PROJECT CONCEPT NOTE

CARBON OFFSET UNIT (CoU) PROJECT

Title: Renewable Projects at Hardoi, Uttar Pradesh.

Version 1.0

Date: 14/03/2023

First CoU Issuance Period: 10 years

Date: 01/01/2013 to 01/01/2023

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

BASIC INFORMATION	
Title of the project activity	Renewable Projects at Hardoi, Uttar Pradesh
Scale of the project activity	Large Scale
Completion date of the PCN	14/03/2023
Project participants	First Climate (India) Private Limited (Aggregator) DCM Shriram Ltd (Sugar Unit: Hariawan) (Developer)
Host Party	India
Applied methodologies and standardized baselines	**CDM UNFCCC Methodology** ACM0006: Electricity and heat generation from biomass (Ver. 16).
Sectoral scopes	01- Energy industries (renewable -/ non-renewable sources)
Estimated amount of total GHG emission reductions	An ex-ante estimate is 1,39,968 CoUs (1,39,968 tCO_2 eq/annum).

SECTION A. Description of project activity

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

The project titled "Renewable Projects at Hardoi, Uttar Pradesh" developed by DCM Shriram Ltd (Sugar Unit: Hariawan) is located at Hariawan Village- Hariawan, District- Hardoi- 241405, Uttar Pradesh, India.

The details of the project are as follows:

Purpose of the project activity:

The project activities are promoted by DCM Shriram Limited (Sugar Unit: Hariawan), (henceforth referred as DCM) in their sugar mill.

This Greenfield project activity involves the installation of the following units in their sugar mill at Hariawan:

Project I: Two 60 TPH biomass fired boilers connected to one 12MW and one 13MW turbine sums up to 25 MW was commissioned in 2006 and 2008 respectively.

Project II: 150 TPH biomass fired boiler connected to a 30 MW turbine commissioned in 13/11/2020.

The units were synchronized with the grid on 29/11/2008.

Installation of these project activities will allow DCM to export renewable electricity to the Uttar Pradesh electricity grid. DCM has signed PPA with the state Dis-com for both projects, as follows:

Project I: PPA of 15 MW
Projects II: PPA of 21 MW

DCM is expected to generate 237.6 GWh of electricity per annum among which 155.52 GWh will be exported to Uttar Pradesh Power Transmission Corporation Limited (UPPTCL) after commissioning of all 3 turbines.

The purpose of the project activity is to provide renewable electricity to the grid and increase the percentage of renewable energy mix in the grid.

In absence of the project activity, equivalent amount of electricity which is supplied by this project activity would have been supplied to the grid by fossil fuel dominated power plant(s) connected to the grid. Hence, baseline of this project is, equivalent amount of electricity would have been supplied from fossil fuel dominated power plants connected with the Indian grid mix. After commissioning of all 3 projects, project activity thus reduces 139,968 t-CO2e/annum greenhouse gas emissions (GHG) by supplying green power to grid. Therefore, the UCR project activity thus proposes to reduce GHG emissions by displacing the fossil fuel dominated grid-based electricity with biomass based renewable electricity.

The project activity uses bagasse and other biomass residue as fuel for cogeneration power unit, which is a renewable and carbon neutral bio-mass fuel. Therefore, the project activity leads to zero CO_2 on-

site emissions associated with bagasse and other biomass combustion.

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:

- Employment creation: Besides providing direct employment to the local population in the operation of the boiler, the project activity also provides indirect employment to number of people in activities associated with biomass collection, processing and operation of the boiler.
- The plant will inspire renewable energy adoption in the nearby areas and educate people on the benefits of adopting more sustainable lifestyles.
- The method adopted for cogeneration is controlled direct combustion, which is an environmentally sound technology. This is adopted replacing the practice of open dumping of fuel, which is environmentally unsafe. Prolonged exposure to such gases could lead to health problems.

Environmental benefits:

- Reduction of fossil fuels consumption: With the implementation of the proposed project activity, the renewable energy source will replace the fossil fuels source thus contributing to reduced GHG emissions.
- Utilization of Agricultural residues – The project activity utilizes agricultural residue, which is a carbon neutral fuel hence do not contribute to additional atmospheric CO2 emission as compared to baseline coal.
- As the biomass residues have inherently low sulphur and nitrogen content, the problems of NO_X and SO_X emissions is almost nil.
- The biomass residues are dumped causing air pollution and soil pollution.
- The project activity would ensure the biomass residues are combusted efficiently in the boiler with proper air treatment and handling systems. Thus preventing air and soil pollution and getting economic value from the wastes.

Economic benefits:

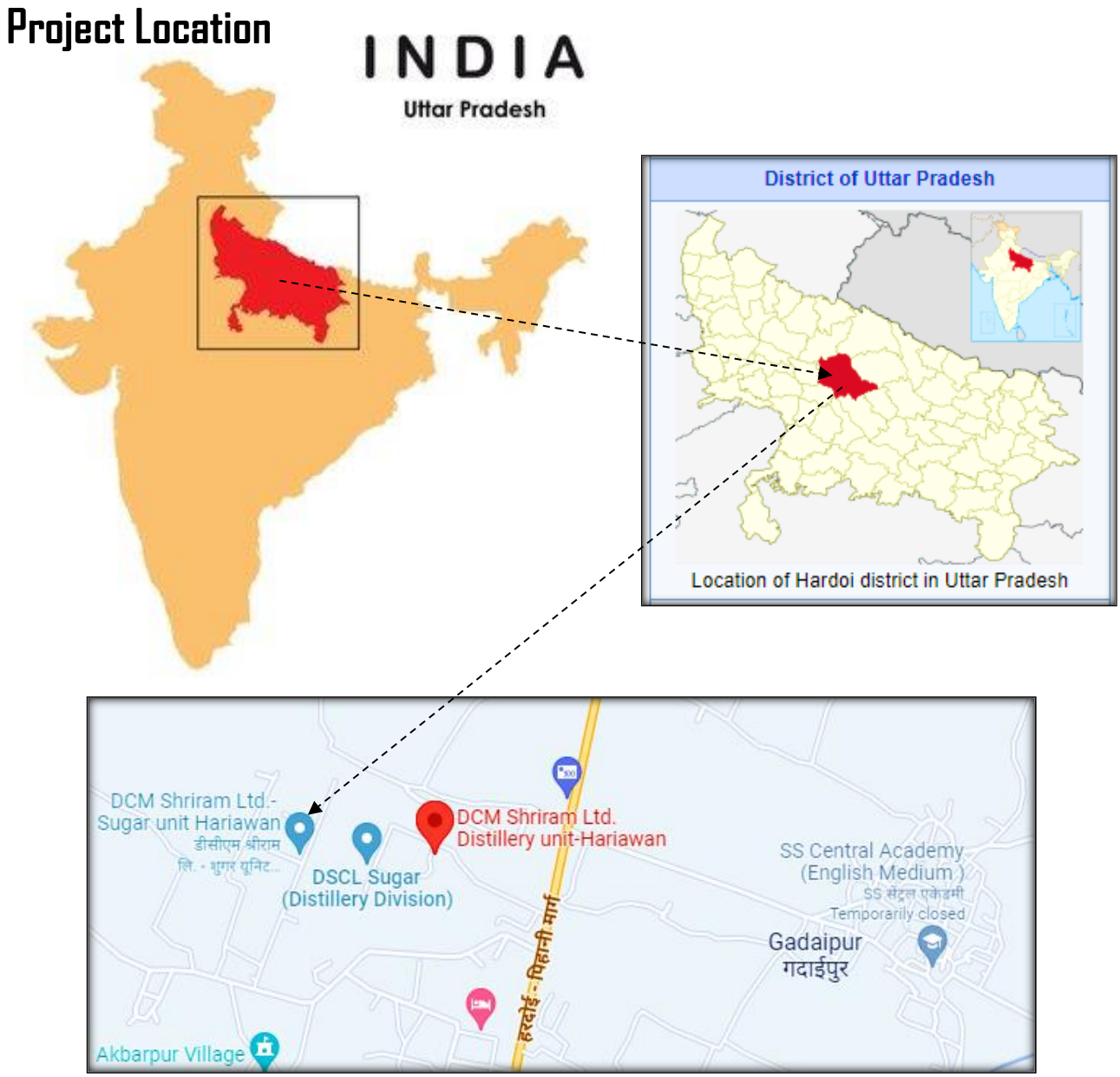
- Reduction of dependence from fossil fuels: The project activity will reduce the Production facility's dependence on fossil fuel. This will reduce the overall dependence of the whole region from the imports and availability of fossil fuels and will allow other industries to use energy resources which will allow their development.
- Project activity acts as a nucleus for other economic activities such as setting up of shops, hotels etc. in and around the area contributing to the economic development around the project activity site.
- Results in increased business opportunities for local contractors and suppliers during the various phases.

A.3. Location of project activity >>

Country: INDIA
District: Hardoi
Village: Hariawan Village
State: Uttar Pradesh
Code: 241405

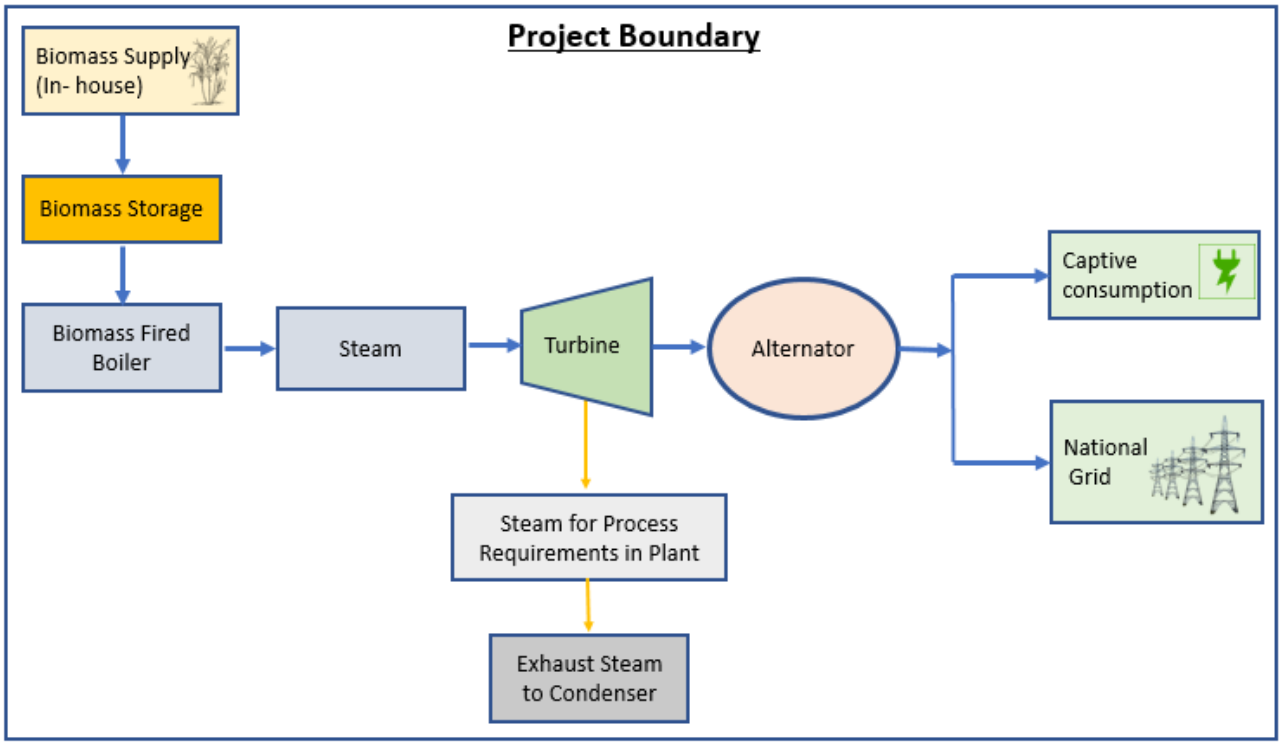
The project site is well connected by district and village roads to the nearest town. The geographic co-ordinates of the project location are:
Latitude: 27.2979° N
Longitude: 80.1875° E

The representative location map is included below:



A.4. Technologies/measures >>

Process flow chart:



The project activity involves generation of renewable electrical energy from the combustion of renewable biomass, to generate process steam and electricity for captive consumption and grid supply. The technology employed is a biomass-based cogeneration system, generating steam and electricity. Thus, the technology to be used in this project is indigenous and is environmentally safe & sound. Emission reductions will be claimed from electricity exported to grid only.

Details of the technical concept is as below:

The sugar mill demands both electrical and thermal energy to run the process. To meet the demand, plant has installed a biomass fired co-generation system at their facility.

As the project is a co-gen system, conventional Rankine cycle is considered. Equipment required for the project are as follows:

• Boiler
• Turbine
• Alternator
• Boiler and Turbine Auxiliaries
• Cooling water system
• Air pollution controlling system
• BOP

Technical details of boiler, turbine and alternator are tabulated below:

Boiler:

Parameter	**Unit**	**Project 1: Details**		**Project 2: Details**
Type of boiler	-	Travelling Grate	Travelling Grate	Travelling Grate
Boiler rated capacity	TPH	60	60	150
Steam Pressure	kg/cm2	88	88	111
Steam Temperature	Deg. C	515 +/- 5	515 +/- 5	540 +/- 5
Feed water Temperature	Deg. C	120	120	130
Fuel Type	-	Bagasse and other biomass	Bagasse and other biomass	Bagasse and other biomass

Turbine:

Parameter	**Unit**	**Project 1: Details**		**Project 2: Details**
Capacity	MW	12	13	30
Inlet steam pressure	kg/cm2	86	86	105
Inlet steam temperature	Deg. C	510	510	535
Inlet Stem Quantity (maximum as per design)	TPH	65	69	150
Extraction pressure	kg/cm2	2.2	2.2	3

Alternator:

Parameter	**Unit**	**Project 1: Details**		**Project 2: Details**
Type	-	4 pole synchronous generator	4 pole synchronous generator	4 pole synchronous generator
Rated Capacity	MW	12	13	30
Rated power factor	-	0.8	0.8	0.8
Generation voltage	V	11000	11000	11000
Frequency	Hz	50	50	50

A.5. Parties and project participants >>

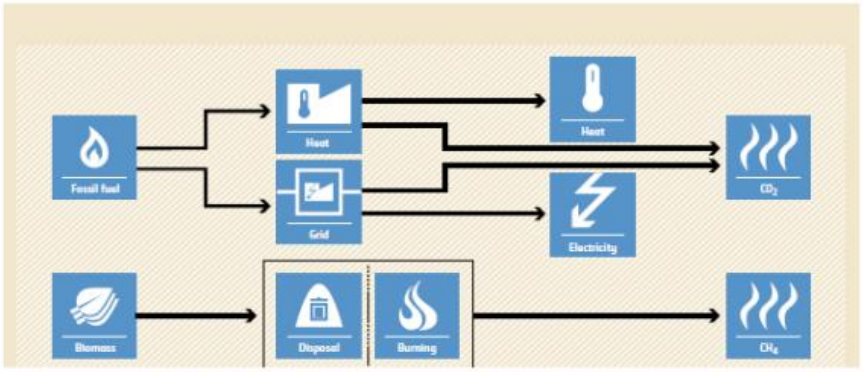
Party (Host)	Participants
India	**First Climate (India) Pvt. Limited (AGGREGATOR)** Contact person: Partha P Chaudhuri Mobile: +91 9831012824 Address: 903 ERGO Tower, Plot No. A1-4, Block EP & GP, Sector V, Salt Lake, Kolkata 700 091 **DCM Shriram Ltd (Sugar Unit Hariawan) (DEVELOPER)** Address: Hariawan Village- Hariawan, Distt.-Hardoi- 241405, Uttar Pradesh, India.

A.6. Baseline Emissions>>

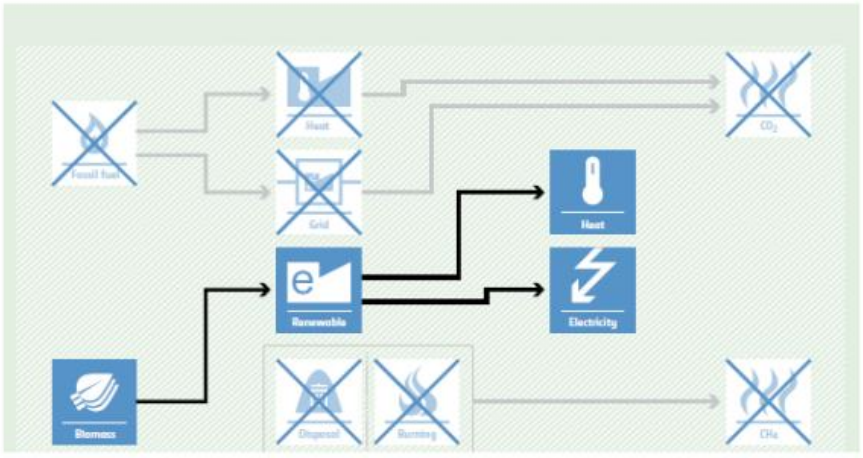
The proposed project activity uses bagasse as fuel for cogeneration unit. The bagasse being a renewable biomass fuel does not add any net carbon-dioxide to the atmosphere because of the carbon recycling during growth of sugar cane. Therefore, the project activity will lead to zero CO_2 on-site emissions associated with bagasse combustion. The crushing season of 180 days is envisaged for project activity operation. Without the project activity, the energy load equivalent 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.

Flow showing baseline scenario:

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.



A.7. Debundling>>

This 55 MW (30 MW + 12 MW + 13 MW) biomass based cogeneration project is not a debundled component of a larger project activity.

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 (Ver. 16)

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 cogeneration plant can be considered as per the below applicability: .

Applicability 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 pelletisation, are allowed.	The project activity would use bagasse and other type of renewable biomass without any chemical, physical and biological processing. Biomass would not be stored in the project boundary more than one years. Project would not use any fossil fuel for co-firing. Hence the criteria points (a), (c), (b), (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 purpose of the project (e.g. collecting and cleaning contaminated new sources of biomass residues that could otherwise not be used for energy purposes); or Equipment for preparation and feeding of biomass.	This is not a fuel switch project activity. 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; 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 criteria 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 dedicated plantation is not applicable to the project and there are no leakage emissions from the utilization of biomass residues as the plant uses its own waste as fuel. Hence the given clause is not applicable to the Project so concerned.

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:

- Projects have dedicated commissioning certificate and connection point,
- Projects have obtained dedicated consent to establish certificate from relevant authorities.

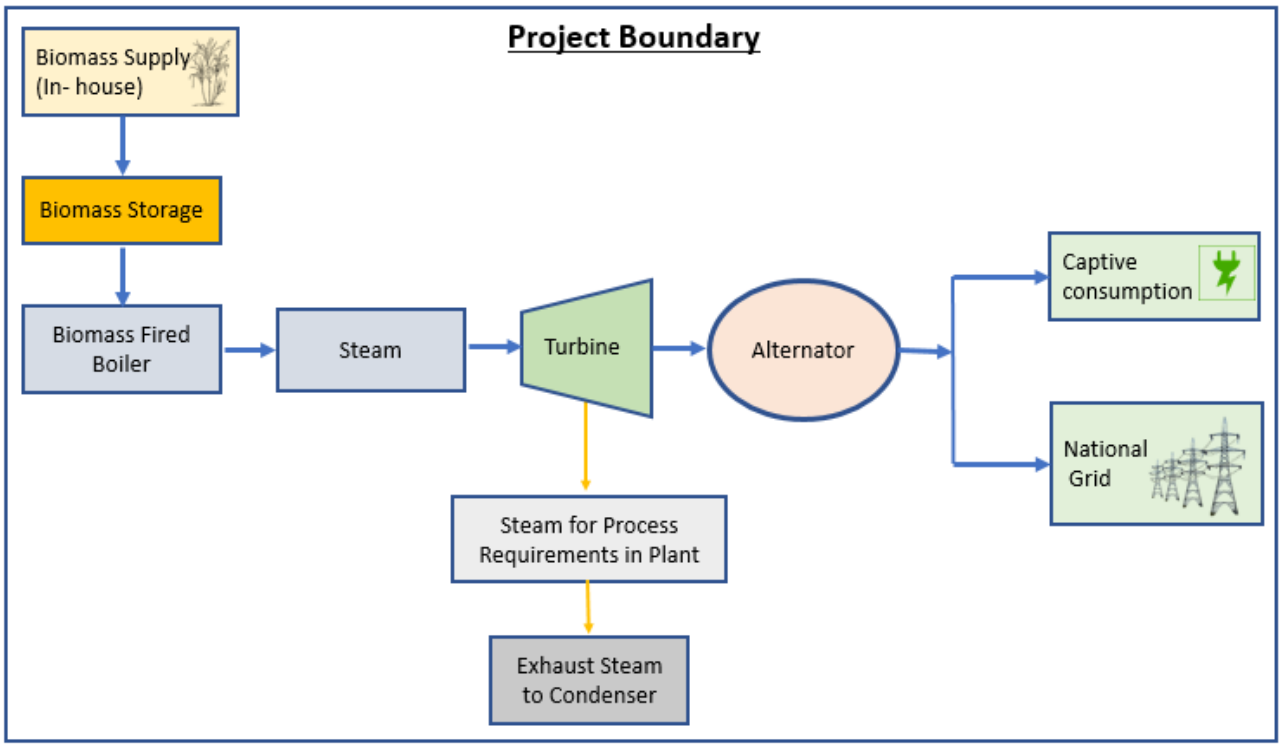
B.4. Project boundary, sources and greenhouse gases (GHGs)>>

In line with the methodology, the project boundary encompasses the industrial facility of DCM,

equipment installed for the operation of cogeneration plant, the biomass storage facility, the facility (sugar unit) consuming the energy (electrical and thermal) generated by the project activity plant and its supply to the grid;

Plant would use the bagasse as renewable fuel for the boiler. Quantity of the biomass required would be generated in-house.

Project boundary of this project is illustrated below:



The table below provides an overview of the emission sources included or excluded from the project boundary for determination of baseline and project emissions.

Source		Gas	Included	Justification/Explanation
Baseline	Electricity and heat generation	CO2	Yes	Main emission source
		CH4	No	Excluded for simplification. This is conservative
		N2O	No	Excluded for simplification. This is conservative
	Uncontrolled burning or decay of surplus biomass residues	CO2	No	It is assumed that CO_2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector
		CH4	No	Excluded for simplification. This emission source is assumed to be very small
		N2O	No	Excluded for simplification.

Source		Gas	Included	Justification/Explanation
Project activity	On-site fossil fuel consumption	CO2	No	Project Activity does not use fossil fuel.
		CH4	No	Project Activity does not use fossil fuel.
		N2O	No	Project Activity does not use fossil fuel.
	Off-site transportation of biomass	CO2	No	Biomass is not transported to the outside of the plant premises.
		CH4	No	Biomass is not transported to the outside of the plant premises.
		N2O	No	Biomass is not transported to the outside of the plant premises.
	Combustion of biomass for electricity and heat	CO2	No	It is assumed that CO2 emissions from surplus biomass do not lead to changes of carbon pools in the LULUCF sector
		CH4	No	Not applicable, as not considered in baseline scenario either.
		N2O	No	Excluded for simplification. This emission source is assumed to be small
	Wastewater from the treatment of biomass	CO2	No	Biomass does not undergo any treatment. So no wastewater is generated.
		CH4	No	Biomass does not undergo any treatment. So no wastewater is generated.
		N2O	No	Biomass does not undergo any treatment. So no wastewater is generated.
	Cultivation of land to produce biomass feedstock	CO2	No	Not applicable, as the biomass is not sourced from dedicated plantations.
		CH4	No	Not applicable, as the biomass is not sourced from dedicated plantations.
		N2O	No	Not applicable, as the biomass is not sourced from dedicated plantations.

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

In absence of the project activity equivalent energy would have been generated and supplied to the grid by the power plants connected to the grid which are dominated by fossil fuel fired power generation unit.
In the absence of the project activity, no electricity is exported into the grid and consequently other plants which are mainly based on fossil fuel would have generated the same power into the grid.

Emission reductions are calculated as follows:
$ER_y = BE_y - PE_y - LE_y$ (Eq. 1)

Where,
ERy = Emissions reductions in year y (t CO2)
BEy = Baseline emissions in year y (t CO2)
PEy = Project emissions in year y (t CO2)
LEy = Leakage emissions in year y (t CO2)

$BE_y = EL_{BL,GR,y} \times EF_{EG,GR,y} + \sum FF_{BL,HG,y,f} \times EF_{FF,y,f} + EL_{BL,FF/GR,y} \times \min(EF_{EG,GR,y}, EF_{EG,FF,y}) + BE_{BR,y}$

Where,

BE_y = Baseline Emission in year y;
$EL_{BL,GR,y}$ = Baseline electricity sourced from the grid in year y (MWh)
$EF_{EG,GR,y}$ = Grid emission factor in year y (t CO_2/MWh)
$FF_{BL,HG,y,f}$ = Baseline fossil fuel demand for process heat in year y (GJ)
$EF_{FF,y,f}$ = CO_2 emission factor for fossil fuel type f in year y (t CO_2/GJ)
$EL_{BL,FF/GR,y}$ = Baseline uncertain electricity generation in the grid or on-site or off-site power-only units in year y (MWh) $EF_{EG,,y}$ = CO_2 emission factor for electricity generation at the project site or off-site plants in the baseline in year y (t CO_2/MWh)
$BE_{BR,y}$ = Baseline emissions due to disposal of biomass residues in year y (t CO_2e)

Generation of captive thermal and electrical energy from its own by-products like bagasse is a common practice across the sugar mills. The fuel used for the project activity is entirely carbon neutral biomass residue. In absence of the project activity, plant would not have exported green power to grid and consequently other thermal power plants which are dominated by fossil fuels would generate electricity and supply equivalent energy to grid. Hence the emission reduction can only be calculated for the replacement of equivalent grid- mix energy, which would be exported to grid by this project activity, with renewable electricity.

Hence, now the baseline emission reduces to:

$BE_y = EL_{BL,GR,y} \times EF_{EG,GR,y}$

Where,
BE_y = Baseline Emission in year y;
$EL_{BL,GR,y}$ = Baseline electricity sourced from the grid in year y (MWh)
$EF_{EG,GR,y}$ = Grid emission factor in year y (t CO_2/MWh)

Plant is exporting surplus energy to grid after auxiliary and captive consumption. Hence, as per para 45 of the methodology, ($EL_{BL,y} - CAP_{EG,total,y}$) would be the quantity of electricity supplied to the grid by the project activity which is greater than zero. So,

$EL_{BL,GR,y}$ = Net electricity exported to the grid.

The electricity import from the grid is subtracted from the baseline scenario, hence there is no separate project emissions.

$$PEy = 0$$

It is an integrated cogeneration plant. The biomass is the output of the sugar mill and which is being consumed hence there is no leakage emissions being generated.

$$LEy = 0$$

Estimated Annual or Total baseline emission reductions (BE_y) = 139,968 CoUs /year (139,968 tCO_2eq/yr) after commissioning of all 3 projects.

B.6. Prior History>>

The project activity has not applied to any other GHG program for registration or issuance of credits for the said crediting period. This is a green field project and has never got registered, de-registered or rejected in any other GHG emission reduction programme before. Also, the project has never been a part of any large scale project activity or a PoA.

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

There is no change in the start date of crediting period.

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: 10 years – 01/01/2013 to 01/01/2023

B.8. Monitoring plan>>

Following parameters being used in emission reductions determination (Fixed Ex-Ante)

Data / Parameter:	EF_{Gridy}
Data unit	t-CO_2/MWh
Description	Emission Factor
Source of data	https://a23e347601d72166dcd6-16da518ed3035d35cf0439f1cdf449c9.ssl.cf2.rackcdn.com//Documents/U

	CRCoUStandardAug2022updatedVer6_090822220127104470.pdf
Value applied	0.9
Measurement methods and procedures	Not Applicable
Monitoring Frequency	Ex-ante fixed parameter
Purpose of data	To calculate baseline emission
Additional comments	-

Data and parameters that require to be monitored at the Project location from time to time is tabulated below:

Data / Parameter:	$EL_{BL,GR,y}$
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	Monthly Joint Meter Readings (JMRs)
Measurement methods and procedures	Generally, the calculation is done by the Authority/Dis-com 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	Data Type: Measured Monitoring equipment: ABT Energy Meters Frequency: Continuous monitoring and Monthly recording from Energy Meters, Archiving Policy: Paper & Electronic
Value 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 date:	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.