PROJECT CONCEPT NOTE

CARBON OFFSET UNIT (CoU) PROJECT

Title: 27.5 MW Biomass Based Grid Connected Electricity Generation Project in DCM Shriram, Ajbapur Plant

Version 1.0

Date: 28/09/2023

First CoU Issuance Period: 8 years, 02 months

Date: 01/10/2015 to 31/12/2023

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

BASIC INFORMATION	
Title of the project activity	27.5 MW Biomass Based Grid Connected Electricity Generation Project at DCM Shriram, Limited, Sugar Unit : Ajbapur
Scale of the project activity	Large Scale
Completion date of the PCN	30/09/2023
Project participants	DCM Shriram Limited, Sugar Unit: Ajbapur
Host Party	India
Applied methodologies and standardized baselines	ACM0006: Electricity and heat generation from biomass --- Version 16.0
Sectoral scopes	01 Energy industries (Renewable / Non-Renewable Sources)
Estimated amount of total GHG emission reductions	151,372CoUs / Year (151,372t-CO_{2eq} / Year)

SECTION A. Description of project activity

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

The project "27.5 MW Biomass Based Grid Connected Electricity Generation Project at DCM Shriram Limited, Sugar Unit :Ajbapur " is located in Village Ajbapur, Post Office Mullapur, District Lakhimpur kheri, State Uttar Pradesh, Country India.

The details of the registered project are as follows:
The project activity is developed by M/s DCM Shriram Limited, Sugar Unit Ajbapur in village Ajbapur, P.O Mullapur, Lakhimpur Kheri, Uttar Pradesh, India. Project activity involves installation of one 7.5 MW and one 20 MW extraction cum condensing turbine in their existing facility to generate renewable electricity from bagasse and other biomass residue. Generated electricity would be sold to regional electricity grid. Plant has upgraded it's one 50 TPH boiler to 75 TPH and commissioned two new high pressure boiler of capacity 60 TPH each. Generated electricity would be evacuated to the grid via 132 kV step-up substation. Plant has signed PPA with Madhyanchal Vidyut Vitran Nigam Limited for a capacity of 24 MW and expected to operate at 80% capacity utilization factor.

Purpose of the project activity:

The purpose of the project activity is to generate electricity from renewable resource and supply it to national grid. The project activity involves upgradation of one existing boiler and installation of two new 60 TPH high pressure energy efficient boiler and installation of two new turbine of capacity 7.5 MW and 20 MW. The first 7.5 MW turbine was commissioned on 12/04/2005. Other two boilers were commissioned on 03/12/2005 and 09/12/2006 and the 20 MW turbine was commissioned on 02/02/2007. DCM Shriram Limited, Sugar Unit Ajbapur is the sole owner of this project activity. Plant has signed a PPA with Madhyanchal Vidyut Vitran Nigam Limited to sells the surplus electricity to the state dis-com.

In absence of the project activity, equivalent amount of electricity which is supplied by this project activity would have otherwise been supplied to the grid by fossil fuel based power plant connected to the grid. The project activity is expected to supply 168,192 MWh of electricity to the national grid each year. Hence, the project activity is expected to reduce the anthropogenic emission by 151,372 t-CO2/Year.

The project activity reduces GHG emissions which is correlated with United Nations Sustainable Development Goals (SDG) 13 (Climate action). Beside this the project activity addresses multiple other UN developed SDGs. The detailed list of UN SDGs addressed by the project activity is listed below.

SDG	Project Contribution	Description of contribution
SDG 7 : Affordable and Clean energy	Target 7.1 Indicator 7.12 Target 7.2 Indicator 7.2.1 Target 7.a Indicator 7.a.1	The electricity being exported to the grid is carbon-neutral, as it fired by renewable biomass. This increases the access to green power for people connected to the grid. Also, this increases green-power generation establishments and infrastructure within the nation. The project activity builds

	Target 7.b Indicator 7.b.1	reliance on clean fuel and technology, beside increasing the renewable energy share in the total final energy consumption of the country. By requesting submission of this project under UCR, the project owner is evidently seeking international cooperation to facilitate investment into clean energy infrastructure.
SDG 8: Decent work and Economic growth	Target 8.4 Indicator 8.4.1 Target 8.5 Indicator 8.5.1	By using renewable energy sources for economic productivity to achieve same outcomes at the process level the project owner aims to decouple environmental degradation, global warming and climate crisis from economic productivity. The project activity also ensures earning of employees irrespective of caste, creed and sex.
SDG 9: Industry, Innovation and Infrastructure	Target 9.4 Indicator 9.4.1	The project directly contributes to abatement of carbon dioxide emissions.
SDG 12**:** Responsible Consumption and Production	Target: 12.2 Indicator: 12.2.1 Target: 12.5 Indicator: 12.5.1 Target: 12.a Indicator: 21.a.1	Biomass like bagasse is a process waste. By repurposing it as a fuel for energy generation, a circularity is established, thereby reducing material footprint. Had this electricity been not supplied to the grid, grid would have made up for its own requirements from other sources, mostly coal, increasing carbon footprint in that process. The efficient use of natural resources is ensured by recycling waste. This project also increases installed renewable energy-generating capacity in developing countries, like India
SDG 13:	Target: 13.2 Indicator: 13.2.2	Carbon neutral biomass is used as a fuel for generating energy which reduces the GHG emissions of the planet at large.

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:

DCM Shriram Limited, Sugar Unit: Ajbapur has provided support to the local communities by organising several social awareness and welfare programmes for the local communities. The initiatives taken up by DCM Shriram Limited include:

- Construction of 52 km of roads
- Provision of free medical facilities at four nearby villages, including weekly visits from a qualified doctor and distribution of medicines free of charge.
- Establishment of a scheme, in collaboration with an NGO, to provide primary education, health, hygiene and self-dependency in 10 villages.
- Installation of 655 bore wells.
- . To execute CSR activities in the local communities in the nearby villages.
- Provision of over 100 extension and community development officers.

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The project makes a significant contribution to development as any rurally based industry in India provides an important source of direct employment to the surrounding area. The plant is expected to increase employment by around 22 people, a number of whom will be skilled boiler and turbine operators and engineers. It is estimated that this project activity would generate employment for 200 to 300 households.

Environmental benefits:

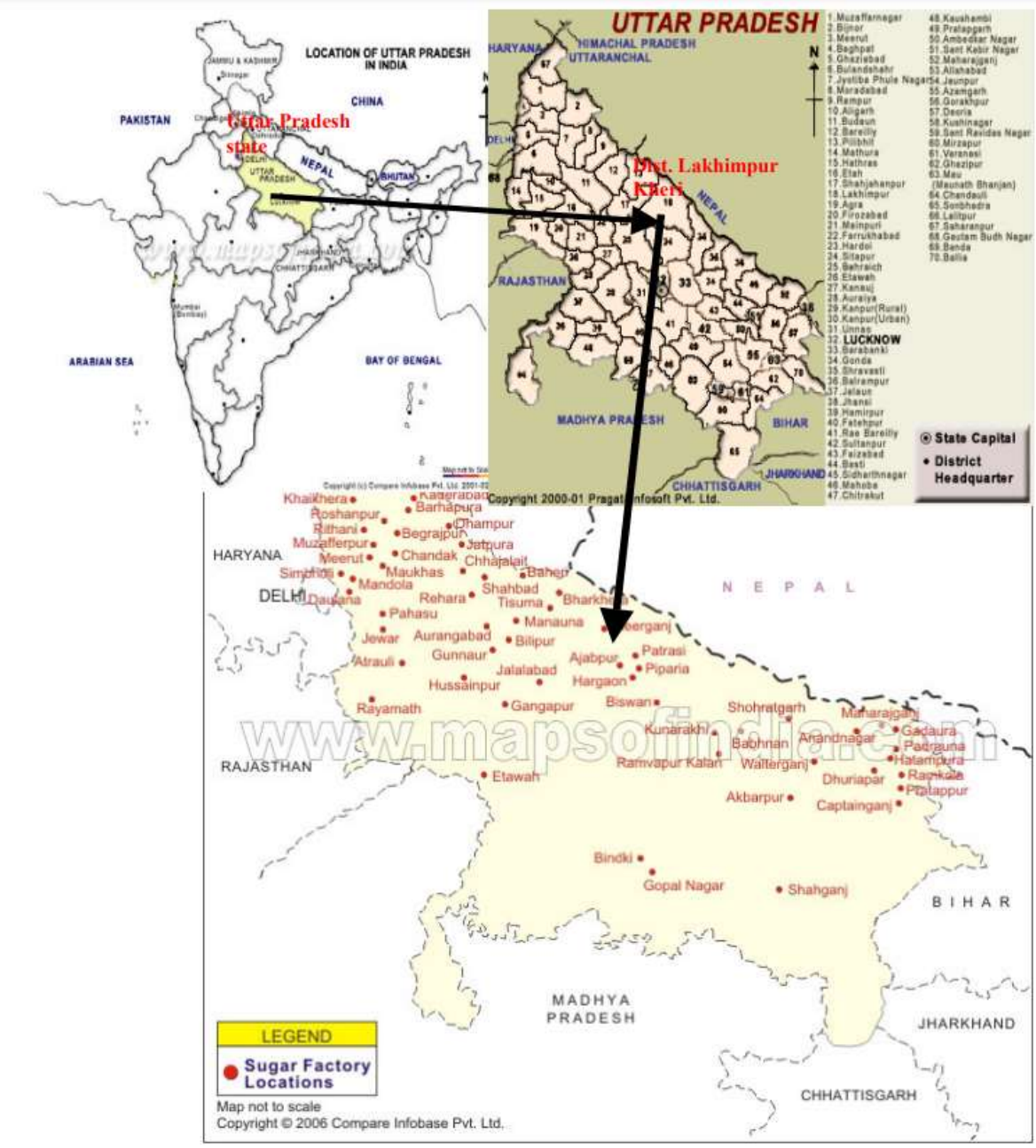
The project activity is reducing GHG emissions through the generation of renewable energy and exporting it to the grid. This replaces power from existing grid based units and planned capacity additions which are dominated by fossil fuel. In addition to the reduction in carbon dioxide (CO2) emissions 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 will also lead to reduced ash generation since the ash content in bagasse is lower than that of Indian coal.

Economic benefits:

The major role of DCM Shriram Limited, Sugar Unit -Ajbapur in the economic well-being is reflected through the option of providing direct and indirect employment opportunity to the rural community. The construction of the sugar factory has had a major impact on the surrounding rural economy and on the welfare of villagers. The revenue from growing sugar cane exceeds that of alternative crops, and by providing an outlet for increased cane production, the installation and growth of the factory has allowed farmers to increase their income sharply. This is illustrated by the increase in the cane area supplying the factory – up from 17,000 hectares in 1997/8 to 42,400 hectares in 2003/4. The increasing cane cultivation has encouraged the factory to invest in capacity expansion, which will further benefit the rural community. The proposed project activity, which is expansion of the existing cogeneration system to supply electricity to grid, should strengthen the returns of the factory. Thus, the higher returns associated with a broadening of its activities, diversification from sugar manufacturing to power production, should filter back to farmers supplying cane to the sugar factory.

A.3. Location of project activity >>

Country: India
District: Lakhimpur Kheri
Village: Ajbapur
Tehsil: -
State: Uttar Pradesh
Code: 261 505



A.4. Technologies/measures >>

The project activity involves upgradation of existing 50 TPH boiler to 65 TPH boiler, installation of two new high-pressure boilers, each generating 60 TPH steam at 87 kg/cm2 pressure and 515 ºC

temperature. The travelling grate boilers are designed for multifuel firing and will use bagasse as the main fuel with other biomass residues as supplementary fuel.

The generated steam will be used to run the newly installed 7.5 MW and 20 MW turbine to generate power. The turbines are of extraction condensing type allowing for tapping low-pressure steam for the process during the sugar season. During the off-season, there will be no extraction and all the steam will be passed through the condenser, thus enabling year round power generation. The flue gases from the boiler before being exhausted to atmosphere will be passed through ESP to achieve the existing norm of 150 mg/ Nm3 of SPM concentration in the exhaust.

The power will be generated at 11 kV from the turbine generator. The turbine will be operating in parallel with the UPPCL grid. The 7.5 MW (TG5) and 20 MW (TG6) are also operating in parallel with the grid and the generation bus will be common to both units. The power output from the turbine generators will be stepped up to 132 kV at a step up station within the plant and then connected to the UPPCL grid line.

Technical details of the boilers and turbines are as below:

Upgraded boiler (65 TPH):

Sl. No.	Boiler Details	Make
1	Dumping grate Steam Generation – 65 tph Working Pressure – 45 kg/cm2 Steam Temperature – 425 Degree C Sr. no.: UP 5741	Walchandnagar Industries Ltd

7.5 MW Turbine:

Sl. No.	Turbine Details	Make
1	Type: Extraction cum Condensing Power Generation – 7.5 MW Inlet Steam Pressure – 45 kg/ cm2 Sr. no.: 1052	Kessels Engineering

Alternator:

Sl. No.	Alternator Details	Make
1	Type: CACW Brushless Cylid Rotor Power Rating: 9375 kVA Voltage Rating: 11 kV, 3 Phase Power Factor: 0.8 PF Lag RPM: 1500	Kessels Engineering

New Boiler (60 TPH):

Sl. No.	Boiler Details	Make
1	Travelling grate Steam Generation – 60 tph Working Pressure – 87 kg/cm2	ISGEC John Thompson

20 MW Turbine:

Sl. No.	Turbine Details	Make
1	Type: Extraction cum Condensing Power Generation – 20 MW Inlet Steam Pressure – 87 kg/ cm2	GE

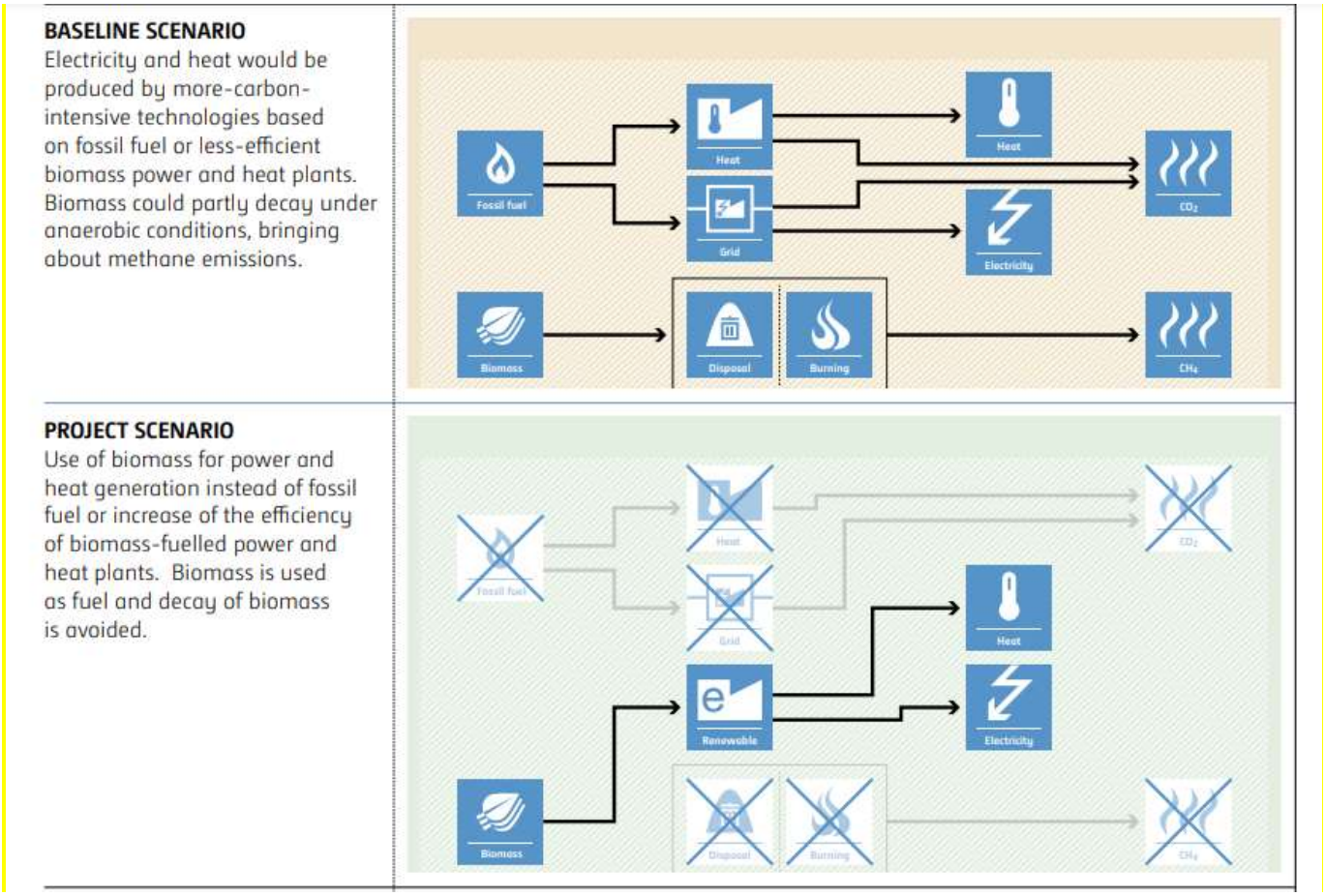
The technology employed in the project activity is readily available in India. The individual suppliers of the equipment will train the staff in charge at DCM Shriram Limited; Sugar Unit Ajbapur after commissioning to operate the equipments efficiently and to maintain the equipments. Apart from this, the equipment supplier will provide a complete manual giving details for the maintenance schedule and the required activities associated with it.

A.5. Parties and project participants >>

Party (Host)	Participants
India	DCM Shriram Limited; Sugar Unit Ajbapur . Address: Village Ajbapur,P.O Mullapur, Distt :Lakhimpur Kheri, Uttar Pradesh, India.

A.6. Baseline Emissions>>

The baseline scenario identified at the PCN stage of the project activity is:
In absence of the project activity, the energy supplied by the plant to grid would have been generated by fossil fuel dominated power plant connected to the grid. Due to the combustion of fossil fuel such as coal, emissions of carbon dioxide would have occurred. Since the project activity is using bagasse as fuel, which is a renewable and carbon neutral fuel, it is reducing greenhouse gas emissions.



A.7. Debundling>>

This project activity 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 >>

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.	**Applicable** Project activity uses bagasse as renewable biomass without any chemical or biological processes. Fossil fuels are not used in co- firing of the activity. Biomass used is not stored more than one year. Hence the points (a), (b), (c), (d), (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	**Not Applicable** It is not a fuel switch project activity. Hence the criteria 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	**Not Applicable** Biogas is not produced in the project activity. So the 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.	**Not Applicable** No dedicated plantation is done for the biomass production. There are no project and leakage emissions as the plant uses its own waste. Hence the criteria is 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 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: (i) 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; (ii) In cases M4 and M5, steam turbine(s) generating mechanical power to be used for the	The scenario of power generation to power grid is applicable from the criteria (a). The project activity is not claiming CoU for heat generation. Hence point (b) and (c) are not applicable.

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.	The existing plant utilizes all the biomass and no residue is left. Hence not applicable. Biogas is not produced in the project activity. Hence this scenario is not considered.

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

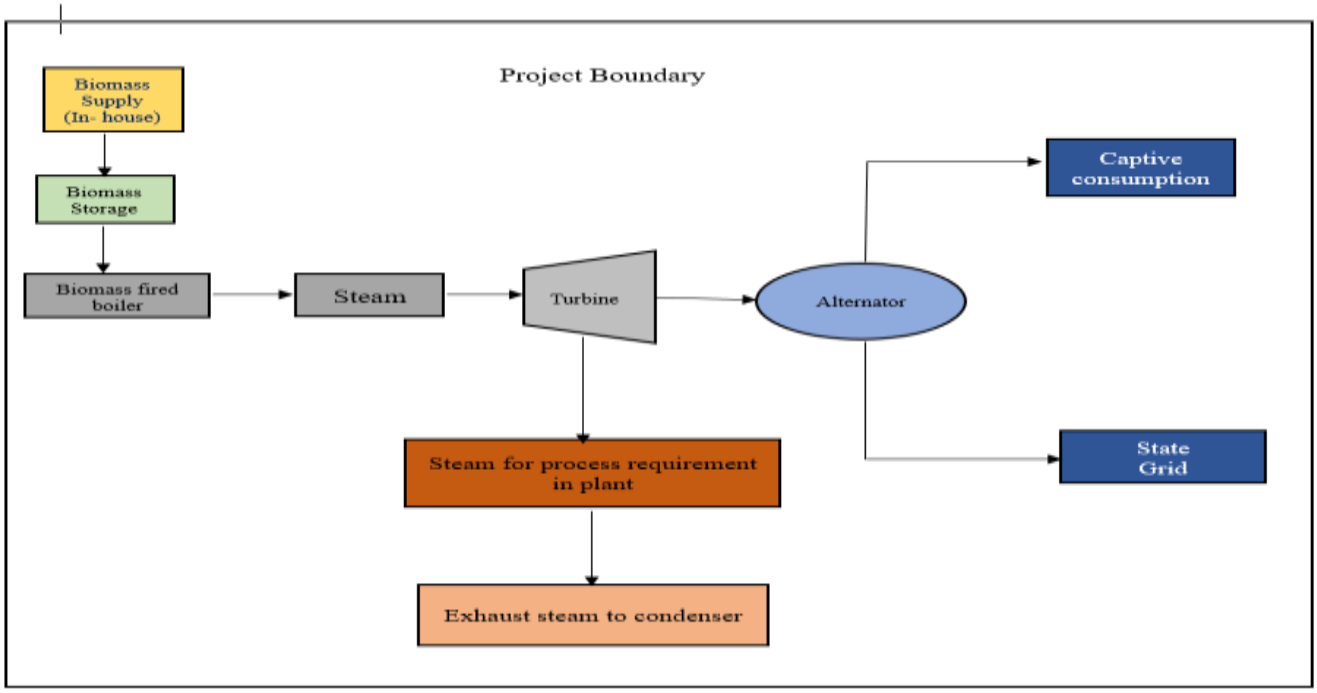
There is no double accounting of emission reductions in the project activity due to the following reason

- Project has dedicated commissioning certificate and connection point.
- The 7.5 MW project was registered on the CDM with project ID 0332 and the 20 MW project was also registered under CDM with project ID 0982. However, the crediting period of both the projects has been expired. After that both the projects are not registered or seeking registration any other voluntary or compliance program, nor a de-bundled component of any large scale project or PoA.

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

In line with the methodology, the project boundary encompasses the industrial facility of DCM Shriram Limited, sugar unit : Ajbapur, 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 emission:

Source		Gas	Included	Justification
Baseline	Electricity and heat generation	CO_2	Yes	Main emission source
		CH_4	No	Excluded for simplification. This is conservative
		N_2O	No	Excluded for simplification.
	Uncontrolled burning or decay of surplus biomass residues	CO_2	No	Excluded for simplification.
		CH_4	No	Excluded for simplification.
		N_2O	No	Excluded for simplification.
Project Activity	On-site fossil fuel consumption	CO_2	No	Project activity does not use fossil fuel.
		CH_4	No	Project activity does not use fossil fuel.
		N_2O	No	Project activity does not use fossil fuel.
	Off-site transportation of biomass	CO_2	No	Biomass is not transported outside the plant premises.
		CH_4	No	Biomass is not transported outside the plant premises.
		N_2O	No	Biomass is not transported outside the plant premises.
	Combustion of biomass for electricity and heat	CO_2	No	Biomass is a carbon neutral fuel.
		CH_4	No	Not applicable, as not considered in baseline scenario.
		N_2O	No	Excluded for simplification. This emission source is assumed to be small
	Wastewater from the treatment of biomass	CO_2	No	Biomass does not undergo any treatment. So no wastewater is generated.
		CH_4	No	Biomass does not undergo any treatment. So no wastewater is generated.
		N_2O	No	Biomass does not undergo any treatment.

				So no wastewater is generated.
	Cultivation of land to produce biomass feedstock	CO_2	No	Not applicable as biomass is not sourced from dedicated plantations.
		CH_4	No	Not applicable as biomass is not sourced from dedicated plantations.
		N_2O	No	Not applicable as biomass is not sourced from dedicated plantations.

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

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.

Emission Reductions are calculated as follows:

$$ER_y = BE_y - PE_y - LE_y$$

Where,
ER_y = Emissions reductions in year y (t CO_2)
BE_y = Baseline emissions in year y (t CO_2)
PE_y = Project emissions in year y (t CO_2)
LE_y = Leakage emissions in year y (t CO_2)

Baseline emissions are calculated as follows:

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

Where,
BE_y = Baseline emissions in year y (t CO_2)
$EL_{BL,,}$ = Baseline electricity sourced from the grid in year y (MWh)
$EF_{EG,,}$ = Grid emission factor in year y (t CO_2/MWh)
$FF_{BL,,,}$ = Baseline fossil fuel demand for process heat in year y (GJ)
$EF_{FF,,}$ = CO2 emission factor for fossil fuel type f in year y (t CO_2/GJ)
$EL_{BL,/GR,y}$ = Baseline uncertain electricity generation in the grid or on-site or off-site power-only units in year y (MWh)
$EF_{EG,,}$ = 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)
$BE_{BR,}$ = Baseline emissions due to disposal of biomass residues in year y (t CO_2e)
f = Fossil fuel type

Generation of captive thermal and electrical energy is a common practice across the sugar sector. The fuel used for the project activity is entirely biomass fired and no fossil fuel is required to run the plant. In absence of the project activity, plant would not have exported green power to grid and consequently

other plants which are dominated by fossil fuel 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.

The equation reduces to:

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

Where,
BE_y = Baseline emissions in year y (t CO_2)
$EL_{BL,GRy,}$ = Baseline electricity sourced from the grid in year y (MWh)
$EF_{EG,,}$ = Grid emission factor in year y (t CO2/MWh)

Plant is exporting surplus energy to grid after captive consumption. Hence as per para 45 of the methodology, $(ELBL, - CAPEG,al,y)$ would be the quantity of electricity supplied to the grid by the project activity which is greater than zero.

Therefore,

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

Referring to TOOL 16 "Project and leakage emissions from biomass"

The project and leakage emissions for the project activity are 0.

$PEy = 0$

$LEy = 0$

Estimated Annual or Total baseline emission reductions (BEy) = 151,372 CoUs /year (151,372 tCO2eq/yr)

B.6. Prior History>>

The 7.5 MW project was registered under CDM with project ID 0332[1] and the 20 MW project was registered under CDM with project ID 0982[2]. Details of the project activity is as below as per the CDM portal:

Particulars	7.5 MW Project	20 MW Project
CDM Project ID	0332	0982
Registration Date	01/05/2006	18/05/2007
Crediting Period Type	Fixed	Fixed
Start Date of Crediting Period	01/10/2005	18/05/2007
End Date of Crediting Period	30/09/2015	17/05/2017
Status of Crediting Period	Expired	

[1] CDM project link for 7.5 MW project: https://cdm.unfccc.int/Projects/DB/TUEV-SUED1142619739.4/view

[2] CDM project link for 20 MW project: https://cdm.unfccc.int/Projects/DB/BVQI1173177798.18/view

Issuance Record	Issued for entire crediting period

After expiry of the crediting period under CDM, both projects have not been registered under any other carbon abetment programme. As the crediting period of the 7.5 MW project had expired on 30/09/2015, the project would only clam credit under UCR after 30/09/2015. Hence, the crediting period of the project activity under UCR would start from 01/10/2015. However, as the crediting period of 20 MW project had expired on 17/05/2017, the credit would only be accounted on and after 18/05/2017. As the start date of crediting period of the 1st project started before the 2nd project, start date of crediting of the 1st project would be considered as the start date of the entire project activity.

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: 08 years, 02 months – 01/10/2015 to 31/12/2023

B.8. Monitoring plan>>

Data/Parameter	$EF_{EG,GR,y}$
Data unit	t CO_2/MWh
Description	Grid emission factor
Source of data	UCR standard version 6.0
Value(s) applied	0.9
Measurement methods and procedures	N/A
Monitoring frequency	N/A
Purpose of data	To calculate baseline emission

Data / Parameter:	$EL_{BL,GR,y}$
Data unit:	MWh
Description:	Net electricity exported to grid in year y
Source of data:	Joint meter readings (JMRs)
Measurement procedures (if any):	Data will be measured on- site via calibrated electricity meters
Monitoring frequency:	Monthly
QA/QC procedures:	Calibrations of the main meter will be carried out once in 5 years as per national standards (as per provision of CEA, India). Any faulty meters will be duly replaced immediately as per the provision of PPA. Cross checking Quantity of net electricity supplied to grid will be crossed checked from the invoices raised by the project participants to grid.
Any comment:	The purpose of the data is to calculate baseline emission.