PROJECT CONCEPT NOTE

CARBON OFFSET UNIT (COU) PROJECT

Title: 27 MW Bagasse based co-generation at M/S Karmayagi kundlikrao Ramrao jagtap patil kukadi sahakari sakhar karkhana (KKRJPKSSK) ahmednagar Maharashtra.

Version 2.0

Date 1-03-2024

First CoU Issuance Period: 9 Years 26 days

Crediting Period: 05-12-2013 to 31-12-2022

BASIC INFORMATION	
Title of the Project activity	**27 MW Bagasse based Co-generation by M/s Karmayogi Kundalikrao Ramrao Jagtap Patil kukadi Sahakari Sakhar Karkhana – Pimpalgaon Vasa Tal-Shrigonda Dist- Ahmednagar**.
Scale of the project activity	**Large Scale**
Completion date of the PCN	01-03-2024
Project Participants	**Project Proponent:** M/s Karmayogi Kundalikrao Ramrao Jagtap Patil kukadi Sahakari Sakhar karkhana. **Aggregator:** Climekare Sustainability Pvt ltd.(336812961)
Host Party	India
Applied methodologies and standardized baselines	**CDMUNFCCC Methodology** **ACM0006**: Electricity and heat generation from biomass(Ver.16)&UCR Standard for Emission Factor
Sectoral scopes	01 Energy industries (Renewable/Non-Renewable Sources)
Estimated total amount of average GHG emission reductions per year	14,130 tCO2eq or 14,130 CoUs

SECTION A. Description of Project Activity

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

The Project Titled "27 MW Bagasse based Co-generation by "M/s Karmayogi Kundalikrao Ramrao Jagtap Patil kukadi Sahakari Sakhar Karkhana- Pimpalgaon" is a bagasse-based Co-Generation (co-gen) Power Project successfully commissioned by Maharashtra State Electricity Transmission Company Limited (MSETCL). The 12 MW co-generation plant is synchronized with grid on date of 06-12-2013 and started exporting of power from 24-12-2013 and another 15 MW co-generation plant is synchronized and started power exporting on the date of 29-10-2018. The Project authority is M/s Karmayogi Kundalikrao Ramrao Jagtap Patil kukadi Sahakari Sakhar Karkhana- Pimpalgaon (hereby to be called as Project Proponent, PP).

Before 2019 this project name was Kukadi sahakari sakhar karkhana but according to section 15 of the Maharashtra Co-operative societies act, 1960 the name of the society has been amended as "Karmyogi kundalikrao ramrao jagrap patil kukadi sahakari sakhar karkhana ltd.

Purpose of the project activity:

The purpose of the project activity is to generate electricity using renewable biomass (Bagasse) and thereby reduce GHG emissions by displacing the fossil fuel dominated grid based electricity with biomass based renewable electricity. The electricity produced by the project is directly contributing to climate change mitigation by reducing the anthropogenic emissions of greenhouse gases (GHGs) into the atmosphere by displacing an equivalent amount of fossil power at grid.

The PP has set up an integrated sugar mill with sugar crushing capacity of 3500 TCD (Further increased to 5500 TCD in 2018) and installs new 12 MW turbine commissioning on 5/12/2013 and 15 MW turbine commissioning on 16/10/2018 Bagasse based Cogeneration power plant. This will remove the dependency of the sugar mill on the power supplied from the state grid. Power generated from this project activity will be used for meeting plant requirement. After fulfilling its captive energy requirement, remaining power will be sold to the state grid as per the Power Purchase Agreement / Energy Purchase agreement.

The Co-gen power project of 27 MW capacities will operate on bagasse only for 140 to180 days during season days. Actual number of mill operation days will be mentioned in the monitoring period. At designed level, the project will generate clean energy and after meeting the captive requirement export the surplus energy to Maharashtra State Electricity Transmission Company Limited (MSEDCL). All the steam and power requirements of the sugar mill and co-gen power plant will be met internally from the project itself.

The project activity employs 27 MW aggregated generators along with two boiler of 40 TPH and one of 85 TPH boilers with high pressure and temperature configuration (45kg/cm^2, 490^{0}C and 87 kg/cm^2, 515°C).




The project activity is the construction and operation of a power-plant/unit that uses renewable energy sources and supplies electricity to the grid as well as generate heat for the captive consumption at 5500 TCD sugar mill. Earlier capacity of the sugar mill was 3500 TCD, which was later increased to 2000 TCD and in 2018 its capacity was further increased to 5500 TCD. The project activity is thus the displacement of electricity that would be provided to the grid by more-GHG-intensive means and provides long-term benefits to the mitigation of climate change.

The project activity also induces environmental and sustainable development benefits. The project activity has introduced efficient high pressure cogeneration technology to the Indian sugar industry; reducing power shortages in the state of Maharashtra India; and fostering sustainable economic growth through promoting energy self-sufficiency and resource conservation in India's sugarcane industry. The policy to grow in a sustainable manner with a commitment towards the environment has been adopted by KSSK Pimpalgoan.

The technology used in the project activity is highly replicable as the country's sugar mills produce large quantities of bagasse that could be efficiently utilized to generate power. The export of electricity hence reduces GHG emissions by replacing the fossil fuel dominated grid based electricity with a renewable source of electricity. The high pressure boilers are fired by bagasse, a byproduct from the sugar manufacturing process to generate steam, which in turn powers all the steam turbines to generate electricity.

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

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

Social benefits:

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

Environmental benefits:

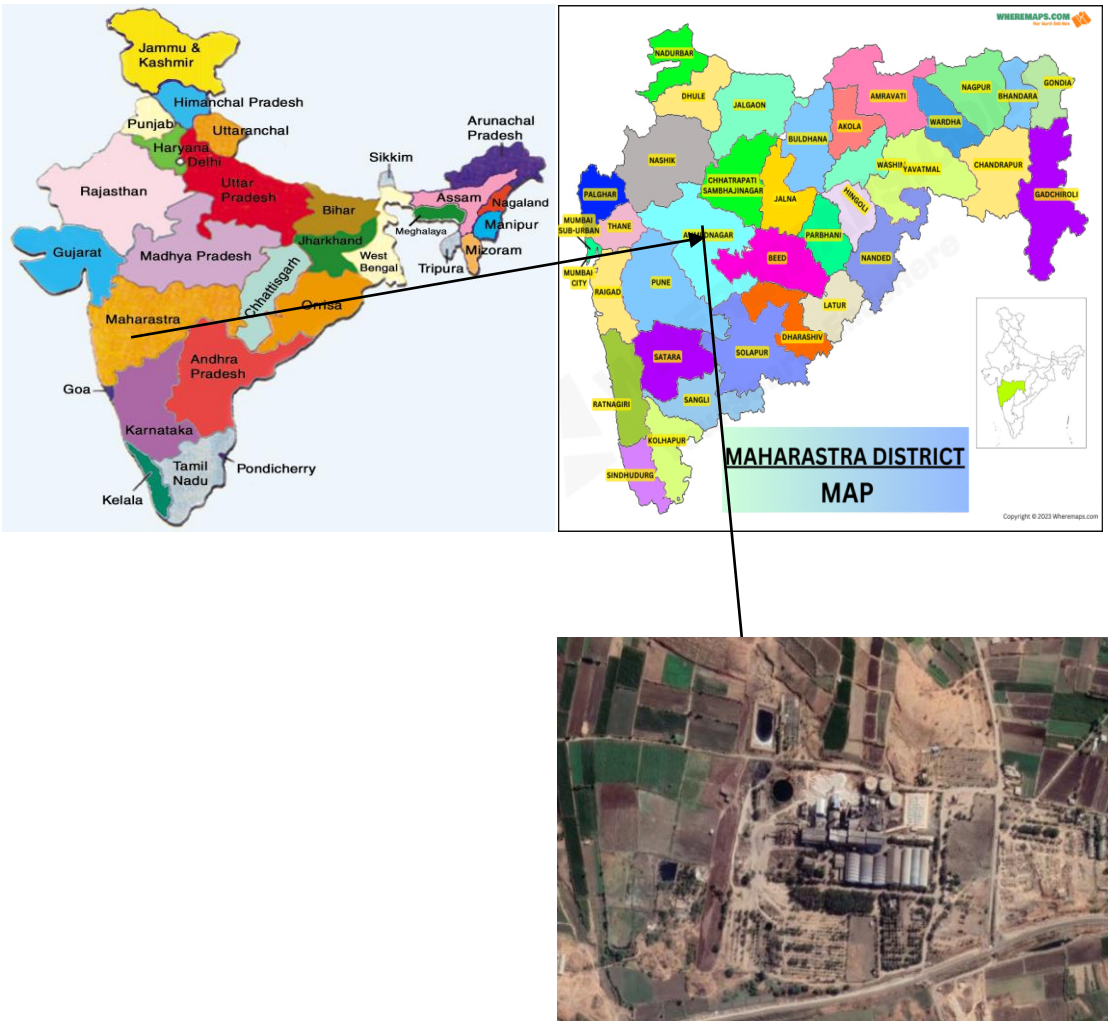
- The project activity is a renewable energy project, which utilizes biomass as a fuel for power generation and heat, a move that is voluntary and not mandated under current environmental laws of India. Since this project activity generates green energy in the form of power and heat, it has positively contributed towards the reduction in (demand) use of finite natural resources like coal, gas and oil, minimizing depletion and in turn increasing its availability to other important purposes. Therefore, this project activity helps to environment sustainability by reducing GHG emission in the atmosphere.
- Avoids global and local environmental pollution, leading to reduction of GHG emissions.
- Indirect capacity building by providing a case example to other sugar mills in the region for switching to high capacity cogeneration configuration, for electricity generation. In addition to the reduction in carbon dioxide (CO2) emissions the project implementation will result in reduction of other harmful gases (NOx and SOx) that arise from the combustion of coal used in power generation. The project activity also leads to reduce ash generation since the ash content in bagasse is lower than that of Indian coal.
- The bagasse generated in sugar mills in the region is generally in excess and hence get disposed in unplanned ways including dumping into nearby land or rivers. This will be reduced.

Economic benefits:

- The project activity creates employment opportunities during the project stage and operation and maintenance of the Co-gen power plant.
- The project activity helps in conservation of fast depleting natural resources like coal and oil thereby contributing to the economic wellbeing of country as a whole.
- The increase in demand of bagasse exerted by the project has had a local effect on its price and generates additional revenue for the sugarcane farmers. The project activity results in saving the coal and allowing it to be diverted to other needy section of the economy.
- The various other benefits due to the project activity ensure that the project is contributing to the sustainable development of the region by bringing in green technologies and processes to a backward region. The technology is indigenous and by implementing such projects the country is showcasing its GHG mitigation actions in its efforts to combat climate change.

A.3. Location of project activity >>

Country	:	India
Village	:	Pimpalgaon
District	:	Ahmednagar
State	:	Maharashtra
Latitude	:	18°47'45"N
Longitude	:	74°36'57"E



A.4. Technologies/measures >>

The UCR project activity is a grid-connected bagasse based cogeneration power plant with a high back pressure steam-turbine configuration. The UCR project activity is the electricity generation capacity and the installation of facilities for allowing captive use and export of electricity to the electricity grid.

The technology of biomass residue based high steam pressure power generation itself is known and in use in India. The use of high pressure system allows for increased efficiency levels for electricity generation.

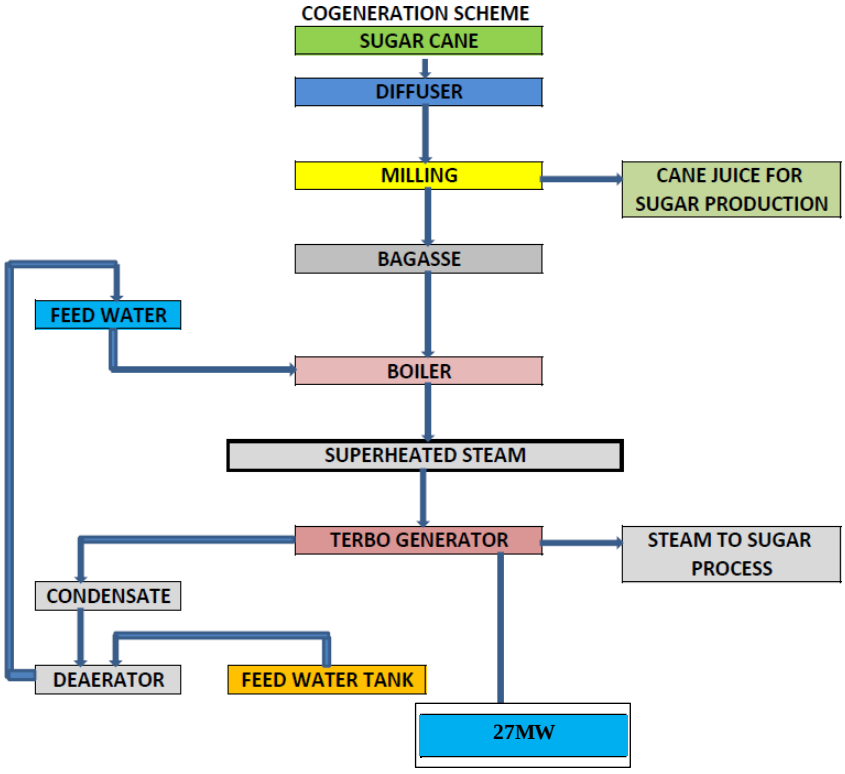
The main elements of the power plant are as follows.

- A boiler unit which converts the energy available in the fuels into thermal energy;
- A steam turbine unit which converts thermal energy into mechanical energy;
- An alternator unit, which converts mechanical energy into electrical power.

A number of other equipment components, as listed below, also form part of the biomass power plant.

- Fuel and ash handling equipment © Universal CO2 Emission and Offset Registry Private Ltd
-Water cooled condenser system for cooling the exhaust steam - DM Water system and Air Compressor Plant
- Electrical systems and Automation system

The project activity involves two 40 TPH boilers and One 85 TPH boiler with high pressure and temperature configuration (87kg/cm^{2}ata and 515 °C). The Project activity in a process flow diagram can be expressed as below:



- Some of the salient features of the project equipment can be found in the below mentioned table:

Boiler	No. 1	No. 2	No. 3
Manufacturer	SS Engineers, MIDC, Bhosari, Pune	SS Engineers, MIDC, Bhosari, Pune	SS Engineers, MIDC, Bhosari, Pune
Capacity Kg/Hr.	40000 Kg/Hr	40000 Kg/Hr	85000 Kg/Hr
Heating Surface M2	2177	2177	4924
Type of Furnace	Dumping Grate	Dumping Grate	Chain Grate
Grate Area M2	22.8	22.8	1250
Super heater H.S. M2	270	270	Pri-572 & Sec-449
Air heater H.S. M2	1500	1500	4611
Degree of super heat °C (Steam)	490	490	525
Details of Soot blower	Two Nos Retractable type Remaining Rotary Type	Two Nos Retractable type Remaining Rotary Type	Four Nos Retractable type Remaining Rotary Type
Plain tube Economizer H.S. M2	450	450	1810

Turbine	No. 1	No. 2
Power Rated (KW)	12000	15000
Turbine Speed (RPM)	7018	6050
Gear Box Type	Double Helical	Double Helical
Steam Exhaust Pressure (Kg/cm^2g)	1.5	$-0.9468 kg/cm^2g$
Oil Cooler Type	Shell & Tube, Duplex	Shell & Tube

A.5. Parties and Project Participants >>

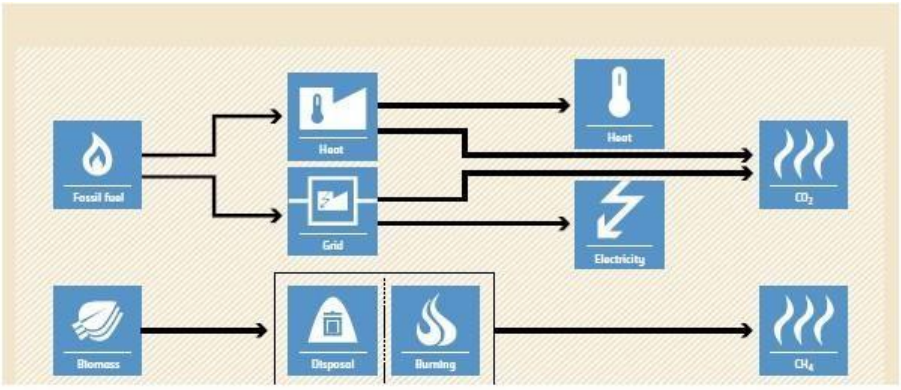
Project activity does not involve any public funding from Annex I Party, which leads to the diversion of the official development assistance.

Party (Host)	Participants/Aggregator

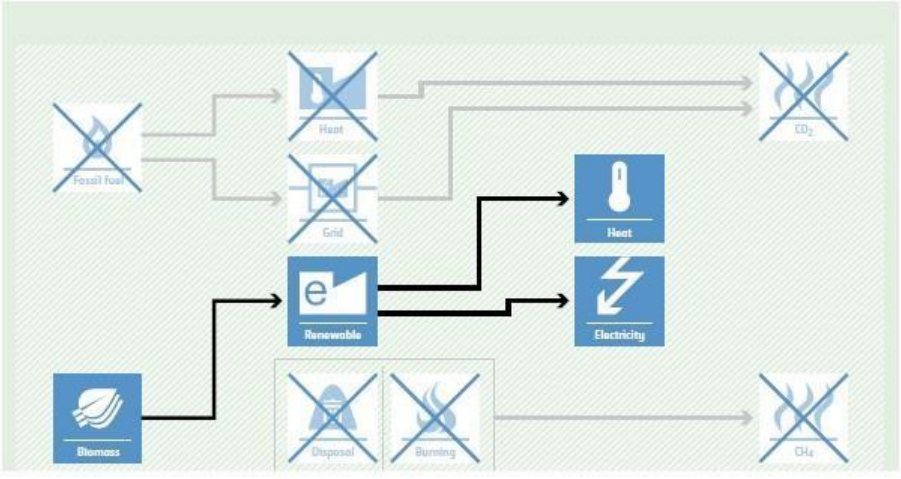
India	**Project Owner:** M/s. Karmayogi Kundalikrao Ramrao Jagtap Patil kukadi Sahakari Sakhar Karkhana Pimpalgaon Pisa, Tal– Shrigonda Dist– Ahmednagar. **Project Aggregator:** Climekare sustainability Pvt. Ltd**.**

A.6. Baseline Emissions >>

BASELINE SCENARIO
Electricity and heat would be produced by more-carbon-intensive technologies based on fossil fuel or less-efficient biomass power and heat plants. Biomass could partly decay under anaerobic conditions, bringing about methane emissions.



PROJECT SCENARIO
Use of biomass for power and heat generation instead of fossil fuel or increase of the efficiency of biomass-fuelled power and heat plants. Biomass is used as fuel and decay of biomass is avoided.



The proposed project activity uses bagasse as fuel for cogeneration unit. The bagasse being a renewable bio- mass fuel does not add any net carbon-dioxide to the atmosphere because of the carbon recycling during growth of sugar cane. Therefore, the project activity will lead to zero CO2 on-site emissions associated with bagasse combustion.

The operation during crushing season is of 180 days during season days. Actual number of mill operation days will be mentioned in the monitoring period. Without the project activity, total energy supplied from the boiler would have been taken-up by coal fired boiler, and energy transferred to the grid would have been imported from grid mix and emission of CO2 would have occurred due to combustion of conventional fossil fuels. Considering the export of clean electricity to the fossil fuel dominated grid by the project activity there will be continuous GHG reductions, as it would avoid equivalent GHG emissions.

A.7. Debundling >>

This project is not a debundled component of a larger registered carbon offset project activity. There is no registered large-scale UCR project activity or a request for registration by another small-scale project activity:

- By the same project participants;
- In the same project category and technology/measure; and
- Whose project boundary is within 1 km of the project boundary of the proposed small-scale activity--at the closest point.

SECTION B. Application of methodologies and standardized baselines

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

SECTORAL SCOPE -01 Energy industries (Renewable/Non-renewable sources)

TYPE I- **Renewable Energy Projects**

CATEGORY-ACM0006: "Electricity and heat generation from biomass" Version 16.0

B.1. Applicability of methodologies and standardized baselines >>

This methodology is applicable to project activities that operate biomass (co-gen) fired power and heat plants.

The project activity is a power generation project using a biomass (bagasse) and displaces CO2 emissions from electricity generation in power plants that are displaced due to the project activity. Since the project activity utilizes biomass (bagasse) for the generation of power and supplies it to the local grid, it displaces fossil fuel (coal), and hence it meets the primary applicability criteria of the methodology.
The project activity is a power-and-heat plant that encompasses cogeneration plants, i.e. power-and-heat plant in which at least one heat engine simultaneously generates both process heat and power. The total installed capacity of project activity is 27 MW which is acceptable as per the applied large scale methodology.
The installation of a new biomass residue fired power generation unit, which are places existing power generation capacity fired with fossil fuel as in the project plant (power capacity expansion projects) is also included in this methodology.
For the purposes of this methodology, heat does not include waste heat, i.e. heat that is transferred to the environment without utilization, for example, heating flue gas, heat transferred to cooling towers or any other heat losses.
The biomass used by the project plant is not stored for more than one year. The biomass used by the project plant is not processed chemically or biologically (e.g. through esterification, fermentation, hydrolysis, pyrolysis, bio-or chemical degradation, etc.) prior to combustion.

The Project Activity uses biomass residues from a production process (e.g. production of sugar), and the implementation of the project does not result in an increase of the processing capacity of (the industrial facility generating the residues) raw input (e.g. sugar) or in other substantial changes (e.g. product change) in this process.
The project activity unit does not co-fire fossil fuel and/or does not exceed the limit of 25%co-firing fossil fuel criteria as per the UCR Protocol for such projects.
Bio-mass generated power is used for direct grid supply and for meeting the captive need facility. The project activity is involves the grid-connected bagasse based electricity generation capacity involving the installation of facilities for all owing the export of electricity to the regional grid.
Bio-mass is not sourced from dedicated plantations. The existing installed turbo-generators are fired by bagasse, a by-product of the sugarcane processing and a biomass residue
Bagasse is burnt in boilers as generated from the sugar mill and does not require any specific technology for its preparation before combustion. No fuel preparation equipment has been installed at site for preparation of bagasse. Hence no significant energy quantities are required to prepare the biomass residues for fuel combustion.
The project activity also does not include any GHG emissions related to the decomposition or burning of biomass. The baseline heat emissions for the project activity are not included in the project boundary nor does it claim for emission reductions from heat.

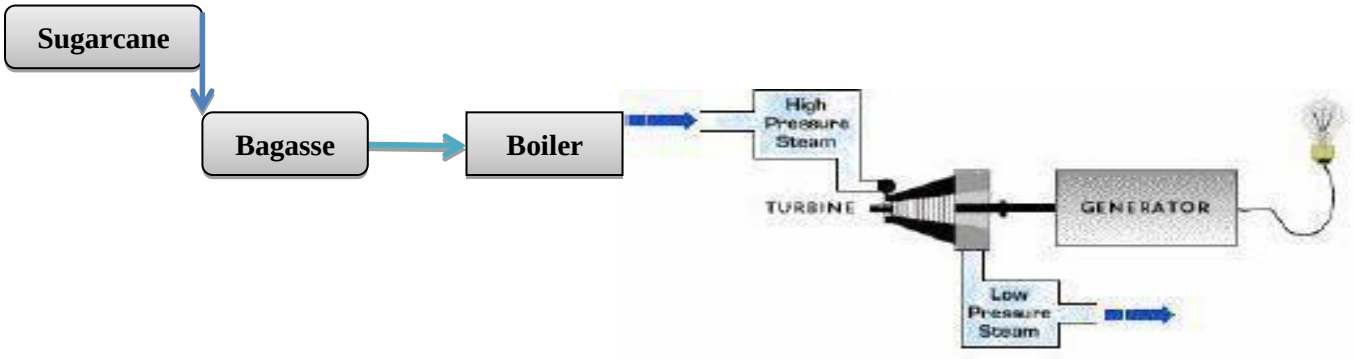
B.2. Applicability of double counting emission reductions >>

The project is not registered in any other GHG mechanism. Hence, there will not be any double counting possibility.

B.3. Project boundary, sources and green house gases (GHGs) >>

The spatial extent of the project boundary encompasses:

- All plants generating power and/or heat located at the project site, whether fired with biomass, fossil fuels or a combination of both.
- All power plants connected physically to the electricity system (grid) that he project plant is connected to.
- The means of transportation of biomass to the project site if the feedstock is biomass residues, the site where the biomass residues would have been left for or dumped.



B.4. Establishment and description of baseline scenario >>

❖ Emission reductions are calculated as follows:

$ERy = BEy - PEy - LEy$ (Eq.1) Where,

$ERy =$ Emissions reductions in year y (tCO2)

$BEy =$ Baseline emissions in year y (tCO2)

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

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

The baseline scenario identified at the PCN stage of the project activity is:

Renewable energy technologies that displace technologies using fossil fuels, wherein the simplified baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity, times an emission factor for the fossil fuel displaced. The baseline emissions due to displacement of electricity are determined by net quantity of electricity generation as a result of the project activity (incremental to baseline generation) during the year y in MWh times the CO_2 emission factor for the electricity displaced due to the project activity during the year y in tons CO_2/MWh Given that steam and electric power generation for internal consumption is part of the present project activity, emission reductions are only claimed from on-site incremental power generation that is injected to the grid. Therefore, the base line scenario is the emission of GHG from the present energy grid. Emission Reductions (ERy) the emission reduction due to the project activity is calculated as the difference between the baseline emissions and the sum of the project emissions and the leakage:

$ERy = BEy - (PEy + LEy)$ Equation-(1)

BE_y = Baseline emissions in year y (tCO2e)

As mentioned in the methodology the baseline emissions are calculated as follows:

BE_y= EGpj, y*EF grid, y Equation (2)

BE_y = 17454 * 0.9 = 15,700

Where:

$EG_{grid,y}$=Quantity of net electricity generation that is fed into the local grid as a result of the implementation of the project activity in year y (MWh)

$EF_{grid,y}$=The CO2 emission factor for grid connected power generation in year y calculated using UCR Standard emission factor (0.9 tCO2/MWh).

❖ Project Emissions is calculated as follow:

$PE_y = PE_{Biomass,y} + PE_{FF,y} + PE_{GR1,y} + PE_{GR2,y} + PE_{CBR,y} +$

$E_{BG2,y}$

Where,

PE_y	=	Project emissions in year *y* (tCO_2)
$PE_{Biomass,y}$	=	Project emissions associated with the biomass and biomass residues inyear *y* (t CO_2)
$PE_{FF,y}$	=	Emissions during the year *y* due to fossil fuel consumption at the project site (t CO_2)
$PE_{GR1,y}$	=	Emissions during the year *y* due to grid electricity imports to the projectsite (t CO_2)
$PE_{GR2,y}$	=	Emissions due to are reduction in electricity generation at the project site in year *y* (t CO_2)
$PE_{CBR,y}$	=	Emissions from the combustion of biomass during the year *y*(t CO_2e)
$PE_{BG2,y}$	=	Emissions from the production of biogas in year *y* (tCO_2e)

In this project activity electricity is imported from the grid ($PE_{GR1, y}$) which will count as project emissions. This amount will be deducted from the total value of emission reduction post-ante.

For large-scale project activities, a net-to-gross adjustment of 10%, i.e. the emission reductions determined based on the applied methodology by 0.9 to determine the final amount of emission reductions that can be claimed per vintage.
Therefore,

PEy = 15700 * 10% Equation (3)

PE_y = 1570.

Leakage:

It is an integrated Co-gen plant. The biomass is the output of the sugar mill, which is being consumed by the power plant as a source of fuel. Therefore, there is no leakage due to cultivation of biomass in a dedicated plantation. As it is integrated Co-gen power plant, there is no leakage due to transportation of biomass from outside of project activity.
Also, biomass is not processed outside of project boundary hence there are no leakage emissions being generated.

$LEy = 0$ Equation (4)

$$ERy = BEy - (PEy + LEy)$$

$$= 15700 - (1570+0)$$

$$= 14{,}130 \text{ CoU's}$$

	Source	GHG	Included?	Justification/Explanation
Baseline	GHG Emissions from fossil fuel in Grid Baseline Power Generation Uncontrolled burning or decay of surplus biomass residue	CO2	**Included**	Major source of GHG emissions
		CH4	Excluded	Excluded for simplification. This is conservative
		NO2	Excluded	Excluded for simplification. This is conservative
		CO2	Excluded	Excluded for simplification. This is conservative
		CH4	Excluded	Excluded for simplification. This is conservative
		No2	Excluded	Excluded for simplification. This is conservative
Project Activity	Emissions from Biomass Project Activity On-site fossil fuel and electricity consumption due to the project activity (stationary or mobile) Off-site transportation of biomass residue Combustion of biomass residue for electricity and / or heat generation	CO2	Excluded	No fossil fuel / electricity are consumed at the project site due to the project activity. No biomass residue from off-site will be used for the project activity. Excluded for simplification. This is conservative
		CH4	Excluded	No fossil fuel / electricity is consumed at the project site due to the project activity. No biomass residue from off-site will be used for the project activity Excluded for simplification. This is conservative
	Storage of biomass residue	NO2	Excluded	Excluded for simplification. This is conservative

Prior History >>

The project has never applied for the GHG mechanism in the past.

B.5. Changes to start date of crediting period >>

The start date of crediting period is 05-12-2013.

B.6. Permanent changes from PCN monitoring plan, applied methodology or applied standardized baseline >>

There is a change in PCN (Version-1). The name of the project proponent is M/s Karmayogi Kundlikrao Ramrao Jagtap Patil Kukadi sahakari sakhar karkhana and the methodology used is the same but the project emission has been added in the current version.

B.7. Monitoring period number and duration >>

First Issuance Period	:	9 Years 26 days.
Crediting Period	:	05-12-2013 to 31-12-2022
Monitoring Period	:	05-12-2013 to 31-12-2022

[Note: Because of drought situation in the area of sugar factory i.e. Ahmednagar district in 2019-2020 season, the factory was close due to unavailability of sugarcane in the area.]

B.8. Monitoring Plan

Data and Parameters to be monitored

Data/Parameter	EF Grid y
Data unit	tCO2/MWh
Description	A "grid emission factor" refers to a CO2 emission factor (tCO2/MWh) which will be associated with each unit of electricity provided by an electricity system. The UCR recommends an emission factor of 0.9 tCO2/MWh for the 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	https://a23e347601d72166dcd6-16da518ed3035d35cf0439f1cdf449c9.ssl.cf2.rackcdn.com//Documents/UCRCoUStandardAug2022updatedVer6_090822220127104470.pdf
Value applied	0.9
Measurement methods and procedures	-
Monitoring frequency	Ex-ante fixed parameter
Purpose of Data	For the calculation of Emission Factor of the grid
Additional Comment	The combined margin emission factor as per CEA database (current version16, Year2021) results into higher emission factor. Hence for 2021 vintage UCR default emission factor remains conservative.

Data/Parameter	EG_y
Data unit	MWh/year

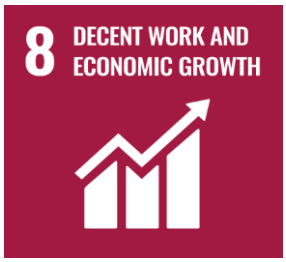
Description	Quantity of net electricity supplied to the grid as a result of the implementation of the project activity in year y (MWh)
Source of data	Energy Bills/invoices
Measurement procedures (if any):	Data Type: Measured Monitoring equipment: Energy Meters are used for monitoring Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually Archiving Policy: Paper & Electronic Calibration frequency: 5 years (as per CEA provision) Generally, the calculation is done by the Authority/Discom and the project proponent has no control over the authority for the calculation. Therefore, based on the joint meter reading certificates/credit notes, the project shall raise the invoice for monthly payments. EL= E(export)-E(import)
Measurement Frequency:	Monthly
Value applied:	To be applied as per actual data
QA/QC procedures applied:	Calibration of the Main meters will be carried out once in five (5) years as per National Standards (as per the provision of CEA, India) and faulty meters will be duly replaced immediately as per the provision of power purchase agreement. Cross Checking: Quantity of net electricity supplied to the grid will be cross checked from the invoices raised by the project participant to the grid.
Purpose of data:	The Data/Parameter is required to calculate the baseline emission.
Any comment:	All the data will be archived till a period of two years from the end of the crediting period.

United Nations Sustainable Development Goals:

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

Positive contribution of the project to the following Sustainable Development Goals:

SDG 7: Climate Action: **Affordable and Clean Energy**: The project would lead to reduction of CO2 due to implementation of project activity.



SDG 8: Decent Work and Economic Growth: The project is generating clean energy.

SDG 13: The project is providing direct employment. The project leads to Trainings & workshops which are conducted for the O&M staff of the PP.