PROJECT CONCEPT NOTE

CARBON OFFSET UNIT (CoU) PROJECT

Title: 28.7MW Biomass based Power Generation by M/s CBKSSKN, Chikkodi by Energy Advisory Services

Version 1.0

Date 25/04/2023

First CoU Issuance Period: 09 years, 0 months

Date: 01/01/2013to 31/12/2021

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

BASIC INFORMATION	
Title of the project activity	28.7MW Biomass based Power Generation by M/s CBKSSKN, Chikkodi by Energy Advisory Services
Scale of the project activity	Large Scale
Completion date of the PCN	**25/04/2023**
Project participants	**Project Proponent:**M/s Chidanand Basaprabhu Kore Sahakari Sakkare Karkhane Niyamit Chikkodi **Aggregator:** Energy Advisory Services Pvt. Ltd.
Host Party	INDIA
Applied methodologies and standardized baselines	**ACM0006** - Large-scale Consolidated Methodology: Electricity and heat generation from biomass Version 16.0 and National electricity/power authority published data & UCR Standard for **Emission Factor**
Sectoral scopes	Biomass, or Liquid Biofuel – Electricity
Estimated amount of total GHG emission reductions per year	46,173CoUs (46.173 tCO2eq)
Estimated total amount of average GHG emission reductions for the entire monitoring period	4,15,290 CoUs (415290 tCO2eq)

SECTION A. Description of project activity

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

The project "28.7 MW Bagasse Based Power Plant is in Village Nanadi, Tehsil Chikodi, District Belagavi, State Karnataka, Country INDIA.

Co-Generation (cogen) Power Project is having two units, 20.7 MW and 8.0 MW. The first unit of 20.7 MW unit was successfully commissioned by Karnataka Power Transmission Corporation Limited (KPTCL) on **25/03/2004**and in operation from that date. The second unit of 8.0 MW was commissioned KPTCL on **20/02/2020** and operational since that date. The Project is owned and operated by M/s Chidanand Basaprabhu Kore Sahakari Sakkare Karkhane Niyamit(CBKSSKN), Chikkodi. (Hereby to be called as Project Proponent (PP))

The details of the registered project are as follows:

Purpose of the project activity:

The PP has set up an integrated new sugar mill of 5500 TCD capacity along with eco-friendly 20.7 MW capacity Cogen power project for decentralized generation of exportable surplus power, mainly from renewable source of fuel (bagasse). The capacity of the sugar mill enhanced to 10,000 TCD in the year 2014 and the Cogen power plant to 28.7 MW in the year 2020.

The integrated project comprises of a sugar mill for the manufacture of high-quality sugar and ethanol. The by-product from the sugar mill is used in the Cogen power plant during crushing season.

The Cogen power project of 28.7 MW capacity operates on bagasse for around 160 season days of the sugar mill operation. At designed level, it is expected that the project will generate 11 million kWh/y of clean energy and export about 56 million kWh/y through KPTCL grid for sale to KPTCL or to third party consumer as per the prevailing tariff.

All the steam and power requirements of the sugar mill and Cogen power plant will be met internally from the project itself.The project activity employs three boiler and two turbo-generators of the following capacity along with all auxiliaries.

a. 1*150TPH boiler with high pressure and temperature configuration (66kg/cm^2 and 495°C),
b. 1*50 TPH boiler with medium pressure and temperature configuration (45kg/cm^2 and 495°C)
c. 1*15 TPH boiler with low pressure and temperature configuration (10kg/cm^2 and 180°C)
d. 1*20.7 MW Double extraction cum condensing Turbine Generator set, as well as ESP for emission control and DCE control system for efficient operation.
e. 1*8 MW Double extraction cum condensing Turbine Generator set, as well as ESP for emission control and DCE control system for efficient operation.

The power plant also includes the Balance of plants like, bagasse handling/feeding system, ash handling system, compressed air system, cooling towers, electrical system and DCS control system for efficient operation of the plant.

The project activity is the construction and operation of a Cogen power plant/unit that uses bagasse as a renewable energy sources to generate electricity as well as steam and supplies electricity and

steam to the 10,000 TCD sugar mill and 30 KLPD ethanol plant.

The excess power is sold to KPTCL/third party through KPTCL grid. The project activity is thus the displacement of electricity that would be provided to the grid by more-GHG-intensive means like coal, oil and provides long-term benefits to the mitigation of climate change.

Figure 1: 10T cane unloading crane

Figure 2: Overview of 150tph bagasse boiler

Table 1: Sugar production from 2018-19 to 2021-22

	2022-2023	2021-2022	2020-2021	2019-2020	2018-2019
Crushing Capacity (Ton/Day)		10000	10000	10000	10000
Cane Crushed (Lakh M.T.)		11.78	10.14	6.58	9.29
Sugar Produced (Lakh Qtl)		12.68	11.31	7.00	10.85
Sugar Recovery (%)		11.80	11.53	11.76	11.68
Molasses Produced (M.T.)		63900	49760	38580	37050
Sugarcane Rate/Ton (Rs.)					

Data Source: https://www.anekantprakashan.com/sugar-factory/chidanand-basavprabhu-kore-sahakari-sakhar-karkhana-niyamit-shree-doodhaganga-krishna-ssk-niyamit-chikodi-karnataka/263

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 main objective of business is to encourage proper devolvement of agricultural industrial amongst members on co-operative lives by promotions of co-operative and joint forming methods to secure best merits of modern large-scale agriculture production to the owners of the lands. The nature of business is to encourage self-help, thrift and co-operate amongst members

- The project activity contributed to employment generation in the local area for both skilled & unskilled people for operation and maintenance of the plant. The project creates several permanent jobs, in addition to persons gaining indirect jobs through the supply of sugarcane to the plant. Apart from the direct and indirect employment generation, the project also encourages indirect employment by setting up other agro-based industries due to availability of power supply from the project.

- 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 bagasse 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.

- The bagasse generated in sugar mills is generally more than the requirement of the sugar mill and hence get disposed in unplanned ways including dumping into nearby land or rivers. The excess bagasse is used to generate electricity and supplied to the grid. This will help to reduce the GHG emission from the coal/oil-based power plant by reducing the power generation by these plants to some extent.

- **Economic benefits:**

- The project activity creates employment opportunities during the project stage and operation and maintenance of the Cogen power plant. The project activity results in saving the coal and allowing it to be diverted to other needy section of the economy.

- The project activity helps in conservation of fast depleting natural resources like coal, gas and oil thereby contributing to the economic wellbeing of country.

- 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 bagasse-based power generating plant facilitates the availability of continuous and sustained power to the local industries and agricultural farmers located in remote areas, thereby avoiding the load shedding and low frequency of power.

- 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 >>

1	Country	India
2	State	Karnataka
3	District	Belagavi
4	Tehsil	Chikodi
5	Village	Nanadi
6	Coordinates	Latitude: $16^0$30’26” N Longitude: $74^0$36’51” E
7	Project Code	

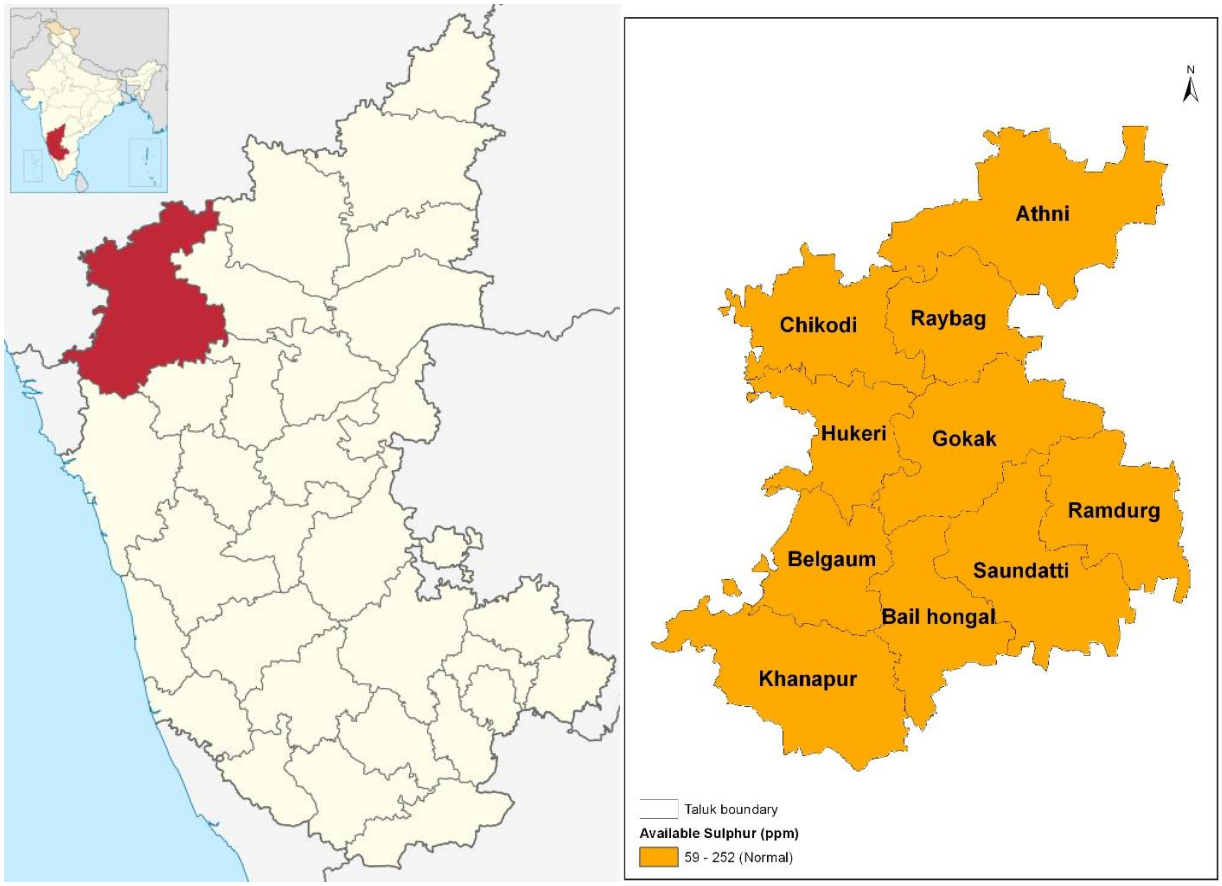

Figure 3: Location of Chikodi Taluk

Figure 4: Location of the plant near Chikodi

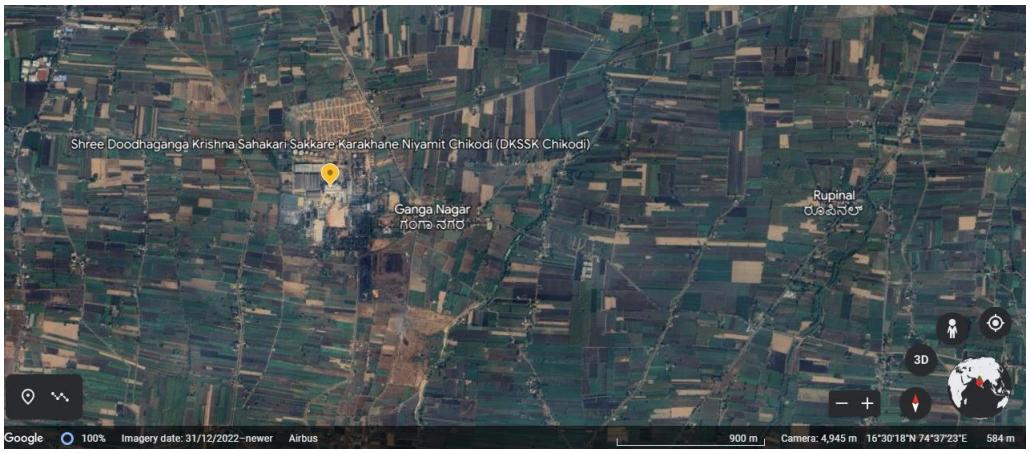

Figure 5: Plant co-ordinates

A.4. Technologies/measures >>

The project activity involves three (3) boilers and two (2) steam turbo generators in the plant to generate steam and power using Bagasse as fuel in the boilers.

the technologies or workings of the system. Provide diagrams of flow, process flow chart (cradle to grave), critical systems, overview of design etc. Mention the renewable fuel, process involved, end use. Provide installation tables if the project activity involves multiple sub installations in phased approaches etc. Provide pictures where applicable of the installation or technology.

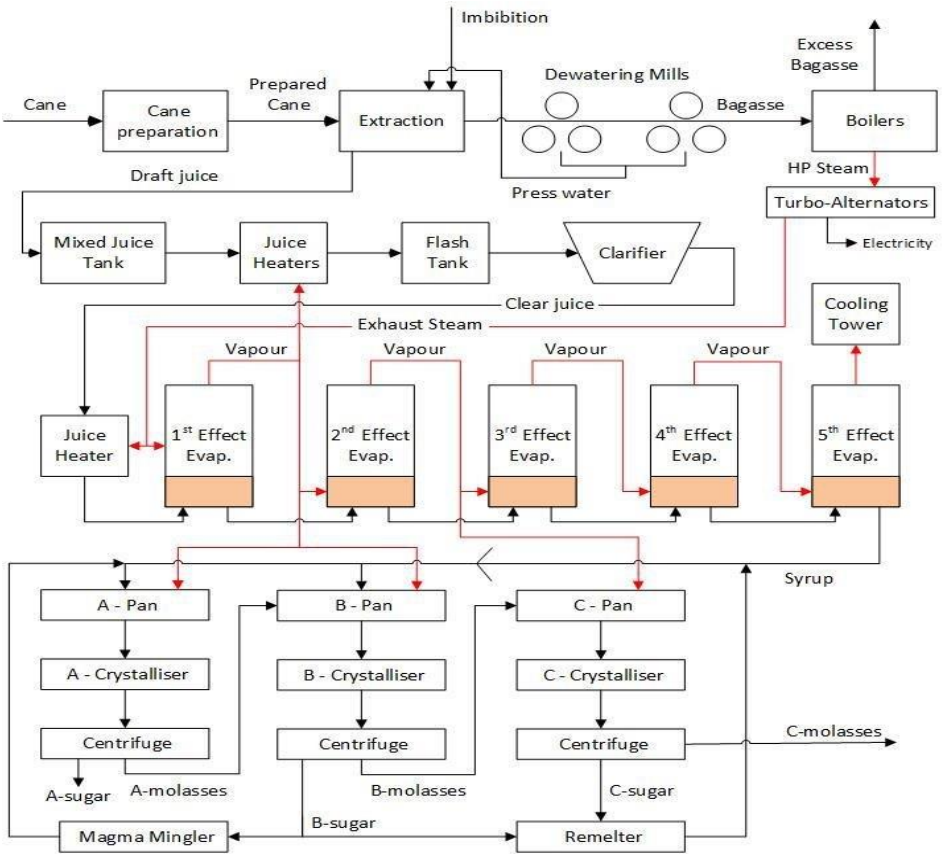

Figure 6: Process flow diagram of typical sugar mill

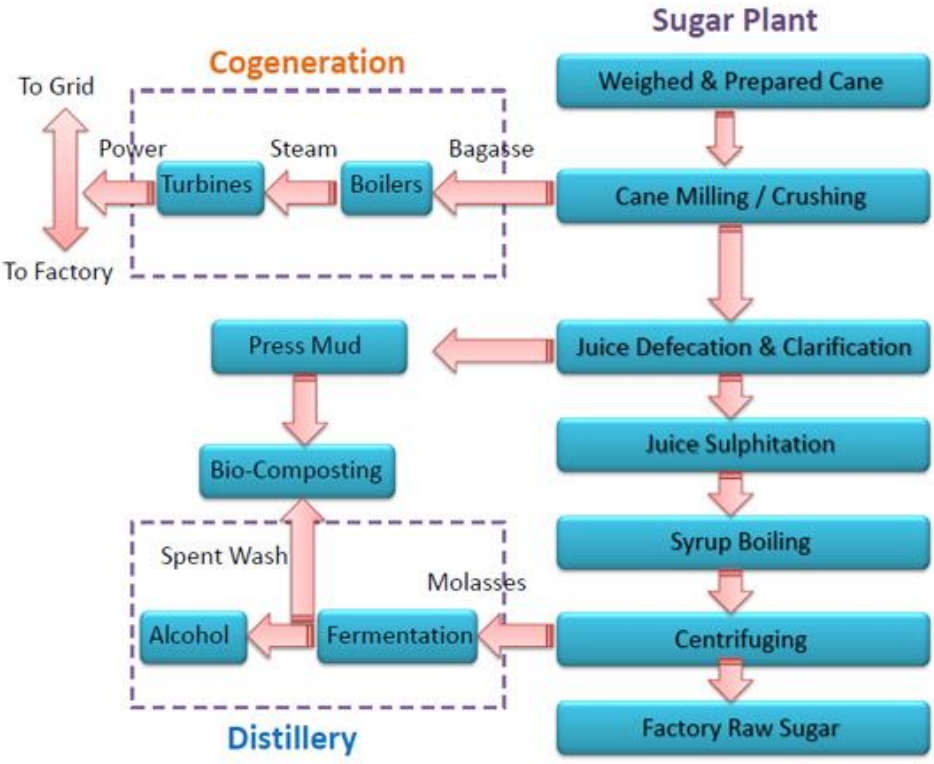

Figure 7: Sugar& Cogen power plant process flow chart

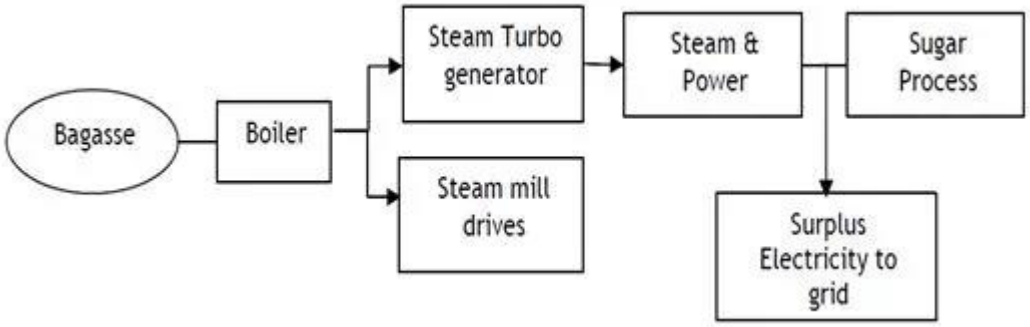

Figure 8: Typical Cogen power plant

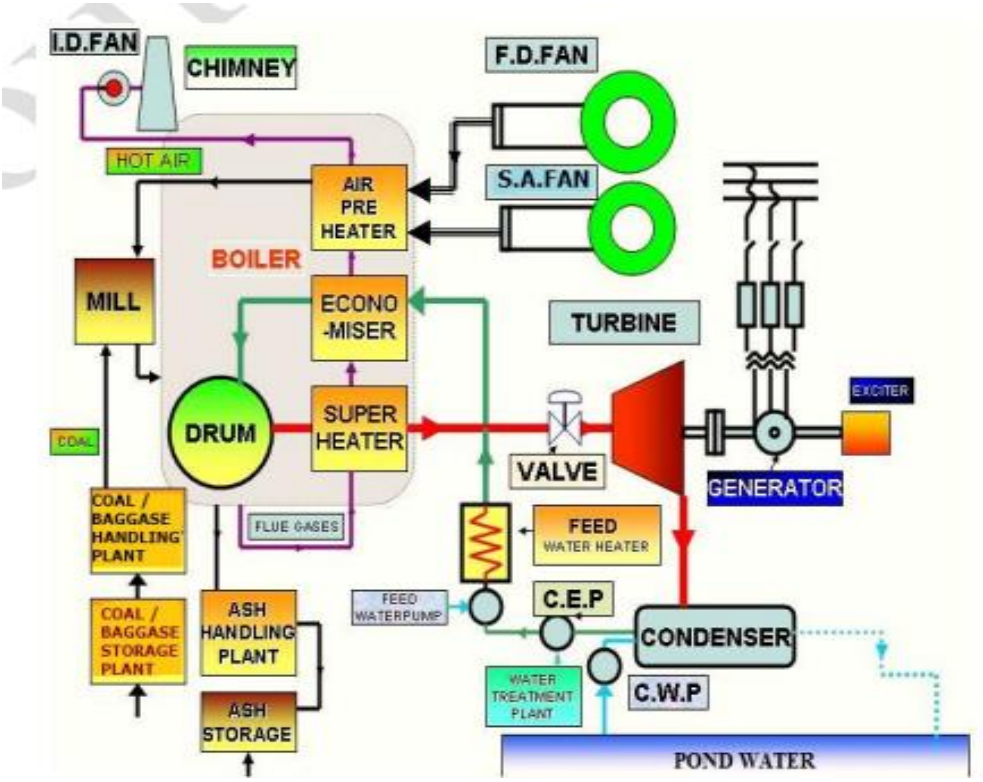

Figure 9: Typical Bagasse based power plant

If applicable, provide technical specifications of the key components that are used for baseline calculations or methodology selection limits as follows:

Table 2: Technical specification of Boiler

Description	UoM	Value		
		125 tph	50 tph	15 tph
Make		Walchandnagar	Walchandnagar	Industrial Boiler
Commissioning year		2004	1994	2015
Fuel		Bagasse with 50% moisture	Bagasse with 50% moisture	Bagasse with 50% moisture
Furnace type		Travelling grate with continuous font ash discharge	Dumping grate	Dumping grate

MCR steam flow	tph	125	50	15
Steam pressure at superheater outlet	Kg/cm^2	66	45	10.55
Steam temperature at superheater outlet	^0C	495	495	180
Feed water temperature at the inlet of economiser	^0C	160	105	-
Efficiency at MCR		70%	70%	-

Table 3: Technical specification of Steam Turbo Generator

Description	UoM	Value	
		20.7 MW	8 MW
Make		BHEL	Arani Power Systems (P) Limited
Commissioning year		2004	2014
Type		Extraction cum condensing	Back pressure
MCR steam flow	tph	125	50
Steam pressure at turbine inlet	ata	64	43
Steam temperature at turbine inlet	^0C	490	495
Extraction pressure -1	ata	16	NA
Extraction pressure - 2	ata	3	
Exhaust steam pressure	ata	0.075	3
Exhaust steam temperature	^0C	140	140
Generator type		Totally enclosed (IP54) horizontal, brushless type, 3-phase synchronous generator	Totally enclosed (IP54) horizontal, brushless type, 3-phase synchronous generator
Generator rated voltage	kV	11	11+/-10%
Rated frequency	Hz	50+/-5%	50+/-5%
Power output at generator terminal@ 0.8pf	MWe	20.7	8

A.5. Parties and project participants >>

Party (Host)	Participants
India	**Project Owner:** M/s Chidanand Basaprabhu Kore Sahakari Sakkare Karkhane Niyamit Chikkodi **Project Aggregator:** Energy Advisory Services Pvt Limited, Bangalore, Karnataka. Email: manoj@easpl.co.in

A.6. Baseline Emissions>>

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

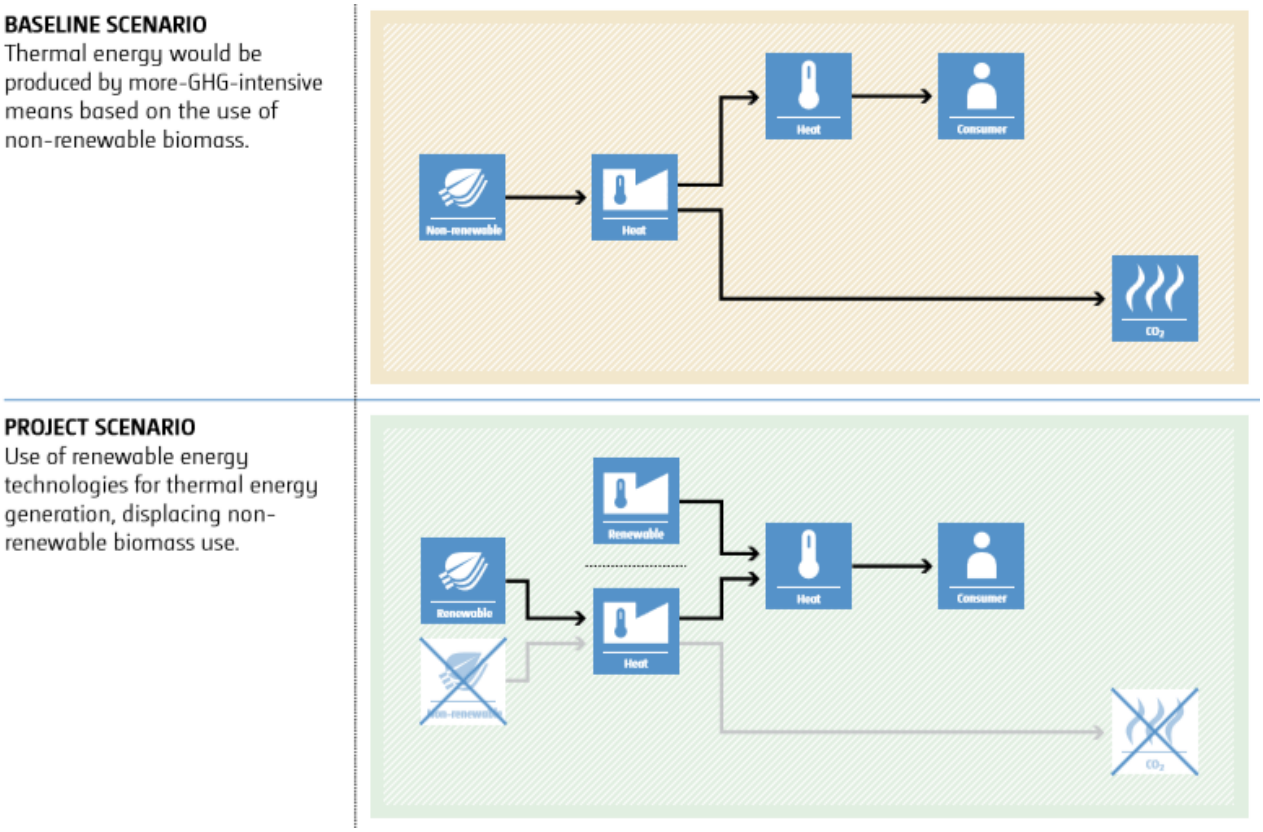

Figure 10: Project scenario

The proposed project activity uses bagasse as fuel for the cogeneration power plant. The bagasse being a renewable bio-mass fuel, it 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 CO_2 on-site emissions associated with bagasse combustion.

The crushing season of around 160 days is envisaged per year for project activity operation. Without this project activity, the energy load equal to electricity supplied to grid would have been taken-up by grid mix and emission of CO_2 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. De-bundling>>

This Cogen power plant project is not a de-bundled component of a larger 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– Biomass, or Liquid Biofuel - Electricity

PROJECT TYPE: Type I: Biomass energy project activities with a maximum output capacity of 15 MW (or an appropriate equivalent);

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

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

This methodology is applicable to project activities that operate biomass (co-)fired power-and-heat plants. The Cogen plant can be considered as per the below applicability:

Applicable Criteria	**Project condition**
The methodology is applicable under the following conditions: (a) Biomass used by the project plant is limited to biomass residues, biogas, RDF2 and/or biomass from dedicated plantations; (b) Fossil fuels may be co-fired in the project plant. However, the amount of fossil fuels co-fired does not exceed 80% of the total fuel fired on energy basis. (c) For projects that use biomass residues from a production process (e.g. production of sugar or wood panel boards), 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, rice, logs, etc.) or in other substantial changes (e.g. product change) in this process; (d) The biomass used by the project plant is not stored for more than one year; (e) 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. Drying and mechanical processing, such as shredding and palletisation, are allowed.	The project is implemented to use 100% of the bagasse generated in the cane crushing season, hence the criteria points (b), (c), (d) and (e) are applicable.

In the case of fuel switch project activities, the use of biomass or the increase in the use of biomass as compared to the baseline scenario is technically not possible at the project site without a capital investment in: (a) The retrofit or replacement of existing heat generators/boilers; or (b) The installation of new heat generators/boilers; or (c) A new dedicated supply chain of biomass established for the project (e.g. collecting and cleaning contaminated new sources of biomass residues that could otherwise not be used for energy purposes); or (d) Equipment for preparation and feeding of biomass.	The project is a new greenfield/brownfield project and hence this criterion is not applicable.
If biogas is used for power and heat generation, the biogas must be generated by anaerobic digestion of wastewater, and: (a) If the wastewater generation source is registered as a CDM project activity, the details of the wastewater project shall be included in the PDD, and emission reductions from biogas energy generation are claimed using this methodology; (b) If the wastewater source is not a CDM project, the amount of biogas does not exceed 50% of the total fuel fired on energy basis.	There is no production of biogas and hence this criterion is not applicable.
In the case biomass from dedicated plantations is used, the "TOOL16: Project and leakage emissions from biomass" shall apply to determine the relevant project and leakage emissions from cultivation of biomass and from the utilization of biomass residues.	The bagasse generated as a waste from the sugar mill is being used for the generation of steam & power and hence this criterion is also not applicable.
The methodology is only applicable if the baseline scenario, as identified per the "Selection of the baseline scenario and demonstration of additionality" section hereunder, is: (a) For power generation: scenarios P2 to P7, or a combination of any of those scenarios; and (b) For heat generation: scenarios H2 to H7, or a	As per the UCR list of eligible projects and methodologies found in the UCR Program Manual Ver. 4, this criterion is not applicable.

combination of any of those scenarios; (c) If some of the heat generated by the CDM project activity is converted to mechanical power through steam turbines, for mechanical power generation: scenarios M2 to M5: a. In cases M2 and M3, if the steam turbine(s) are used for mechanical power in the project, the turbine(s) used in the baseline shall be at least as efficient as the steam turbine(s) used for mechanical power in the project; b. In cases M4 and M5, steam turbine(s) generating mechanical power to be used for the same purpose as in the baseline are not allowed; (d) For the use of biomass residues: scenarios B1 to B5, or a combination of any of those scenarios; (e) For the use of biogas: scenarios BG1 to BG3, or a combination of any of those scenarios.	

B.3. 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.4. Project boundary, sources and greenhouse gases (GHGs)>>

The project boundary includes the physical, geographical site(s) of:

1. All plants generating power and/or heat located at the project site, whether fired with biomass (bagasse), fossil fuels or a combination of both.

2. All power plants connected physically to the electricity system (grid) that the project plant is connected to.

3. The means of transportation of biomass (bagasse) to the project site.

4. If the feedstock is biomass (bagasse) residues, the site where the biomass residues would have been left for decay or dumped.

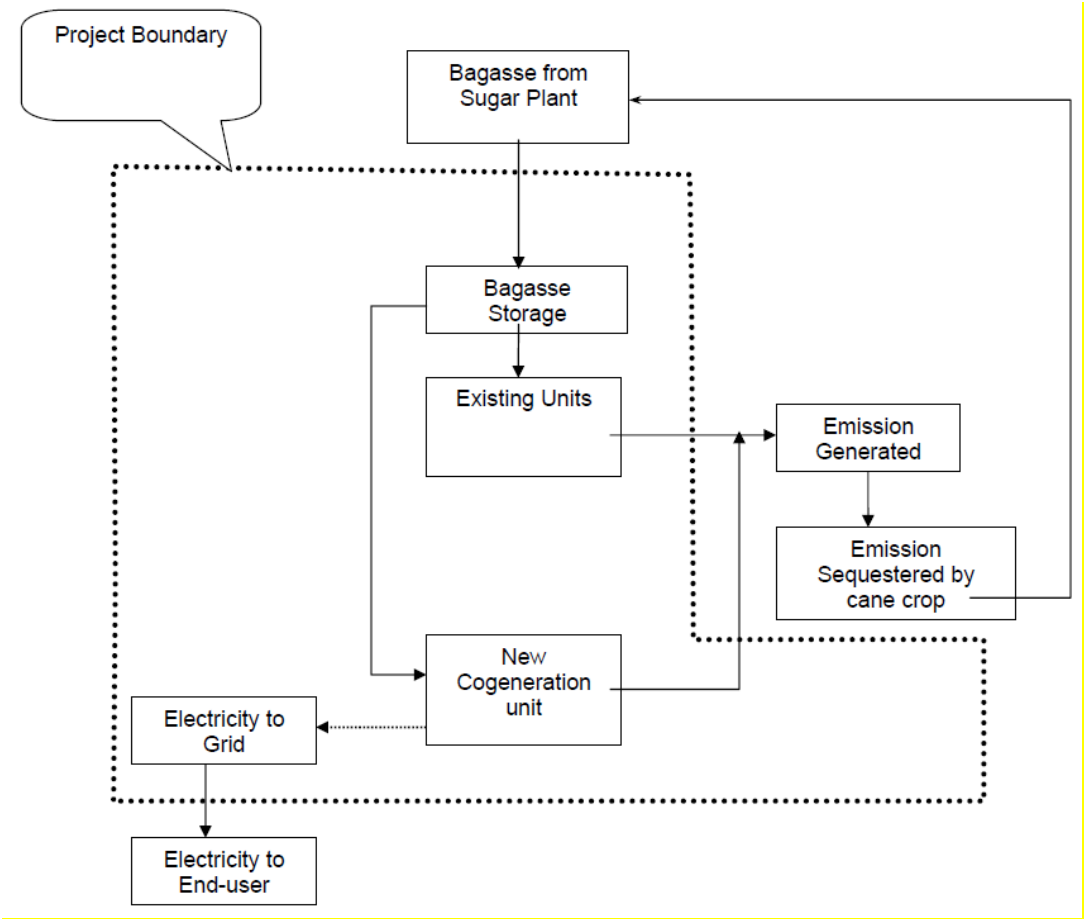

Figure 11: Project boundary

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

Provide details of emission displacement rates/coefficients/factors established by the UCR Standard or appropriate tools or as directed by the methodology selected. Include rates, parameters, default values and all formulas necessary for estimating baseline emissions, project emissions (if any) and leakages (if any).

EXAMPLE

Estimated Emission Reductions: $BE_y = BE_{y1} + BEy_2$

BE_y= Total Baseline Emissions in a year.

BE_{y2}= Baseline Emissions from replacing fuel wood in cook stoves as per the UCR protocol in a year y.

BE_{y1}= min $\{BE_{y3}, MD_y\}$

BE_{y3} = Baseline scenario in the absence of the project activity where animal manure is left to decay anaerobically within the project boundary and methane is emitted to the atmosphere in a year y.

$BE_{y3} = D_{CH4} \times GWP_{CH4} \times UF_b \times \sum MCF_j \times B_{O,LT} \times Q_{manure,\ j,\ LT,y} \times SVS_{j,LT,y}$

where:

BE_{grid}	=	Baseline emissions for the grid electricity displaced by the project in year y (t CO2e)
$EG_{y,grid}$	=	Amount of grid electricity displaced by project in year y (MWh)
$EF_{y,grid}$	=	Emission factor of the grid (t CO2e/MWh) = 0.9 (UCR Standard)

BE_{y1}	=	Baseline emissions from biomass and other organic matter left to decay within the project boundary and methane is emitted to the atmosphere
$BE_{swds,y}$	=	Baseline emission determination of digested waste that would otherwise have been disposed in stockpiles shall follow relevant procedures in AMS-III.E. This is equal to the yearly methane generation potential of the SWDS at the year y, considering all the wastes deposited in it since its beginning of operation, and without considering any removal of wastes by the project activity.
$BE_{manure,y}$	=	Baseline emissions from the manure co-digested by the project activities = 0
$BE_{WW,y}$	=	Baseline emissions from the wastewater co-digested = 0
$MD_{reg,,y}$	=	Amount of methane that would have to be captured and combusted in the year y to comply with the prevailing regulations (tonne) = 0
GWP_{CH4}	=	21 is the default IPCC value of CH_4 applicable to the crediting period ($tCO_{2e}/t\ CH_4$)

Estimated Annual or Total baseline emission reductions (BE_y)= XXXXCoUs /year (XXXX tCO_{2eq}/yr)

B.6. Prior History>>

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

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

The start date of crediting period is 01/01/2013

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

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

B.9. Monitoring period number and duration>>

First Issuance Period: 09 years, 0 months – 01/01/2013 to 31/12/2021

B.8. Monitoring plan>>

USE THE FOLLOWING TABLES TO FOR PARAMETERS BEING MONITORED OR USED IN EMISSION REDUCTIONS DETERMINATION

Data/Parameter	$EF_{\text{Grid}y}$
Data unit	tCO_2 /MWh
Description	A "grid emission factor" refers to a CO_2 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 2014 - 2020 years as a 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	Website link to be updated
Value(s) applied	0.9 as a conservative figure
Measurement methods and procedures	Joint meter reading
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 version 18, Year 2022) results into higher emission factor. Hence for 2021 vintage UCR default emission factor remains conservative.

Data / Parameter:	ELMWhy
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:	Monthly Joint Meter Readings (JMRs)
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)
Monitoring frequency:	Monthly
Values applied	To be applied as per actual data
QA/QC procedures:	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 periods.