PROJECT CONCEPT NOTE

CARBON OFFSET UNIT (CoU) PROJECT

Title: 20 MW Biomass based Grid-connected Biomass Power Project of M/s Shiraguppi Sugar Works Ltd. Karnataka by EASPL

Version 2.0

Date

28-06-2023

First CoU Issuance Period: 09 Years 08 Months

Crediting Period: 04-05-2013 to 31-12-2022

PROJECT CONCEPT NOTE

BASIC INFORMATION	
Title of the project activity	20 MW Biomass based Grid-connected Biomass Power Project of M/s Shiraguppi Sugar Works Ltd. Karnataka by EASPL
Scale of the project activity	Large Scale
Completion date of the PCN	28-06-2023
Project participants	**Project Proponent:** M/s Shiraguppi Sugar Works 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-Renewable Sources)
Estimated total amount of average GHG emission reductions per year	37,378 tCO2eq or 37,378 CoUs
Estimated total amount of average GHG emission reductions for the entire monitoring period	3,58,833 tCO2eq or 3,58,833 CoUs

SECTION A. Description of project activity

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

The Project Titled "20 MW Biomass based Grid-connected Biomass Power Project of M/s Shiraguppi Sugar Works Ltd. Karnataka by EASPL" is a biomass power plant with the capacity of 20 MW, will utilize biomass residues agriculture sugar cane waste (bagasse) for electricity generation. The project will generate clean energy and after meeting the captive requirement surplus energy export to the grid. The project is contributing toward various SDG Goals including Social and Environmental. The Project activity reduces 28,000 t-CO2e/annum greenhouse gas emissions (GHG) by avoiding fossil fuel combustion for Biomass Based Generation

Purpose of the project activity:

The PP has set up an integrated new sugar mill with a 20 MW capacity co-gen power project for decentralized generation of exportable surplus power, mainly from renewable source of fuel. The co-gen plant was commissioned on 04/05/2013 with the capacity of 14 MW, later its capacity was enhanced to 20 MW. The integrated project comprises a sugar mill for the manufacture of high-quality sugar, thereby making available required bagasse for the co-gen power plant in crushing season.

The co-gen power project of 20 MW capacity will operate on mill bagasse only for 233 season days of the sugar mill, actual mill operation days will be mentioned in the monitoring period. At designed level, it is expected that the project will generate energy and use around 36 million kWh (surplus energy) of clean energy Over the period and export it to KPTCL grid for sale to state utility and other private parties through open access. All the steam requirements of the sugar mill and co-gen power plant is met internally from the project itself. For the operating purposes energy is imported from the state grid.

The project activity employs One 100 TPH boiler, with high pressure and temperature configuration (87 kg/cm^2 and 515 °C).

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 and importing surplus energy to the state grid. 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. The purpose of establishing a co-generation plant with the sugar plant is to maximize the productive efficiency of the main raw material in the process sugar cane. When sugar cane is crushed and juiced, it leaves behind a semi-

dry husky by-product called bagasse. This by-product, when dried and burnt, has enough gross calorific value (GCV) and thermal efficiency to power boilers. The power of steam produced by the boilers can be harnessed to drive turbines to produce electricity. This electricity, both, powers the plant and the excess power can be exported to the electricity grid and sold to end-users downstream

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:

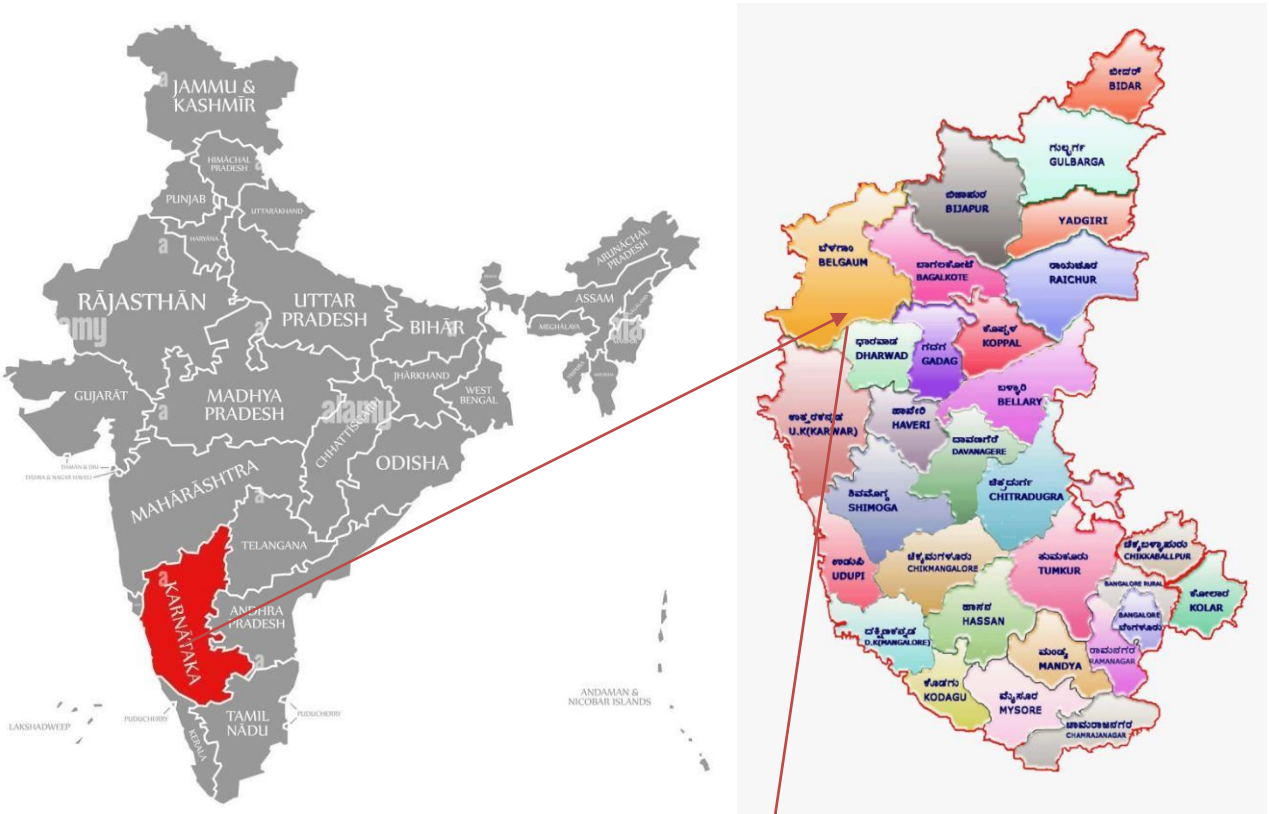
- The project activity is a renewable energy project, which utilizes biomass as a fuel for power generation and heat, a move that is voluntary and not mandated under current environmental laws of India. Since this project activity generates green energy in the form of power and heat, it has positively 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 co-gen 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.

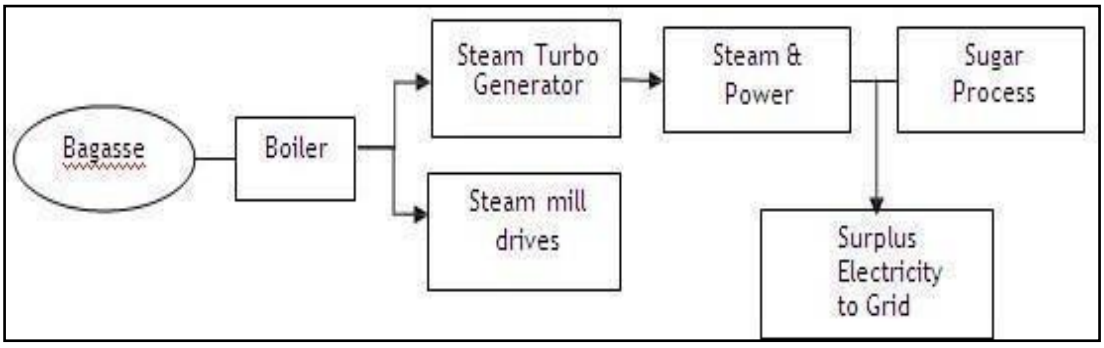
A.3. Location of project activity >>

Country	:	India
Village	:	Kagwad
Taluka	:	Athani
District	:	Belagavi (also known as Belgaum)
State	:	Karnataka
Latitude	:	16°42'36.5"N
Longitude	:	74°43'23.9"E



A.4. Technologies/measures >>

The project activity involves One 100 TPH boiler. 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:

Description	Values
Number of boilers	One
Steam flow at main steam-stop valve outlet For Bagasse	100000kg/hr
Peak Generation (½ hour in a shift of 8 hours) for Bagasse	100000kg/hr
Steam Pressure at Main Steam Stop Valve Outlet	87kg/cm2(a)
Superheated steam temperature at Main Steam Stop Valve outlet	515±5 Deg.C
Superheated steam temperature Control range for Bagasse	70–100% MCR
Feed Water Temperature at inlet of Economizer (One HP heater are in service)	170 Deg.C
Feed water temperature at de-aerator outlet	130 Deg.C
Flue gas out let temperature leaving air heater	150 Deg.C (for bagasse)

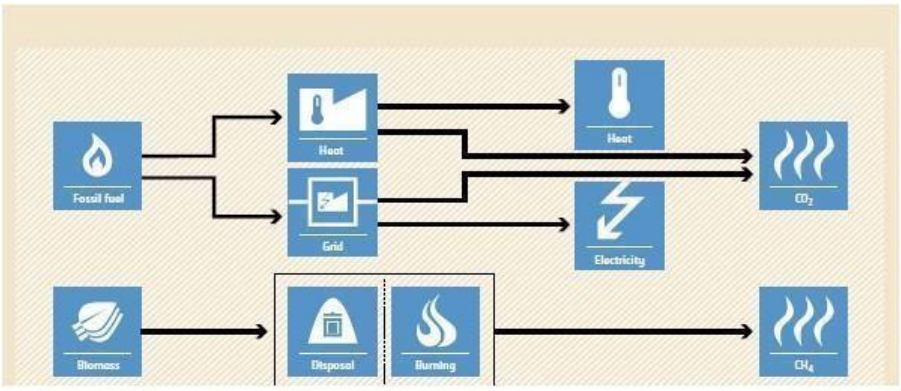
A.5. Parties and project participants >>

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

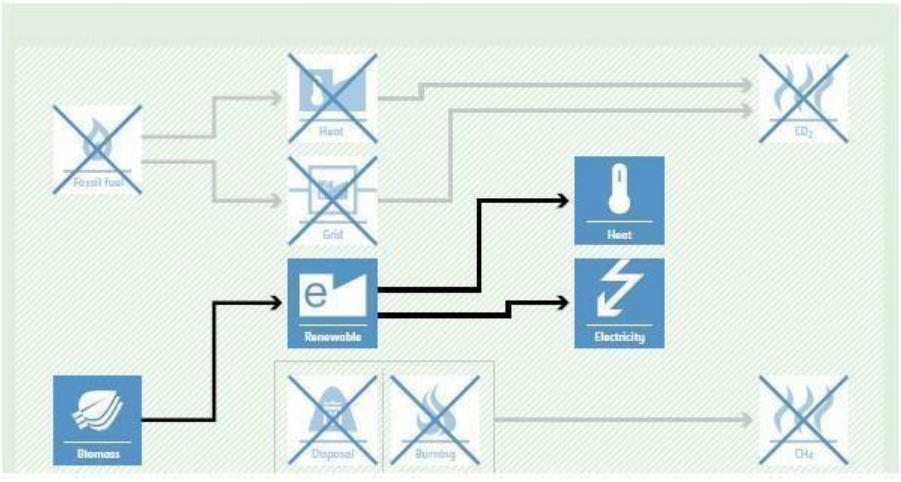
Party (Host)	Participants/Aggregator
India	**Project Owner:** M/s Shiraguppi Sugar Works Ltd. **Address:** 738/1, khanapur road, near 3rd railway gate Belagavi-590008 INDIA **Project Aggregator:** Energy Advisory Services Pvt Limited, Bangalore, Karnataka. Email: manoj@easpl.co.in

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 co-generation 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 233 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 co-gen 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 pelletization, are allowed.	The project is implemented to use 100% of the bagasse in the crushing season, during off season bagasse is imported from outside. hence the criteria points (c), (d) and (e) are applicable.

In the case of fuel switch project activities, the use of biomass or the increase in the use of biomass as compared to the baseline scenario is technically not possible at the project site without a capital investment in: (a) The retrofit or replacement of existing heat generators/boilers; or (b) The installation of new heat generators/boilers; or (c) A new dedicated supply chain of biomass established for the 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.	The project is a new greenfield project and hence this criterion is not applicable.
If biogas is used for power and heat generation, the biogas must be generated by anaerobic digestion of wastewater, and: (a) If the wastewater generation source is registered as a CDM project activity, the details of the wastewater project shall be included in the PDD, and emission reductions from biogas energy generation are claimed using this methodology; (b) If the wastewater source is not a CDM project, the amount of biogas does not exceed 50% of the total fuel fired on energy basis.	There is no production of biogas and hence this criterion is not applicable.
In the case biomass from dedicated plantations is used, the "TOOL16: Project and leakage emissions from biomass" shall apply to determine the relevant project and leakage emissions from cultivation of biomass and from the utilization of biomass residues.	The bagasse produced as a waste of the sugar mill is being used for the generation of steam, and during. and hence this criterion is also not applicable. During offseason biomass will be bought.

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

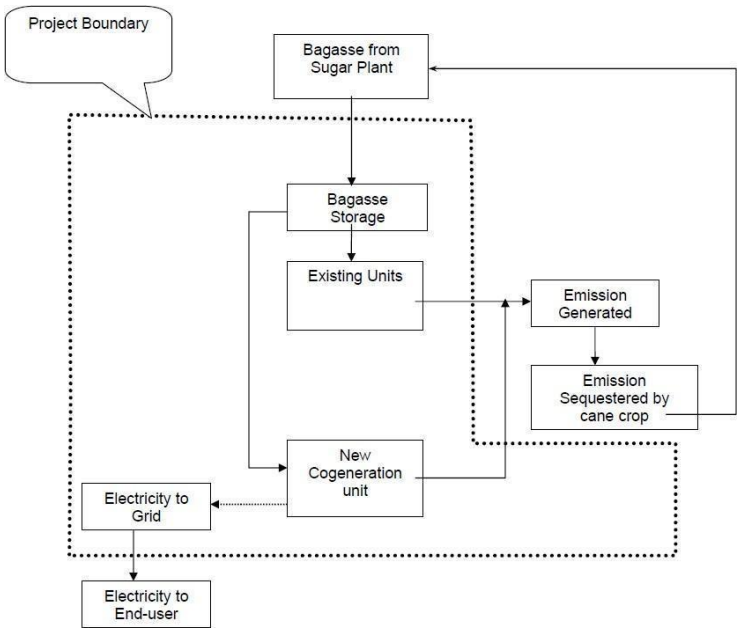
The project is not registered in any other GHG mechanism. Hence, there will not be any double counting possibility.

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:

$$ER_y = BE_y - PE_y - LE_y \quad \text{(Eq. 1)}$$

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)

The baseline scenario identified at the PCN stage of the project activity is:
Renewable energy technologies that displace technologies using fossil fuels, wherein the simplified baseline is the fuel consumption of the technologies that would have been used in the absence of the project activity, times an emission factor for the fossil fuel displaced. The baseline emissions due to displacement of electricity are determined by net quantity of electricity generation as a result of the project activity (incremental to baseline generation) during the year y in MWh times the CO_2 emission factor for the electricity displaced due to the project activity during the year y in tons CO_2/MWh Given that steam and electric power generation for internal consumption is part of the present project activity, emission reductions are only claimed from on-site incremental power generation that is injected to the grid. Therefore, the baseline scenario is the emission of GHG from the present energy grid. Emission Reductions (ER_y) The emission reduction due to the project activity is calculated as the difference between the baseline emissions and the sum of the project emissions and the leakage:

ER_y = BE_y - (PE_y + LE_y) (Eq. 2)

BE_y = Baseline emissions in year y (t CO2e)

As mentioned in the methodology the baseline emissions are calculated as follows:

BE_y = $EG_{pj,y}$ * $EF_{grid,y}$ (Eq. 3)

Where:

$EG_{grid,y}$ = Quantity of net electricity generation that is fed into the local grid as a result of the implementation of the project activity in year y (MWh)

$EF_{grid,y}$ = The CO2 emission factor for grid connected power generation in year y calculated using UCR Standard emission factor (0.9 tCO2/MWh).

❖ Project Emissions is calculated as follow:

$PE_y = PE_{Biomass,} + PE_{FF,y} + PE_{GR1,y} + PE_{GR2,y} + PE_{CBR,y} + PE_{BG2,y}$ (Eq. 4)

Where,

PE_y = Project emissions in year y (t CO_2)

$PE_{Biomass,}$ = Project emissions associated with the biomass and biomass residues in year y (t CO_2)

$PE_{FF,}$ = Emissions during the year y due to fossil fuel consumption at the project site (t CO_2)

$PE_{GR1,}$ = Emissions during the year y due to grid electricity imports to the project site (t CO_2)

$PE_{GR2,}$ = Emissions due to a reduction in electricity generation at the project site in year y(tCO_2)

$PE_{CBR,}$ = Emissions from the combustion of biomass during the year y (t CO2e)

In this case of Cogen biomass, there is no generation due to project emission.
Hence,

PE_y = 0 (Eq. 4)

❖ Leakage

It is an integrated Cogen plant. The biomass is the output of the sugar mill, which is being consumed by the power plant as a source of fuel. Therefore, there is no leakage due to cultivation of biomass in a dedicated plantation. As it is integrated Cogen power plant, there is no leakage due to transportation of biomass from outside of project activity.
Also, biomass is not processed outside of project boundary hence there is no leakage emissions being generated.

LE_y = 0 (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 04-05-2013.

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

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

B.9. Monitoring period number and duration>>

First Issuance Period : 09 Years 08 Months

Crediting Period : 04-05-2013 to 31-12-2022

Monitoring Period : 04-05-2013 to 31-12-2022

B.10. Monitoring Plan

Data and Parameters to be monitored

Data / Parameter	EF_{Grid}
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 2013 - 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/UCRCoUStandardAug2022updatedVer6_090822220127104470.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	G
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	Energy Bills/invoices

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. Therefore, based on the joint meter reading certificates/credit notes, the project shall raise the invoice for monthly payments.
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.