

PROJECT CONCEPT NOTE CARBON OFFSET UNIT (CoU) PROJECT

Title: 3 MW Small Scale Hydro Power project in Jemeithang, Arunachal Pradesh, India

Version 2.0

Date 26/07/2022

First CoU Issuance Period: 2 Years

Date: 23/01/2020 to 31/12/2021

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

Universal Carbon Registry		
BASIC INFORMATION		
Title of the project activity	3 MW Small Scale Hydro Power project in	
	Jemeithang, Arunachal Pradesh, India	
Scale of the project activity	Small Scale	
Completion date of the PCN	26/07/2022	
Project participants	Creduce Technologies Private Limited	
	(Representator) Hydro Power Development	
	Corporation of Arunachal Pradesh Limited	
	(Project Proponent)	
Host Party	India	
Applied methodologies and	Applied Baseline Methodology:	
standardized baselines	AMS-I. D: "Grid connected renewable	
	electricity generation", version 18	
	Standardized Methodology: Not Applicable.	
Sectoral scopes	01 Energy industries	
	(Renewable/Non-Renewable Sources)	
Estimated amount of total GHG	To be estimated during verification	
emission reductions	[An ex-ante estimate is 9,460 CoUs per year]	

SECTION A. Description of project activity

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

The proposed project tile under UCR is "3 MW Small Scale Hydro Power project in Jemeithang, Arunachal Pradesh, India", which is a Hydro Power project located in Tawang district in the state of Arunachal Pradesh (India). The project is an operational activity with continuous reduction of GHG, currently being applied under "Universe Carbon Registry" (UCR).

Purpose of the project activity:

The proposed project activity is promoted by Hydro Power Development Corporation of Arunachal Pradesh Limited (herein after called as project proponent PP). The proposed project activity is installation and operation of 2 Pelton Hydro Turbine Generators having individual capacity 1500 kW with aggregated installed capacity of 3.00 MW in Village- Jemeithang, Arunachal Pradesh state of India.

Sumbachu small hydroelectric project is located in Tawang District in the state of Arunachal Pradesh and envisages utilization of the flow of Sumbachu Nallah for generation of power. The project envisages a generation capacity of 3 MW of power by utilizing the available head between the Nallah elevations at El 2678.5 m & EI 2389.5 m. The project activity aims to harness kinetic energy of water (renewable source) to generate electricity. The project comprises a Trench weir which diverts the water into an intake placed on the right bank of the river. The diverted water passes through Desilting basin. Desilted water enters into water conductor system, forebay and the steel pressure shaft. A surface powerhouse is suitably located on a terrace at right bank of the river. Tail water from the powerhouse is discharged back into the nallah. The project utilises a net head of about 271.0 m. The project activity has been commissioned on 23/01/2020 for trail run and commercial operation has been started as on 29/01/2021.

As the nature of the hydro project, no fossil fuel is involved for power generation in the project activity except a nominal operation of diesel gen-sets for emergency and/or as a backup arrangement. The electricity produced by the project is directly contributing to climate change mitigation by reducing the anthropogenic emissions of greenhouse gases in to the atmosphere by displacing an equivalent amount of power at grid, which would otherwise have been generated from fossil fuel-based power plants which are connected to the Indian grid system.

The net generated electricity from the project activity is sold to state electricity board under the Power Purchase Agreement (PPA) signed between the project developer and the utility. In preproject scenario, electricity delivered to the grid by the project activity would have otherwise been generated by the operation of fossil fuel-based grid-connected power plants and by the addition of new generation sources in the grid.

Hence, project activity is displacing the estimated annual net electricity generation i.e., 10,513 MWh from the regional grid, which otherwise would have been generated by the operation of fossil fuel-based grid-connected power plants. The estimated annual average and the total CO2e emission reductions by the project activity are expected to be 9,460 tCO2e.

The estimated annual average and the total CO_2e emission reductions by the project activity is expected to be 9,460 tCO₂e, whereas actual emission reduction achieved during the first CoU period shall be submitted as a part of first monitoring and verification.

Since the project activity will generate electricity through hydro energy, a clean renewable energy source it will not cause any negative impact on the environment and thereby contributes to climate change mitigation efforts.

Project's Contribution to Sustainable Development

Indian economy is highly dependent on "Coal" as fuel to generate energy and for production processes. Thermal power plants are the major consumers of coal in India and yet the basic electricity needs of a large section of population are not being met. This results in excessive demands for electricity and places immense stress on the environment.

Changing coal consumption patterns will require a multi-pronged strategy focusing on demand, reducing wastage of energy and the optimum use of renewable energy (RE) sources. This project is a greenfield activity where grid power is the baseline. The renewable power generation is gradually contributing to the share of clean & green power in the grid; however, grid emission factor is still on higher side which defines grid as distinct baseline.

The Government of India has stipulated following indicators for sustainable development in the interim approval guidelines for such projects which are contributing to GHG mitigations. The Ministry of Environment, Forests & Climate Change, has stipulated economic, social, environment and technological well-being as the four indicators of sustainable development. It has been envisaged that the project shall contribute to sustainable development using the following ways:

Social well-being: The project would help in generating direct and indirect employment benefits accruing out of ancillary units for manufacturing of the Hydro Turbine Generator and for maintenance during operation of the project activity. It will lead to development of infrastructure around the project area in terms of improved road network, etc. and will also directly contribute to the development of renewable infrastructure in the region.

Economic well-being: Being a renewable resource, using hydro energy to generate electricity contributes to conservation precious natural resources. The project contributes to the economic sustainability through promotion of decentralization of economic power, leading to diversification of the national energy supply, which is dominated by conventional fuel based generating units. Locally, improvement in infrastructure will provide new opportunities for industries and economic activities to be setup in the area. Apart from getting better employment opportunities, the local people will get better prices for their land, thereby resulting in overall economic development.

Technological well-being: The project activity leads to the promotion of 3MW hydro turbine generators into the region and will promote practice for small scale industries to reduce the dependence on carbon intensive grid supply to meet the captive requirement of electrical energy and also increasing energy availability and improving quality of power under the service area. Hence, the project leads to technological well-being.

Environmental well-being: The project utilizes hydro energy for generating electricity which is a clean source of energy. The project activity will not generate any air pollution, water pollution or solid waste to the environment which otherwise would have been generated through fossil fuels. Also, it will contribute to reduction GHG emissions. Thus, the project causes no negative impact on the surrounding environment contributing to environmental well-being.

With regards to ESG credentials:

At present specific ESG credentials have not been evaluated, however, the project essentially contributes to various indicators which can be considered under ESG credentials. Some of the examples are as follows:

Under Environment:

The following environmental benefits are derived from the project activity:

- Produces renewable electricity without any GHG emissions.
- Run of river hydro power plant with little impact on the surrounding ecology.
- No increase in volume of reservoir and no land inundation, hence no disturbance to the natural habitat.

For the project proponent, energy sale pattern is now based on renewable energy due to the project and it also contributes to GHG emission reduction and conservation of depleting energy sources associated with the project baseline. Hence, project contributes to ESG credentials.

Under Social:

The social well-being is assessed by contribution to improvement in living standards of the local community. The project activity is located in remote villages of industrially backward state of Arunachal Pradesh. The implementation of the project activity would provide job opportunities to the local community; contribute in poverty alleviation of the local community and development of basic amenities to community leading to improvement in living standards of the community.

Under Governance:

Governance criteria relates to overall operational practices and accounting procedure of the organization. With respect to this project activity, the PP practices a good governance practice with transparency, accountability and adherence to local and national rules & regulations etc. This can be further referred from the company's annual report. The electricity generated from the project can be accurately monitored, recorded and further verified under the existing management practice of the company. Thus, the project and the proponent ensure good credentials under ESG.

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

There was no harm identified form the project and hence no mitigations measures are applicable.

Rational: as per 'Central Pollution Control Board (Ministry of Environment & Forests, Govt. of India)', final document on revised classification of Industrial Sectors under Red, Orange, Green and White Categories (07/03/2016), it has been declared that hydro project activity falls under the "White category". White Category projects/industries do not require any Environmental Clearance such as 'Consent to Operate' from PCB as such project does not lead to any negative environmental impacts. Additionally, as per Indian Regulation, Environmental and Social Impact Assessment is not required for small scale Hydro Projects.

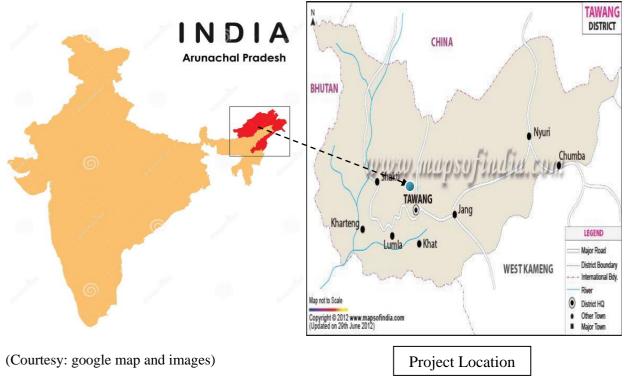
Nevertheless, PP has conducted a press release on 18th February, 2008 at Tawang district of Arunachal Pradesh, India to understand, discuss, record all possible concerns related to environment and socio-economic aspects of the project so that as per requirements mitigation measures can be taken. The feedback and inputs received from local stakeholders confirm that no negative impact is foreseen by them.

Additionally, there are social, environmental, economic and technological benefits which contribute to sustainable development. The key details have been discussed in the previous section.

A.3. Location of project activity

The project location is situated at village Jemeithang of Tawang district in the state of Arunachal Pradesh. The nearest major railway station to Tawang is Rangapara Railway Station located in Tezpur. The project site is located about 430 kms from Tezpur. The Project site is connected to Tawang by all-weather road which is 90 kms away from Jemeithang. The geographic co-ordinate of the project locations is 27°42'26.95" N and 91°43'31.87" E.

The representative location map is included below:



A.4. Technologies/measures

The project activity involves 2 numbers hydro turbine generators of Pelton Horizontal type (1500 KW each) with internal electrical lines connecting the project activity with local evacuation facility. The generators generate power at 3.3kV, which can further be stepped up to 33 KV. The project activity can operate in the frequency range of 47.5–51.5 Hz and in the voltage range of $3.3kV \pm 12.5\%$. The average life time of the generator is around 35 years as per the equipment supplier specification. The other salient features of the technology are:

Design Discharge	1.485 cumecs
Gross Head	281 m
Net Head	271 m
Diversion Weir	
Туре	Trench weir
Shape	Trapezoindal
Length	20 m
Design Discharge	1.84 m3/s including 5% flushing
Feeder Channel	
Length	55 m
Shape / Material	Rectangular / R.C.C (cut and cover)
Size	Bed width 1.00 m
	Height 1.20 m
Design Discharge	1.747 cumecs
Desilting Tank	
Total Length	35.0 m
Width	5.00 m
Full supply depth	1.80 m
Free board	0.30 m
Type / Material	R.C.C
Design Discharge	1.747 m3/s
Power Channel	
Length	270 m
Shape / Material	Rectangular / R.C.C (cut and cover)
Size	Bed width 1.17 m
	Height 1.20 m
Forebay Tank	
Total Length	12.0 m
Width	6.00 m
Full supply depth	2.70 m
Free board	0.50 m
Type / Material	R.C.C
Design Discharge	1.5 m3/s
Penstock	
Number	One
Diameter – Main pipe	750 mm (I.D.)
After bifurcation	520 mm (I.D.) and 16 mm thickness
Thickness for main pipe	8 mm, 12 mm, 16 mm & 20 mm
Length	728 m

A.5. Parties and project participants

Party (Host)	Participants
India	Creduce Technologies Private Limited (Representator) Contact person: Shailendra Singh Rao Mobile: +91 9016850742, 9601378723 Address: 2-O-13,14 Housing Board Colony, Banswara, Rajasthan - 327001, India Hydro Power Development Corporation of Arunachal Pradesh Limited (Developer) Address: (Govt. of Arunachal Pradesh Enterprise) Park View Apartment, Lower Niti Vihar, District Papum Pare, Itanagar, Arunachal Pradesh – 791111, India

A.6. Baseline Emissions

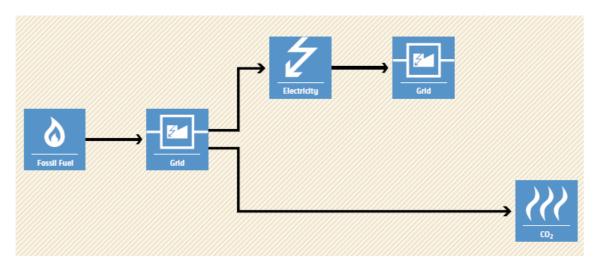
The baseline scenario identified at the PCN stage of the project activity is:

• Grid

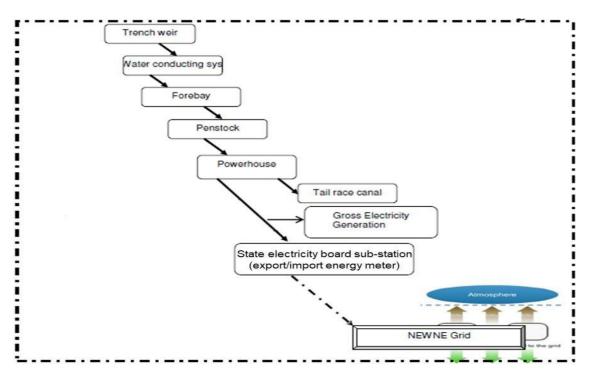
In the absence of the project activity, the equivalent amount of electricity would have been generated by the operation of fossil fuel-based grid-connected power plants and fed into NEWNE grid, which is carbon intensive due to use of fossil fuels. Hence, baseline scenario of the project activity is the grid-based electricity system, which is also the pre-project scenario.

Schematic diagram showing the baseline scenario:

Baseline Scenario:



Project Scenario:



NWENE – North West East and North-East Grid, is now a part of unified Indian Grid system.

Baseline Scenario:

As per the approved consolidated methodology AMS-I.D. Version 18, if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

"The baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid" The project activity involves setting up of a new SHP plant to harness the green power from Hydel energy and to supply the produced power to the grid.

A.7. Debundling

This project activity is not a de-bundled 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:

AMS. I.D. (Title: "Grid connected renewable electricity generation", version 18)

B.2. Applicability of methodologies and standardized baselines

The project activity involves generation of grid connected electricity from the construction and operation of a new hydro power-based power project. The project activity has installed capacity of 3.00 MW which will qualify for a small-scale project activity under Type-I of the Small-Scale methodology. The project status is corresponding to the methodology AMS-I.D., version 18 and applicability of methodology is discussed below:

Applicability Criterion	Project Case
1. This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass:	1 5
 (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling. 	Hence the project activity meets the given applicability criterion.
 2. This methodology is applicable to project activities that: (a) Install a Greenfield plant; (b) Involve a capacity addition in (an) existing plant(s); (c) Involve a retrofit of (an) existing plant(s); (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s). 	The option (a) of applicability criteria 2 is applicable as project is a Greenfield plant /unit. Hence the project activity meets the given applicability criterion.

	Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology:	It is run of river type of project; hence, this criterion is not applicable.
	The project activity is implemented in existing reservoir, with no change in the volume of the reservoir; or	
(b)	The project activity is implemented in existing reservoir, where the volume of the reservoir(s) is increased and the power density as per definitions given in the project emissions section, is greater than 4 W/m^2 .	
(c)	The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m^2 .	
	If the new unit has both renewable and non- renewable components (e.g., a wind/diesel unit), the eligibility limit of 15 MW for a small-scale CDM project activity applies only to the renewable component. If the new unit co-fires fossil fuel, the capacity of the entire unit shall not exceed the limit of 15 MW.	The proposed project is 3 MW Hydro Power Project, i.e., only component is renewable power project below 15MW, thus this criterion is not applicable to this project activity.
5.	Combined heat and power (co-generation) systems are not eligible under this category.	The project is Hydro Power Project and thus, the criterion is not applicable to this project activity.
	In the case of project activities that involve the capacity addition of renewable energy generation units at an existing renewable power generation facility, the added capacity of the units added by the project should be lower than 15 MW and should be physically distinct from the existing units.	The proposed project is a greenfield 3 MW Hydro Power Project, i.e., no capacity addition was done to any existing power plant. Thus, this criterion is not applicable to this project activity.
7.	In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW.	The proposed project is a greenfield 3 MW Hydro Power Project, i.e., no retrofit, rehabilitation or replacement was done to any existing power plant. Thus, this criterion is not applicable to this project activity.
	In the case of landfill gas, waste gas, wastewater treatment and agro-industries projects, recovered methane emissions are eligible under a relevant Type III category. If the recovered methane is used for electricity generation for supply to a grid, then the baseline for the electricity component shall be in accordance with procedure prescribed under this methodology. If the recovered methane is used for heat generation or cogeneration other applicable Type-I methodologies such as "AMS- I.C.: Thermal energy production with or without electricity" shall be explored.	The proposed project is a greenfield 3 MW Hydro Power Project hence, this criterion is not applicable to this project activity.

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9. In case biomass is sourced from dedicated No biomass is involved, the project is only plantations, the applicability criteria in the tool a Hydro Power Project and thus the "Project emissions from cultivation of biomass" criterion is not applicable to this project shall apply.

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 is uniquely identifiable based on its location coordinates,
- Project has dedicated commissioning certificate and connection point,
- Project is associated with energy meters which are dedicated to the consumption point for project developer

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

As per applicable methodology AMS-I.D. Version 18, "The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the project power plant is connected to."

Thus, the project boundary includes the Hydro Turbine Generators and the Indian grid system.

Source		Gas	Included?	Justification/Explanation
	Grid	CO ₂	Yes	CO2 emissions from electricity generation in fossil fuel fired power plants
line	electricity generation	CH ₄	No	Minor emission source
3 ase		N ₂ O	No	Minor emission source
н		Other	No	No other GHG emissions were emitted from the project
	Greenfield	CO ₂	No	No CO ₂ emissions are emitted from the project
Project	Hydro Power	CH ₄	No	Project activity does not emit CH ₄
Proj	Project	N ₂ O	No	Project activity does not emit N ₂ O
	Activity	Other	No	No other emissions are emitted from the project

B.5. Establishment and description of baseline scenario

This section provides details of emission displacement rates/coefficients/factors established by the applicable methodology selected for the project.

As per para 19 of the approved consolidated methodology AMS-I.D. Version 18, if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

"The baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid".

The project activity involves setting up of a new hydro power plant to harness the green power from hydro energy and to use for sale to national grid through PPA arrangement. In the absence of the project activity, the equivalent amount of power would have been generated by the operation of grid-connected fossil fuel-based power plants and by the addition of new fossil fuel-based generation sources into the. The power produced at grid from the other conventional sources which are predominantly fossil fuel based. Hence, the baseline for the project activity is the equivalent amount of power produced at the Indian grid.

A "grid emission factor" refers to a CO₂ emission factor (tCO₂/MWh) which will be associated with each unit of electricity provided by an electricity system. The UCR recommends an emission factor of 0.9 tCO₂/MWh for the 2014- 2020 years as a fairly conservative estimate for Indian projects not previously verified under any GHG program. Also, for the vintage 2021, the combined margin emission factor calculated from CEA database in India results into higher emission than the default value. Hence, the same emission factor has been considered to calculate the emission reduction under conservative approach.

Net GHG Emission Reductions and Removals

Thus, $ER_y = BE_y - PE_y - LE_y$

Where:

 ER_y = Emission reductions in year y (tCO₂/y)

 BE_y = Baseline Emissions in year y (t CO₂/y)

 $PE_y = Project \text{ emissions in year y } (tCO_2/y)$

 LE_y = Leakage emissions in year y (tCO₂/y)

Baseline Emissions

Baseline emissions include only CO_2 emissions from electricity generation in power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants.

The baseline emissions are to be calculated as follows: $BE_y = EG_{Pl,y} \times EF_{arid,y}$

Where:

BE_y	=	Baseline emissions in year y (t CO ₂)
$EG_{PJ,y}$	=	Quantity of net electricity generation that is produced and fed into the grid as a
		result of the implementation of this project activity in year y (MWh)
EF _{grid,y}	=	UCR recommended emission factor of 0.9 tCO ₂ /MWh has been considered, this
		is conservative as compared to the combined margin grid emission factor which
		can be derived from Database of Central Electricity Authority (CEA), India.
		(Reference: General Project Eligibility Criteria and Guidance, UCR Standard,
		page 4)

Project Emissions

As per paragraph 39 of AMS-I.D. (version 18, dated 28/11/2014), for most renewable energy project activities emission is zero.

Hence, PEy = 0

Leakage Emission

As per paragraph 42 of AMS-I.D. version-18, 'If the energy generating equipment is transferred from another activity, leakage is to be considered.' In the project activity, there is no transfer of energy generating equipment and therefore the leakage from the project activity is considered as zero.

Hence, LEy= 0

The actual emission reduction achieved during the first CoU period shall be submitted as a part of first monitoring and verification. However, for the purpose of an ex-ante estimation, following calculation has been submitted:

Estimated annual baseline emission reductions (BEy)

= 10,513 MWh/year *0.9 tCO2/MWh

= 9,460 tCO2/year (i.e., 9,460 CoUs/year)

B.6. Prior History

The project activity is a small-scale hydro project and was not applied under any other GHG mechanism prior to this registration with UCR. Also, project has not been applied for any other environmental crediting or certification mechanism. Hence project will not cause double accounting of carbon credits (i.e., COUs).

B.7. Changes to start date of crediting period

There is no change in the start date of crediting period. The start date of crediting under UCR is considered as 23/01/2020, which is the project commissioning date.

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

As per the latest JMRs and commissioning certificate available the monitoring period will be 23/1/2020 to 31/12/2021

B.9. Monitoring period number and duration

First Monitoring Period: 2 Years 23/01/2020 to 30/11/2021 (inclusive of both dates)

B.10. Monitoring plan

Data and Parameters available at validation (ex-ante values):

Data / Parameter	UCR recommended emission factor
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/UCRS tandardAug2022updatedVer5_030822005728911983.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 and Parameters to be monitored (ex-post monitoring values):

Data / Parameter	EG _{BL, 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. In case the monthly JMR provides net export quantity, the same will be directly considered for calculation.	
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 periods.	