PROJECT CONCEPT NOTE

CARBON OFFSET UNIT (CoU) PROJECT

Title: 26 MW Bagasse based co-generation by Vitthal Refined Sugar Ltd.

Version 1.0

Date 15/06/2022

First CoU Issuance Period: 4 Years, 4 Months

Crediting Period: 01/12/2017 to 31/03/2022

PROJECT CONCEPT NOTE

BASIC INFORMATION	
Title of the project activity	26 MW Bagasse based co-generation by Vitthal Refined Sugar Ltd.
Scale of the project activity	Large Scale
Completion date of the PCN	15/06/2022
Project participants	Project Proponent: Vitthal Refined Sugars Ltd. Aggregator: Energy Advisory Services Pvt. Ltd.
Host Party	India
Applied methodologies and standardized baselines	**CDM UNFCCC Methodology** **ACM0006**: Electricity and heat generation from biomass (Ver. 16) & UCR Standard for Emission Factor
Sectoral scopes	01 Energy industries (Renewable/Non RenewableSources)
Estimated total amount of average GHG emission reductions per year	86,400 tCO2eq or 86,400 CoUs
Estimated total amount of average GHG emission reductions for the entire monitoring period	3,67,200 tCO2eq or 3,67,200 CoUs

SECTION A. Description of project activity

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

The Project Titled "26 MW Bagasse based co-generation by Vitthal Refined Sugar Ltd." is a bagasse based Co-Generation (cogen) Power Project successfully commissioned by Maharashtra State Electricity Distribution Co. Ltd. (MSEDCL) and operational since 01/12/2017. The Project is owned by M/S Vitthal Refined Sugar Ltd (hereby to be called as Project Proponent, PP).

Purpose of the project activity:
The PP has set up an integrated new sugar mill of 5000 TCD capacity along with eco-friendly 26 MW capacity cogen power project for decentralized generation of exportable surplus power, mainly from renewable source of fuel. The integrated project comprises of a sugar mill for the manufacture of high quality sugar, thereby making available required bagasse for the cogen power plant in crushing season.

The cogen power project of 26 MW capacity will operate on mill bagasse only for 160 season days of the sugar mill. At designed level, it is expected that the project will generate 96 million kWh of clean energy and export about 76.8 million kWh through MSEDCL grid for sale to MSEDCL 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 1 x 150 TPH boiler with high pressure and temperature configuration (87 kg/cm^2 and 515 ℃), 1 x 18 MW back pressure and 1 x 8 MW Double extraction cum condensing Turbine Generator set, as well as ESP for emission control and DCE control system for efficient operation.

The project activity is the construction and operation of a power plant/unit that uses renewable energy sources and supplies electricity to the grid as well as generate heat for the captive consumption at 5000 TCD sugar mill. The project activity is thus the displacement of electricity that would be provided to the grid by more-GHG-intensive means and provides long-term benefits to the mitigation of climate change.

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

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

Social benefits:

- The project activity contributes to employment generation in the local area for both skilled & unskilled people for operation and maintenance of the equipment. The project creates several permanent jobs, in addition to persons gaining indirect jobs through the supply of biomass to the plant. Apart from the direct and indirect employment generation, the project also encourages indirect employment by setting up other agro industries due to availability of power supply from the project. Under this project rural youth/women are identified and they can be trained for biomass collection, preparation, processing and transport.
- It has created steady higher value jobs and skilled workers at the facility. The project activity is contributing to the national energy security by reducing consumption of fossil fuels.
- The technology being used in the project is proven and safe for power generation. An increase in such kind of projects shall enable all the technology suppliers to continuously innovate and modernize on the technology front. The local people will know the technological advancement and will help in capacity building.

Environmental benefits:

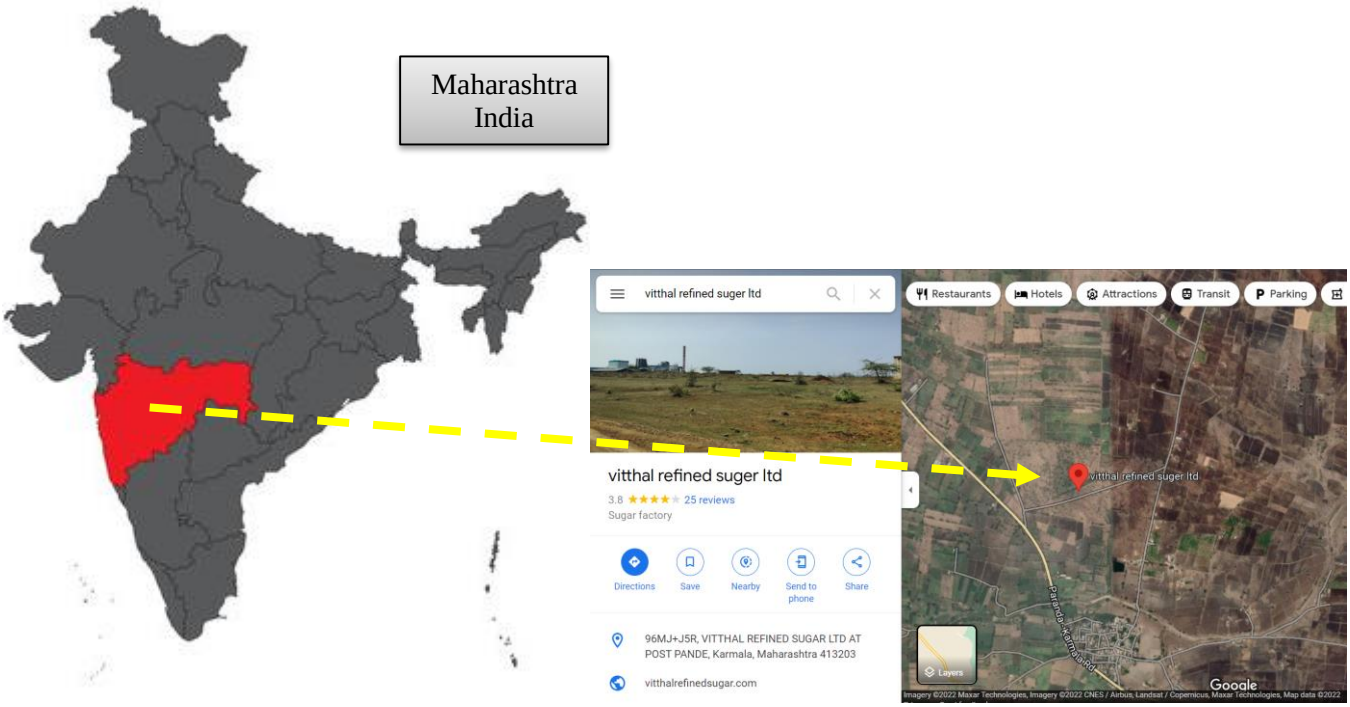
- The project activity is a renewable energy project, which utilizes biomass as a fuel for power generation and heat, a move that is voluntary and not mandated under current environmental laws of India. Since this project activity generates green energy in the form of power and heat, it has positively contributed towards the reduction in (demand) use of finite natural resources like coal, gas and oil, minimizing depletion and in turn increasing its availability to other important purposes. Therefore, this project activity helps to environment sustainability by reducing GHG emission in the atmosphere.
- Avoids global and local environmental pollution, leading to reduction of GHG emissions.
- The bagasse generated in sugar mills in the region are generally in excess and hence get disposed in unplanned ways including dumping into nearby land or rivers. This will be reduced

Economic benefits:

- The project activity creates employment opportunities during the project stage and operation and maintenance of the cogen power plant.
- The project activity helps in conservation of fast depleting natural resources like coal and oil thereby contributing to the economic wellbeing of country as a whole.
- The increase in demand of bagasse exerted by the project has had a local effect on its price and generates additional revenue for the sugarcane farmers. The project activity results in saving the coal and allowing it to be diverted to other needy section of the economy. The biomass 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.

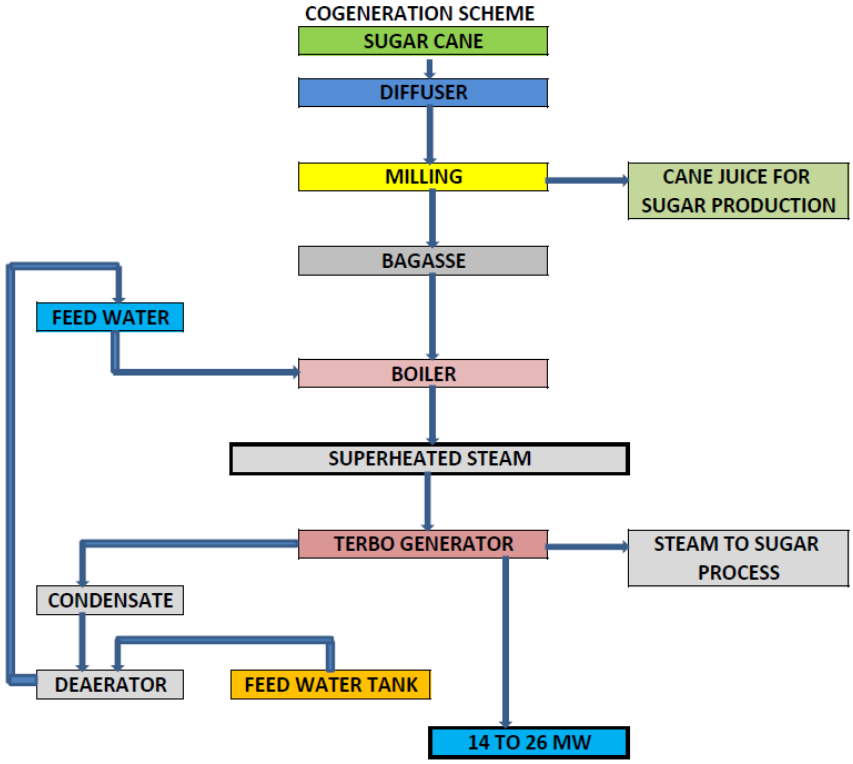
A.3. Location of project activity >>

Country : India
Village : Pande
Taluka : Karmala
District : Solapur
State : Maharashtra
Latitude : 18.3852 N
Longitude : 75.2304 E



A.4. Technologies/measures >>

The project activity involves 1 x 150 TPH boiler with high pressure and temperature configuration (87 kg/cm^2 and 515 °C), 1 x 18 MW back pressure and 1 x 8 MW Double extraction cum condensing Turbine Generator set. The Project activity in a process flow diagram can be expressed as below:



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

Parameters/Description	**Value/Units**
Boiler	1 No.
Boiler Type	Bi drum type water tube boiler
Furnace Type	Travelling grate with spreader stoker to burn bagasse with 50% moisture
Furnace	Leak-proof membrane panel type
MCR evaporation	150 t/hr
Steam pressure at super heater outlet	87 kg/cm^2
Steam temperature at super heater outlet	515 °C
Feed water temperature	165 °C
Efficiency of MCR	71% ± 0.5% on GCV of bagasse having 50% moisture, efficiency determined by heat loss method as per ASME PTC 4.1.
Type of Fuel	Bagasse with 50% moisture.
Turbo Alternator set	18 MW
Double Extraction cum Condensing type Turbo set	10 MW @ 0.8 Power factor

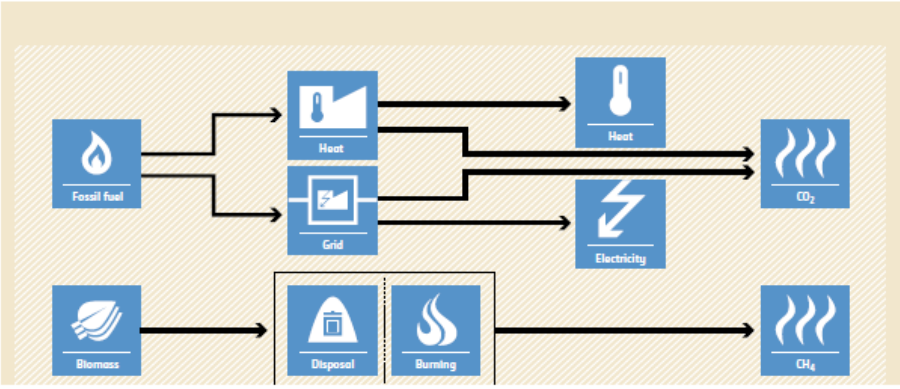
A.5. Parties and project participants >>

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

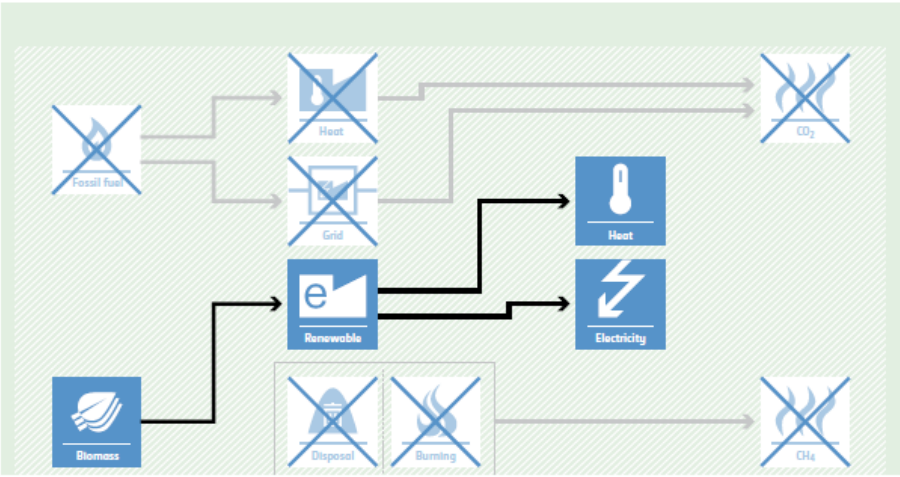
Party (Host)	Participants/Aggregator
India	**Project Owner:** M/S Vitthal Refined Sugar Ltd., At Kamlabhavani Nagar, Post-Pande, Tal. Karmala, Dist. Solapur, Maharashtra-413203. **Project Aggregator:** Energy Advisory Services Pvt Limited, Bangalore, Karnataka. Email: manoj@easpl.co.in

A.6. Baseline Emissions>>

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



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



The proposed project activity uses bagasse as fuel for cogeneration unit. The bagasse being a renewable bio-mass fuel does not add any net carbon-dioxide to the atmosphere because of the carbon recycling during growth of sugar cane. Therefore, the project activity will lead to zero CO_2 on-site emissions associated with bagasse combustion.
The crushing season of 160 days is envisaged for project activity operation. Without the 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. Debundling>>

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

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

SECTION B. Application of methodologies and standardized baselines

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

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

TYPE I **- Renewable Energy Projects**

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

B.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, bio- or chemical-degradation, etc.) prior to combustion. Drying and mechanical processing, such as shredding and pelletisation, are allowed.	The project is implemented to use 100% of the bagasse in the 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	The project is a new greenfield project and hence this 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.	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 bagasse produced as a waste of the sugar mill is being used for the generation of steam and hence this criteria 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 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)	As per the UCR list of eligible projects and methodologies found in the UCR Program Manual Ver. 4, this criterion is not applicable.

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.	

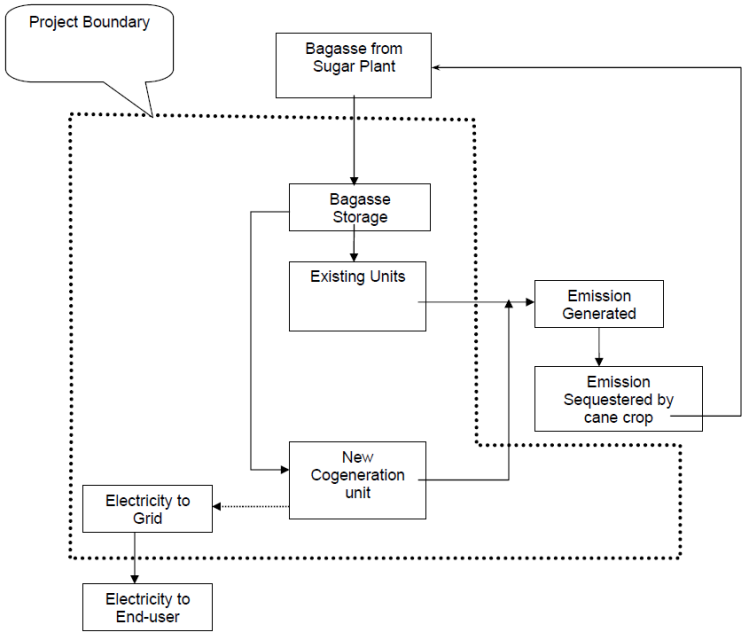
B.3. Applicability of double counting emission reductions >>

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 spatial extent of the project boundary encompasses:

1. All plants generating power and/or heat located at the project site, whether fired with biomass, 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 to the project site.
4. If the feedstock is biomass residues, the site where the biomass residues would have been left for decay or dumped.



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

- Emission reductions are calculated as follows:

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

Where,

ERy = Emissions reductions in year y (t CO_2)
BEy = Baseline emissions in year y (t CO_2)
PEy = Project emissions in year y (t CO_2)
LEy = Leakage emissions in year y (t CO2)

- The Baseline emissions in year y can be calculated as follows:

$$BEy = EL_{\text{MWh}y} \text{ X } EF_{\text{Grid}y} \quad \text{(Eq. 2)}$$

Where,

$EL_{\text{MWh}y}$ = Quantity of net electricity supplied to the grid as a result of the implementation of the project activity in year y (MWh)
$EF_{\text{Grid}y}$ = Grid emission factor in year y (t CO2/MWh)

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

$$PEy = 0 \quad \text{(Eq. 4)}$$

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

$$\text{LE}y = 0 \quad \text{(Eq. 5)}$$

B.6. Prior History>>

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

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

The start date of crediting period is 01/12/2017.

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 : 4 years and 4 months
Crediting Period : 01/12/2017 to 31/03/2022
Monitoring Period : 01/12/2017 to 31/03/2022

B.10. Monitoring Plan

Data and Parameters to be monitored

Data / Parameter	$EF_{\text{Grid}y}$
Data unit	tCO_2 /MWh
Description	A "grid emission factor" refers to a CO_2 emission factor (tCO_2/MWh) which will be associated with each unit of electricity provided by an electricity system. The UCR recommends an emission factor of 0.9 tCO_2/MWh for the 2014 - 2020 years as a fairly conservative estimate for Indian projects not previously verified under any GHG program. Hence, the same emission factor has been considered to calculate the emission reduction under conservative approach.
Source of data	https://a23e347601d72166dcd6-16da518ed3035d35cf0439f1cdf449c9.ssl.cf2.rackcdn.com//Documents/UCRStandardJan2022updatedVer3_180222035328721166.pdf
Value applied	0.9
Measurement methods and procedures	-
Monitoring frequency	Ex-ante fixed parameter
Purpose of Data	For the calculation of Emission Factor of the grid
Additional Comment	The combined margin emission factor as per CEA database (current version 16, Year 2021) results into higher emission factor. Hence for 2021 vintage UCR default emission factor remains conservative.

Data / Parameter	$EL_{\text{MWh}y}$
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 procedures (if any):	Data Type: Measured Monitoring equipment: Energy Meters are used for monitoring Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually Archiving Policy: Paper & Electronic Calibration frequency: 5 years (as per CEA provision) Generally, the calculation is done by the Authority/Discom and the project proponent has no control over the authority for the calculation. Therefore, based on the joint meter reading certificates/credit notes, the project shall raise the invoice for monthly payments. EL = E(export)- E(import)

Measurement Frequency:	Monthly
Value applied:	To be applied as per actual data
QA/QC procedures applied:	Calibration of the Main meters will be carried out once in five (5) years as per National Standards (as per the provision of CEA, India) and faulty meters will be duly replaced immediately as per the provision of power purchase agreement. Cross Checking: Quantity of net electricity supplied to the grid will be cross checked from the invoices raised by the project participant to the grid.
Purpose of data:	The Data/Parameter is required to calculate the baseline emission.
Any comment:	All the data will be archived till a period of two years from the end of the crediting period.