PROJECT CONCEPT NOTE

CARBON OFFSET UNIT (CoU) PROJECT

Title: Cogeneration Plant by Shree Siddheshwar Sahakari Sakhar Karkhana Ltd. Solapur

Version 1.0

Date 04/10/2023

First CoU Issuance Period: 5 years, 9 months

Date: 29/03/2017 to 31/12/2022

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

BASIC INFORMATION	
Title of the project activity	Cogeneration Plant by Shree Siddheshwar Sahakari Sakhar Karkhana Ltd. Solapur
Scale of the project activity	Large Scale
Completion date of the PCN	04/10/2023
Project participants	Shree Siddheshwar Sahakari Sakhar Karkhana Ltd. Solapur (Owner) Niitros Solution Private Limited (Aggregator)
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	To be estimated during verification [An ex-ante estimate is 92,340 CoUs per year]

SECTION A. Description of project activity

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

The project "Cogeneration Plant by Shree Siddheshwar Sahakari Sakhar Karkhana Ltd. Solapur" is located in Village Kumthe, Post – Tikekarwadi, Tehsil – North Solapur, District – Solapur, State – Maharashtra, Country - India.

The details of the registered project are as follows:

Purpose of the project activity:

We are introducing a 38MW Bagasse-based Co-generation plant, initiated by Shree Siddheshwar Sahakari Sakhar Karkhana Ltd. (often referred to as SSSSKL).

The project was commissioned on 28th March 2017. The start date of the crediting period for this UCR project activity aligns with the commissioning date, in accordance with the UCR Program Manual Ver5.

Our sustainable initiative features a 38 MW turbine complemented by a high-efficiency 200 TPH boiler. The project boasts a cane crushing capacity of 7500 TCD, with an average bagasse yield of 30% per cane. The crushing season spans 180 days, while the off-season covers 78 days. Operating at full capacity (7500 TCD), the plant produces more bagasse than it needs, allowing for surplus generation. This excess power will be channelled to the Maharashtra State Electricity Distribution Company Ltd (MSEDCL). We maintain distinct records for power used internally and the power exported.

SSSSKL has signed a PPA with state Discom MSEDCL to export surplus power power to grid. The PPA was signed on 27-Jul-2018.

Sr. No	Items	Value in MW	
		Season	Off-Season
1.	Gross Power Generation Capacity	38.00 MW	38.00 MW
2.	i. Power Consumption (For Sugar Mill Cane Crushing & Boiler Auxiliary)	8.50	5.39 MW
	ii. Distilleries & Colonies	01.22	0.61 MW
3.	Total Consumption	9.72 MW	6.00 MW
4.	Exportable Power at Interconnection point	28.28 MW	32.00 MW

- Season means sugar cane crushing period during the year (180 days)
- Off season means, period other than sugar cane crushing during the year (60 days)

In the absence of the project activity, the plant would have obtained electricity from the grid. Not supplying surplus power to the grid would reduce the proportion of renewable energy in the grid's mix. This void would then be filled by power from existing fossil fuel-based power plants. Consequently, the baseline for this project is defined as: an equivalent amount of electricity being generated by fossil fuel-dominated power plants connected to the Indian grid. The Project activity thus reduces 92,340 t-CO_2e/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 as fuel for cogeneration power unit, which is a renewable biomass fuel and does not add any net carbon-dioxide to the atmosphere because of the carbon recycling during growth of sugar cane. Therefore, the project activity leads to zero CO_2 on-site emissions associated with bagasse 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:**
- Improvement of air quality in the nearby region: With the avoidance of fossil fuel combustion in the proposed project activity, the exhaust gas emissions and direct localized air pollution will be substantially reduced in the neighbouring region. Air Pollution due to open dumping of biomass will be reduced.
- 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 project activity also encourages biomass related agro industries in the area to be setup. As there is no discrimination, the project activity contributes to the removal of social disparities by providing employment to all strata of the social structure throughout the lifetime of the project. The proposed project activity will increase employment amongst the rural area where biomass is available in abundance.

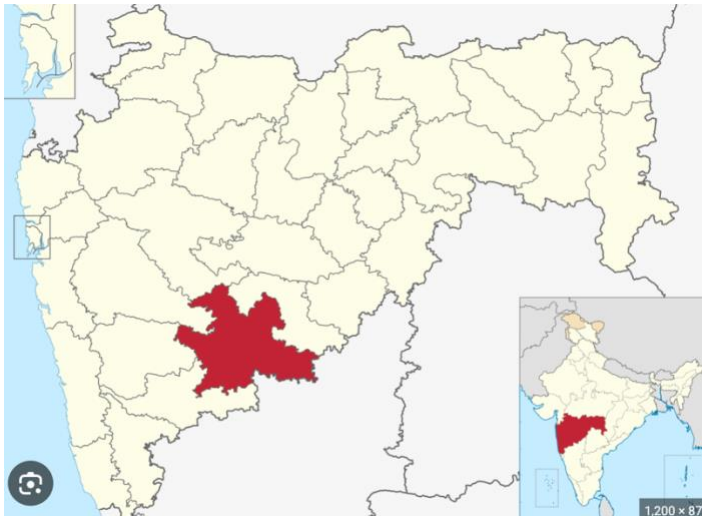
- **Environmental benefits:**
- Reduction of fossil fuels consumption: With the implementation of the proposed project activity, the renewable energy source will replace the fossil fuels source thus contributing to reduced GHG emissions.
- Utilization of Agricultural residues – The project activity utilizes agricultural residue, which is a carbon neutral fuel hence do not contribute to additional atmospheric CO2 emission as compared to baseline coal.
- The project activity helps in proper utilization of agro waste, which otherwise would have been dumped openly.
- As the biomass residues have inherently low sulphur and nitrogen content, the problems of NOX and SOX emissions is almost nil.
- The agricultural residues are dumped providing zero economic value and causing air pollution and soil pollution.
- The project activity would ensure the agricultural 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.

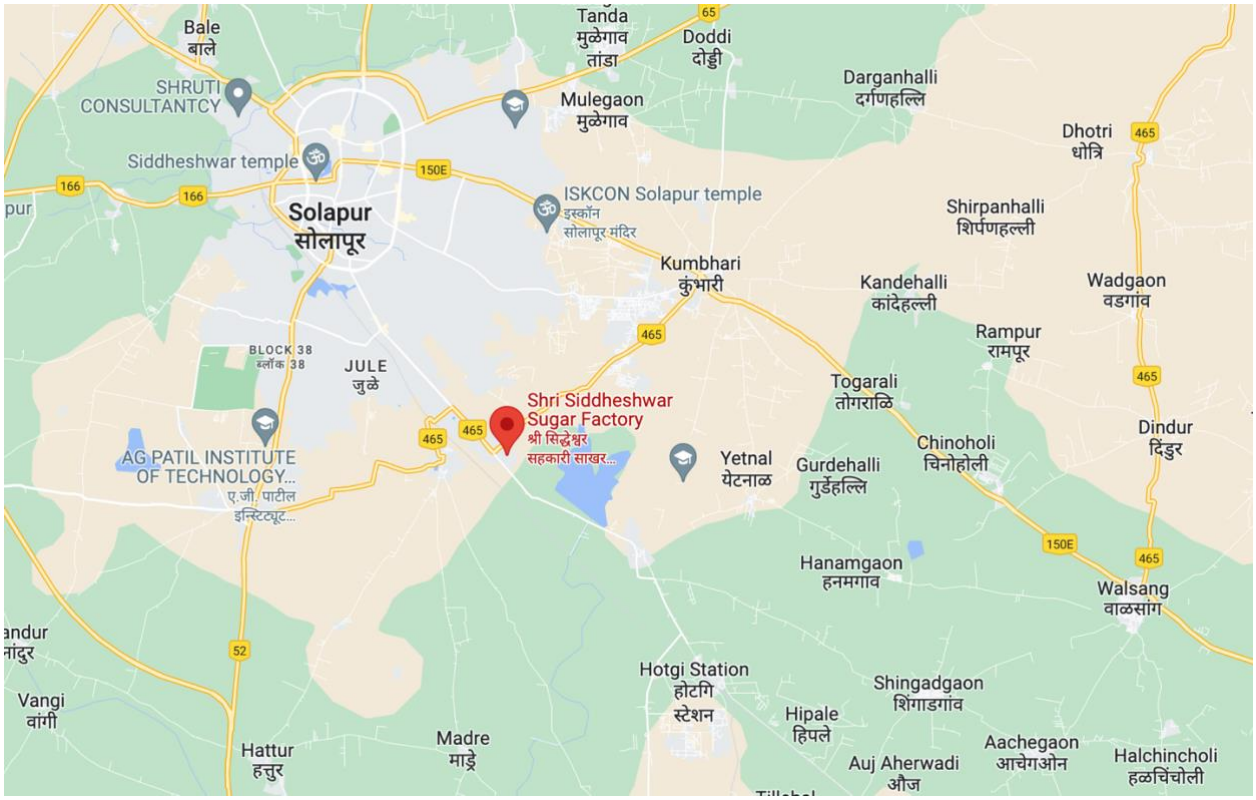
- **Economic benefits:**
- Reduction of dependence from fossil fuels: The project activity will reduce the Production facility's dependence on fossil fuel. This will reduce the overall dependence of the whole region from the imports and availability of fossil fuels and will allow other industries to 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: Solapur
Village: Kumathe
Tehsil: North Solapur
State: Maharashtra

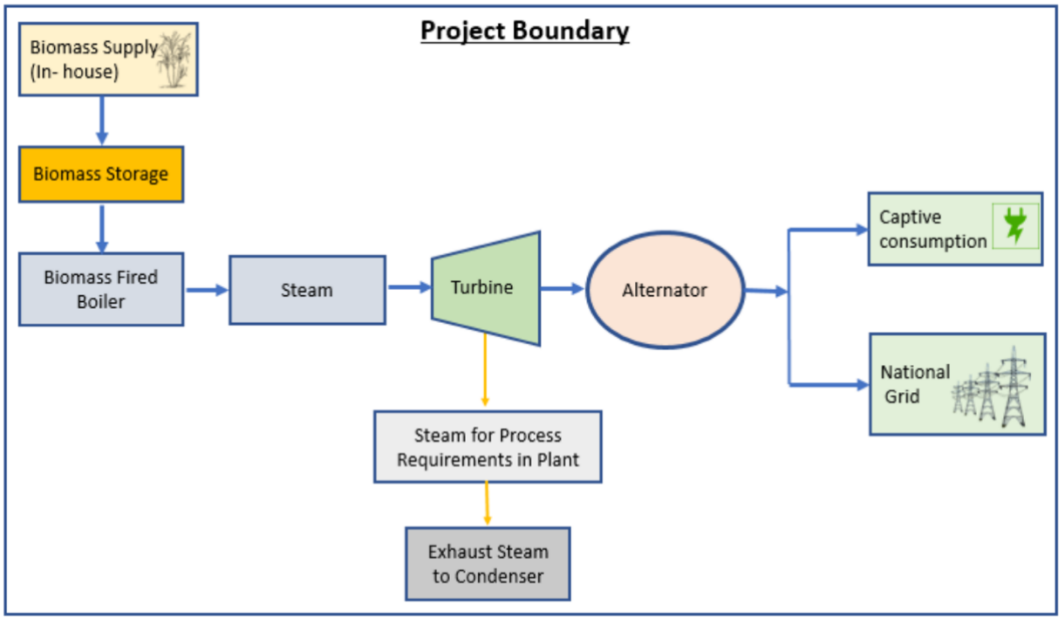
Latitude - 17.6116036 (17° 36' 41.7738")
Longitude - 75.9452494 (75° 56' 42.8964")





A.4. Technologies/measures >>

Process flow chart:



The project activity involves generation of renewable electrical energy from the combustion of renewable biomass i.e. bagasse, 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.

Equipment required for the project are as follows:

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

Boiler:

Specification	Unit	Value
Type of Boiler	-	Single drum, Natural Cooling, Top Supported
Boiler Rated Capacity	TPH	200
Steam Pressure	Kg/cm^2	109
Steam Temperature	Deg. C	540± 5

Feed Water Temperature	Deg. C	210
Fuel Type	-	Bagasse

Turbine:

Specification	Unit	Value
Inlet Stem Pressure	Kg/cm^2	104
Inlet Steam Temperature	Deg. C	540± 5
Inlet Steam quantity	TPH	188
Extraction Pressure	Kg/cm^2	1.8
Extraction steam quantity	TPH	145

Alternator:

Specification	Unit	Value
Type	-	TDPS
Rated Capacity	MW	38
Rated Power Factor	-	0.9
Generation Voltage	V	11000V
Frequency	Hz	50

A.5. Parties and project participants >>

Party (Host)	Participants
India	Shree Siddheshwar Sahakari Sakhar Karkhana Ltd. Solapur (Owner) Address - Kumthe, Post- Tikekarwadi, Tal- North Solapur, Dist- Solapur- 413224 Contact Person - Hon'ble Shri Dharmraj A. Kadadi – Director Name: Niitros Solution Private Limited (Aggregator) Registered Address: C401Balaji Tower, Plot No.8, Sector 22, Nerul West, Navi Mumbai 400706 Contact person name: Vijay Chingunde Email: vijay@niitros.com Mobile: 9223525299

A.6. Baseline Emissions>>

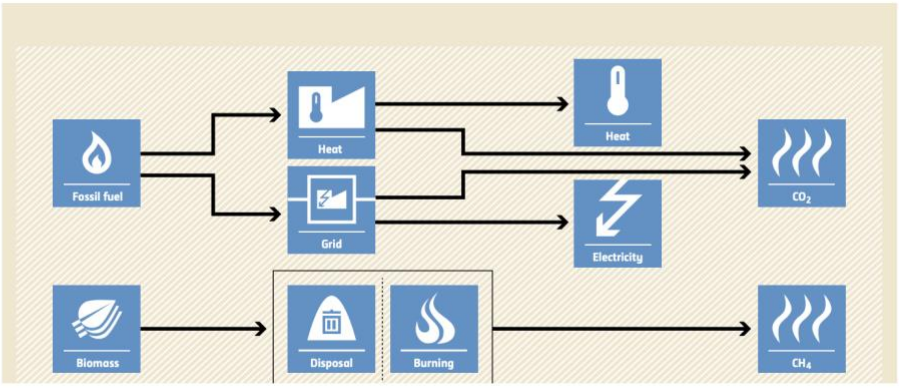
The baseline scenario identified at the PCN stage of the project activity is:

The planned project will employ bagasse, a renewable biomass fuel, for the cogeneration unit. Since bagasse originates from sugar cane, its combustion doesn't contribute any net carbon dioxide to the atmosphere, given the carbon's cyclical nature during the cane's growth. Consequently, the combustion of bagasse will result in zero on-site CO2 emissions.

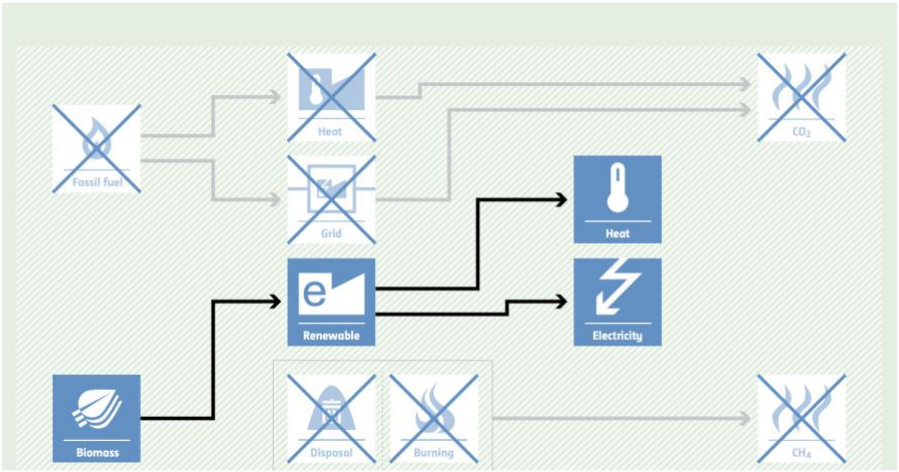
In the absence of this initiative, the electricity sent to the grid would have originated from conventional grid mixes, leading to CO2 emissions from the burning of traditional fossil fuels. By supplying green electricity to a predominantly fossil fuel-based grid, the project ensures ongoing reductions in greenhouse gas emissions, sidestepping the associated 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 Cogeneration Plant by Shree Siddheshwar Sahakari Sakhar Karkhana Ltd. Solapur 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 cogen 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, bioor 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	This is not a fuel switch project activity. Hence, this criterion is not applicable.

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 (d) Equipment for preparation and feeding of biomass.	
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 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:

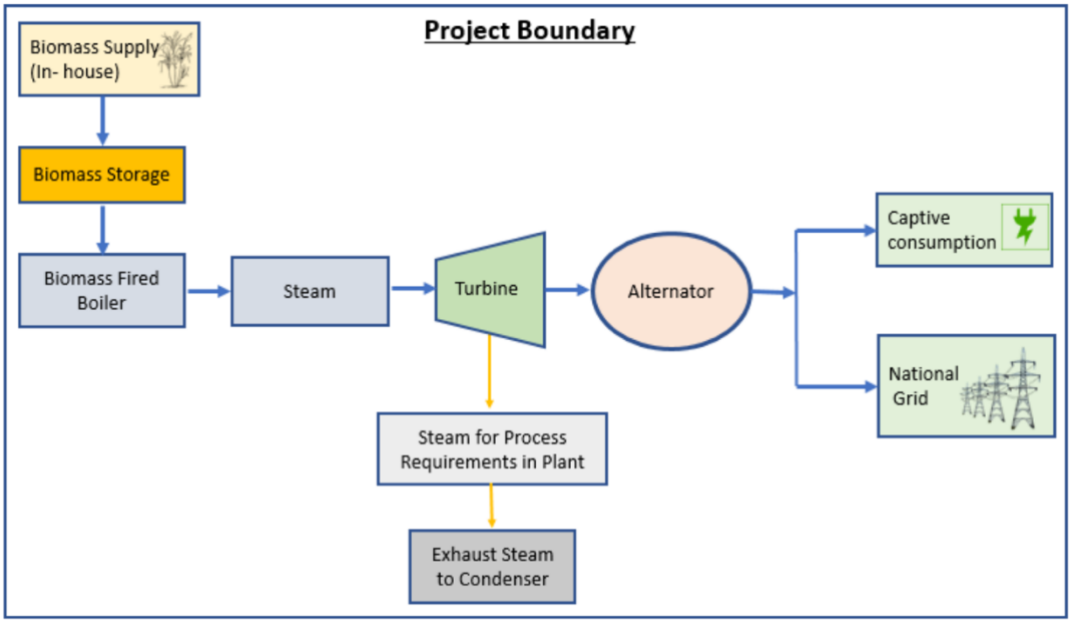
- Project has dedicated commissioning certificate and connection point,
- Project has obtained dedicated consent to establish certificate from relevant authorities.

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

In line with the methodology, the project boundary encompasses the industrial facility of SSSSKL, 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	GHG	Included?	Justification/Explanation
Baseline	Electricity and heat generation	CO_2	Included	Major source of emission
		CH_4	Excluded	Excluded for simplification.
		N_2O	Excluded	Excluded for simplification.
	Uncontrolled burning or decay of surplus biomass residues	CO_2	Excluded	It is assumed that CO2 emissions from surplus biomass residues do not lead to changes of carbon pools in the LULUCF sector
		CH_4	Excluded	Excluded for simplification. This emission source is assumed to be very small
		N_2O	Excluded	Excluded for simplification.

Project Activity	On-site fossil fuel consumption	CO_2	Excluded	Project activity does not use fossil fuel.
		CH_4	Excluded	Project activity does not use fossil fuel.
		N_2O	Excluded	Project activity does not use fossil fuel.
	Off-site transportation of biomass	CO_2	Excluded	Biomass is not transported to the outside of the plant premises.
		CH_4	Excluded	Biomass is not transported to the outside of the plant premises.
		N_2O	Excluded	Biomass is not transported to the outside of the plant premises.
	Combustion of biomass for electricity and heat	CO_2	Excluded	It is assumed that CO_2 emissions from surplus biomass do not lead to changes of carbon pools in the LULUCF sector
		CH_4	Excluded	Not applicable, as not considered in baseline scenario either.
		N_2O	Excluded	Excluded for simplification.
	Wastewater from the treatment of biomass	CO_2	Excluded	Biomass does not undergo any treatment. So no wastewater is generated.
		CH_4	Excluded	Biomass does not undergo any treatment. So no wastewater is generated.
		N_2O	Excluded	Biomass does not undergo any treatment. So no wastewater is generated.
	Cultivation of land to produce biomass feedstock	CO_2	Excluded	Not applicable, as the biomass is not sourced from dedicated plantations.
		CH_4	Excluded	Not applicable, as the biomass is not sourced from dedicated plantations.
		N_2O	Excluded	Not applicable, as the biomass is not sourced from dedicated plantations.

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

Most plausible baseline scenario of the project is generation of power in the power grid.

Without the project in place, no electricity would be fed into the grid. As a result, other plants, primarily those using fossil fuels, would have had to produce the equivalent amount of power for the grid

Emission reductions are calculated as follows:

$$ERy = BEy - PEy - LEy \quad \textbf{(Eq. 1)}$$

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)

$BE_y = EL_{BL,GR,y} \times EF_{EG,GR,y} + \sum FF_{BL,HG,y,f} \times EF_{FF,y,f} + EL_{BL,FF/GR,y} \times \min(EF_{EG,GR,y}, EF_{EG,FF,y}) + BE_{BR,y}$ (Eq. 2)

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 (tCO2/MWh)
$FF_{BL,HG,y,f}$ = Baseline fossil fuel demand for process heat in year y (GJ)
$EF_{FF,y,f}$ = CO2 emission factor for fossil fuel type f in year y (tCO2/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)
$EF_{EG,y}$ = CO2 emission factor for electricity generation at the project site or off-site plants in the baseline in year y (t CO2/MWh)
$BE_{BR,y}$ = Baseline emissions due to disposal of biomass residues in year y (t CO2e)

Entire project would be run with bagasse which is generated in-house and no fossil fuel is required to run the project as plant has enough bagasse to run the project. In absence of the project activity, plant would have generated steam by firing bagasse and sourced electricity from its existing power plant which are currently exporting power to the grid. As the project exported renewable electrical energy to grid, 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 and fed into the grid. Hence, emission reduction can only be accounted for the replacement of gridmix energy by renewable electricity. Apart from that, baseline emission due to disposal of biomass residue is not accounted for this project.

Hence, now the baseline emission reduces to:

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

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); UCR recommended emission factor of 0.9 tCO_2/MWh has been considered. (Reference: General Project Eligibility Criteria and Guidance, UCR Standard, page 4)

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

BE_y = 1,14,000 MWh * 0.9 tCO_2/MWh
BE_y = 1,02,600 tCO_2

PE_y = Project emissions in year y (t CO_2) **(Eq. 3)**

As per UCR Update (Dated 4/10/2023 - https://medium.com/@UniversalCarbonRegistry/biomass-based-power-thermal-energy-project-transport-emissions-related-default-parameters-6dea0e40c938) ; For large-scale project activities, 10% of net-to-gross adjustment is applied i.e. multiply 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.

PE_y = 1,02,600 tCO_2 * 10%
PE_y = 10,260 tCO_2

LE_y = Leakage emissions in year y (t CO_2) **(Eq. 4)**

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 Emission Reduction = 1,02,600-10,260 = 92,340 CoUs /year (92,340 tCO_2/year)

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 >>

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: 5 years, 9 months – 29/03/2017 to 31/12/2022

B.8. Monitoring plan>>

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

Data/Parameter	$EF_{Grid,y}$
Data unit	tCO_2/MWh
Description	Grid Emission Factor
Source of data Value(s) applied	UCR default emission factor for 2013-2022 which is 0.9000 tCO2/MWh
Measurement methods and procedures	0.90
Monitoring frequency	Ex-ante fixed parameter
Purpose of data	For estimation of baseline emission.

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: Description:	MWh/Year 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): Monitoring frequency:	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) Data Type: Measured Monitoring equipment: ABT Energy Meters Frequency: Continuous monitoring and Monthly recording from Energy Meters Archiving Policy: Paper & Electronic
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.
Any comment:	-