higher side which defines grid as distinct baseline.

Being an environmentally sound project, the Project will not only supply carbon-free electricity by means of utilization of waste gas, but also contribute to sustainable development of the local community, the host country and the world by means of:

- 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;
- Generated employment for local people during construction and operation of the Project.

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 (MoEFCC), 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:

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.

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 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.

A.3. Location of project activity >>

Project Proponent	M/s. Kutchh Chemical Industries Ltd.
Project Capacity (MW_{AC})	4.2
Country	India
State	Gujarat
District	Kutch
Tehsil	Gandhidham
Village	Padana
Pin Code	370240

The representative location map is included below:

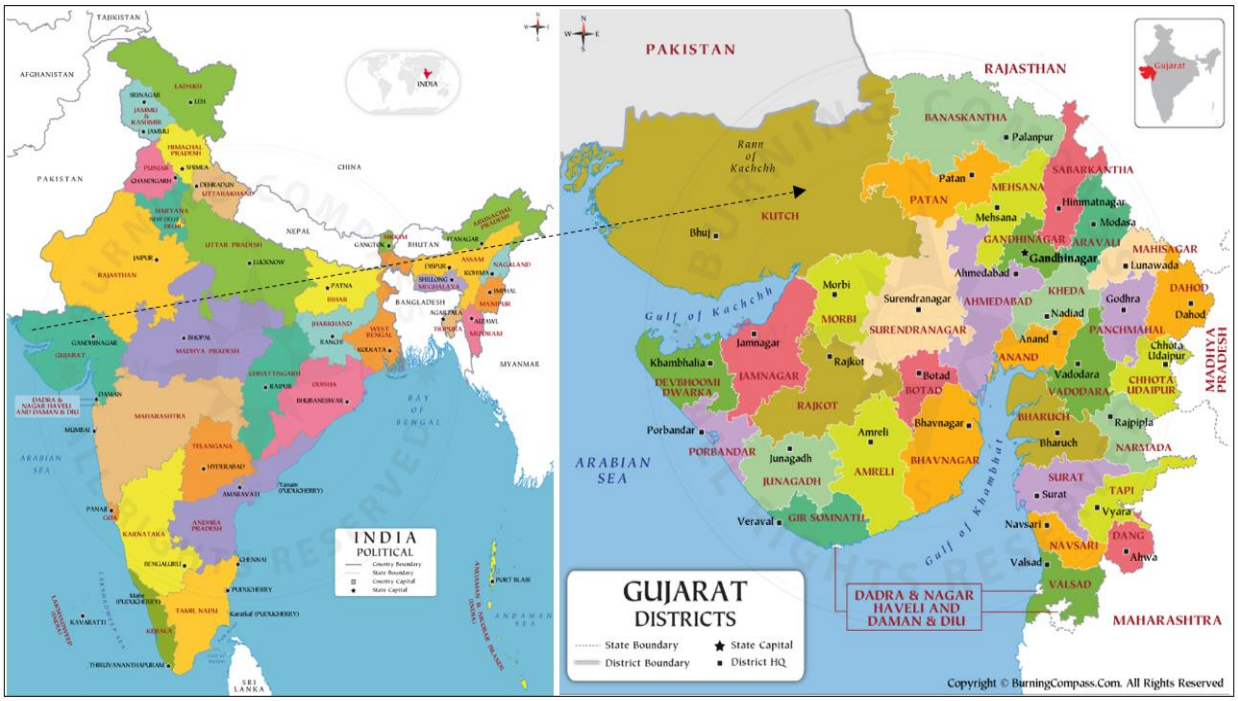

Figure 1: Project Location

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

A.4. Technologies/measures >>

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.

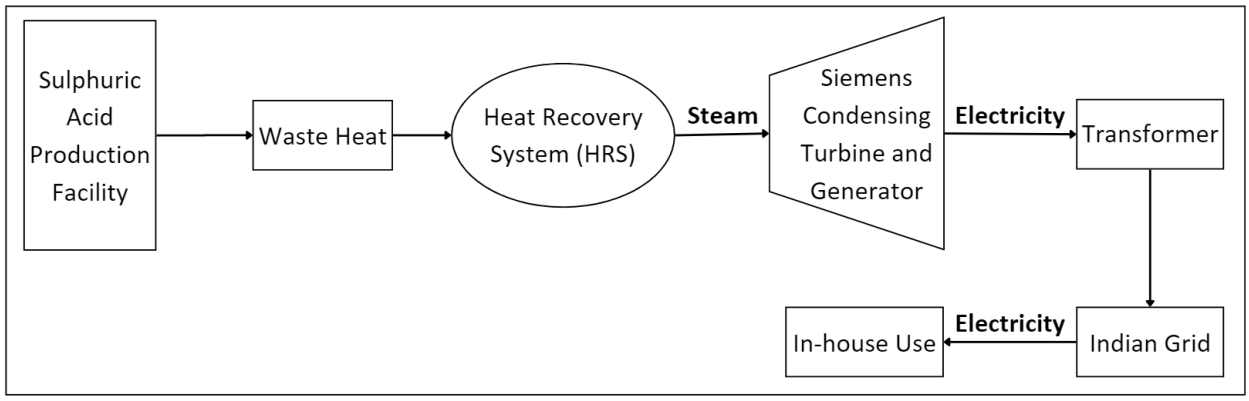

Figure 2: Technique Process

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 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

A.5. Parties and project participants >>

Party (Host)	Participants
Government of India	Advait Greenergy Private Limited (Represntator) M/s. Kutchh Chemical Industries Ltd. (Developer)

A.6. 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:

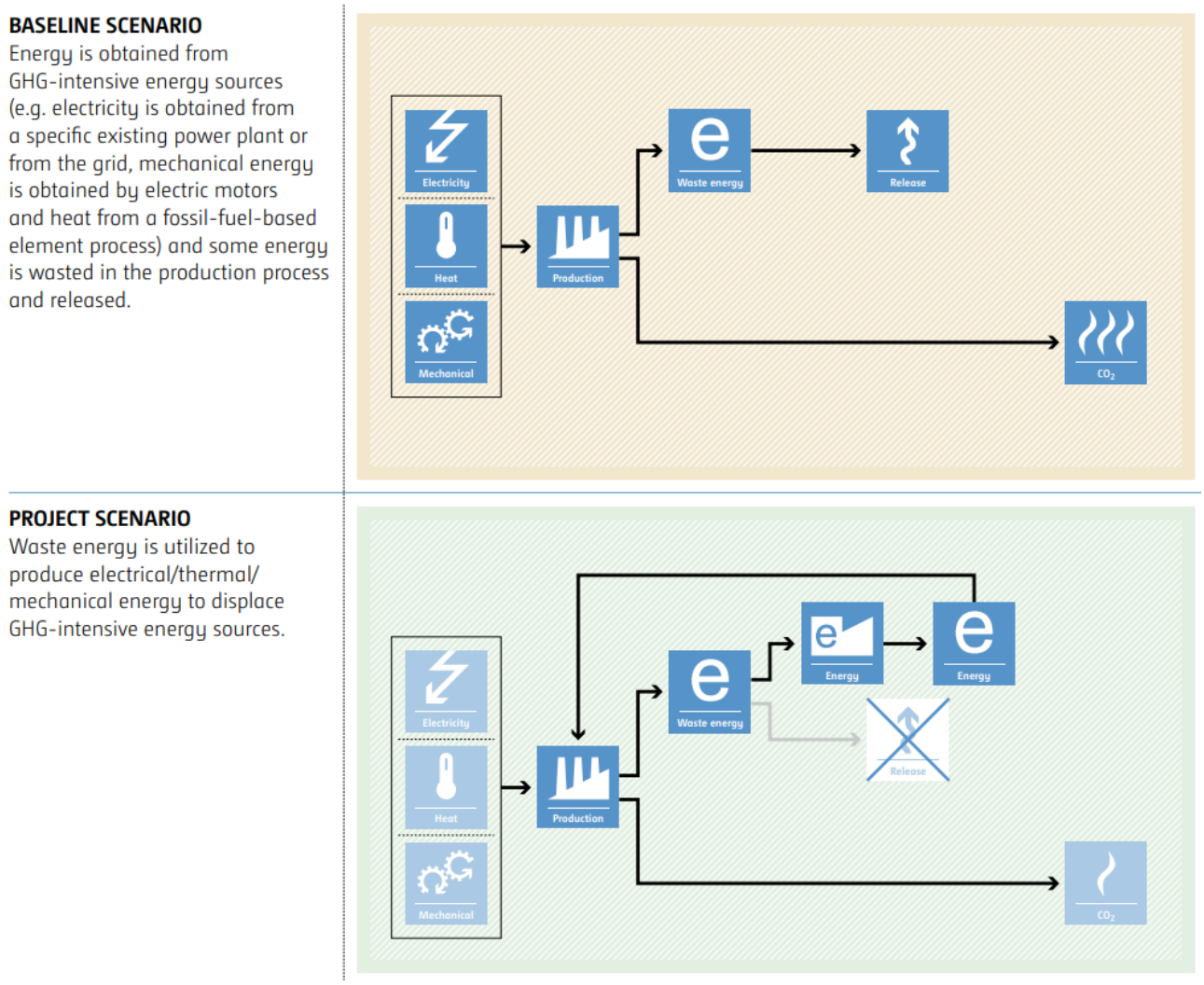

Figure 3: Baseline and Project Scenario

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[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.7. Debundling>>

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

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

SECTION B. Application of methodologies and standardized baselines

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

SECTORAL SCOPE : 04, Manufacturing Industries

TYPE : I – Renewable Energy Projects (Small Scale)

CATEGORY : AMS-III.Q, CDM approved Small-scale Methodology
Waste energy recovery, Version 6.1[2]

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

The chosen methodology 'AMS-III.Q, version 06.1' 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	(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 (emergencies) will not be

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

required. The energy balance shall 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.	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	The project activity uses waste gas and produces more heat and utilises waste heat for generation of electricity.

plants for the purpose of generation of heat can apply this 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 06.1 under Sectoral scope: 04.

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

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

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

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

According to the baseline methodology AMS-III.Q, Version 06.1, 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.

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	

Source		Gas	Included	Justification/Explanation
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[3]	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	

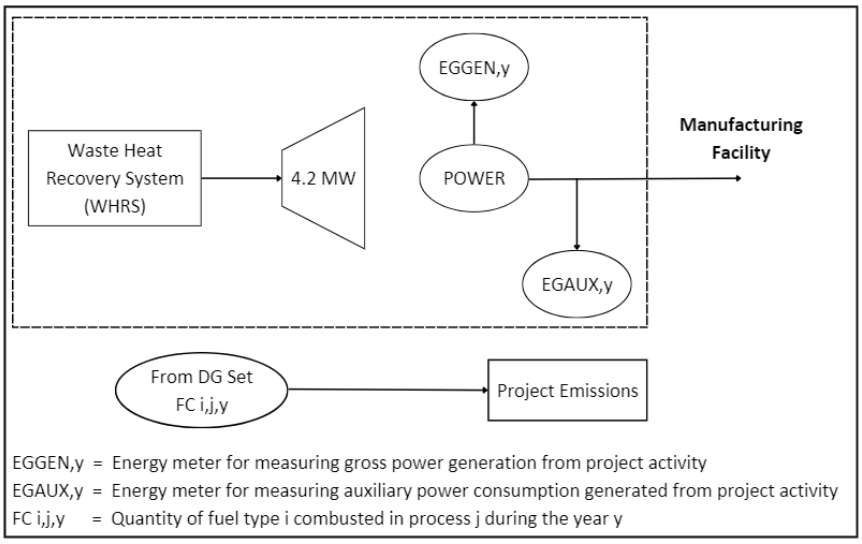

Figure 4: Project Boundary

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 thewaste energy at the WEG facility and the generation of energy consumed by the recipient facility(ies)in the absence of the project activity.

[3] 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.

The baseline scenario for the project activity is identified through the following steps as described in the methodology AMS-III.Q, Version 06.1.

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 06.1, 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 06.1, 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 06.1, 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 06.1, 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).
$\boldsymbol{F_{wcm}}$	=	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, the emission factor is considered as 0.9000 which is the UCR conservative 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 ($EF_{CO2,y}$) 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
$EF_{grid,CM,y}$	0.9352 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[4] Emission Database, Version 19.0 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,OM,y}$	0.9580 tCO_2/MWh	Operating margin CO_2 emission factor for the project electricity system in year y	Calculated as the last 3 years (2020-21, 2021-22 and 2022-23) generation-weighted average, sourced from Baseline CO_2 Emission Database, Version 19.0 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,BM,y}$	0.8670 tCO_2/MWh	Build margin CO_2 emission factor for	Build Margin (not adjusted for imports) for the year 2022-23 taken. Sourced from Baseline CO_2

[4] https://cea.nic.in/wp-content/uploads/baseline/2024/01/User_Guide__Version_19.0.pdf

		the project electricity system in year y	Emission Database, Version 19.0 published by Central Electricity Authority (CEA), Government of India, December 2023

Project emissions:
As per paragraph 38, page no. 15 of AMS-III.Q, version 06.1, 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 06.1, $PE_{AF,y}$ 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 thebaseline 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)

$$ER_y = BE_y$$

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 estimated annual baseline emission reductions has been submitted:

BE_y = 18,396 MWh/year × 0.90000 tCO_2/MWh
= 16,556 tCO_2e/year (i.e. 16,556 CoUs /year)

Hence, Estimated annual Emission Reductions (ER_y) = 16,556 CoUs/year (16,556 tCO_2e/year)

B.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).

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

The project activity is of 4.2 MW capacity. 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 >>

Not applicable.

B.9. Monitoring period number and duration>>

First Issuance Period: 11 Years, 06 Months – 01/01/2013 to 30/06/2024

B.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.

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	A "grid emission factor" refers to a CO_2 emission factor (tCO_2/MWh) which will be associated with each unit of electricity provided by an electricity system. The UCR recommends an emission factor of 0.9 tCO_2/MWh for the 2013-2020 years as a fairly conservative estimate for Indian projects not previously verified under any GHG program. Hence, the same emission factor has been considered to calculate the emission reduction under conservative approach.
Source of data	UCRCoUStandardAug2022updatedVer6_090822220127104470.pdf (rackcdn.com)
Value(s) applied	0.9
Measurement methods and procedures	Fixed
Monitoring frequency	Ex-ante fixed parameter
Purpose of data	Calculation of baseline emissions

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

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 either grid or identified source) during the year *y* in MWh

Source of data:	Calculated
Measurement procedures (if any):	Recipient facility(ies) and generation plant measurement records
Monitoring frequency:	Monthly
Value applied	18,396 (Estimated)
QA/QC procedures:	As per Section B.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.