PROJECT CONCEPT NOTE

CARBON OFFSET UNIT (CoU) PROJECT

Title: 6 MW Bundled Small Scale Hydro Power Project in Andhra Pradesh

Version 2.0

Date 04/10/2022

First CoU Issuance Period: 05 Years and 04 Months

Date: 24/09/2016 to 31/12/2021

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BASIC INFORMATION	
Title of the project activity	6 MW Bundled Small Scale Hydro Power Project in Andhra Pradesh
Scale of the project activity	Small Scale
Completion date of the PCN	04/10/2022
Project participants	**Project Proponent:** M/s Khandaleru Power Company Limited **Aggregator:** Energy Advisory Services Pvt. Ltd.
Host Party	India
Applied methodologies and standardized baselines	**CDM UNFCCC Methodology** **AMS-I.D.**: Grid connected renewable electricity generation version-18 & UCR Standard for Emission Factor
Sectoral scopes	01 Energy industries (Renewable/Non-Renewable Sources)
Estimated total amount of average GHG emission reductions per year	18,921 tCO_2e or 18,921 CoUs

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SECTION A. Description of project activity

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

The proposed project activity involves construction and operation of Small-Scale hydel project in the state of Andhra Pradesh in India. The project activity has been essentially conceived to generate clean energy by utilizing the hydro potential of the water flowing in the Khandaleru Dam Reservoir. It causes minimum environmental impacts and will reduce inhabitants' dependence on fossil fuels. This in turn will lead to reduction of greenhouse gas (GHG) emissions by an estimated 18,921 Tonnes of CO_2e/year during the crediting period.

Total cumulative installed capacity of the project would be 6 MW with an annual gross energy generation of 21,024 MWh. It involves 2 Turbines of Khandaleru Power Company Limited (KPCL). In KPCL Unit-I (3 MW) of this hydro project sells the produced energy to the A One Ispat Pvt Ltd, through Power purchase agreement whereas Unit-II (3 MW) of this Small-Scale hydel project sells electricity to the national grid, through National transmission network.

Purpose of the project activity:

The main purpose of the project activity is to generate renewable electrical energy through sustainable means without causing any negative impact on the environment, and to contribute to climate change mitigation efforts.

Apart from the generation of electrical power, the project also contributes to the following.

- Sustainable development of the region.
- Rural development, as all the projects are located in rural areas.
- Generation of additional employment for the local stakeholders.

The proposed project activity is promoted by M/s Khandaleru Power Company Limited (Herein after called as project proponent 'PP'). The proposed project activity is installation and operation of Small-Scale Hydel Power Project comprising of 2 units of hydro Turbine and Generators with an aggregated installed capacity of 6 MW.

The net generated electricity from the project activity is sold to the state electricity board and private party under the Power Purchase Agreement (PPA) signed between the PP and respective parties. In pre-project 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 fossil fuel-based generation sources in the grid. The electricity produced by the project is directly contributing to climate change mitigation by reducing the anthropogenic emissions of greenhouse gases into the atmosphere by displacing an equivalent amount of power at grid.

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Sr. No.	Project Proponent	District	Turbine	No. & Capacity	Commissioning Date
1	KPCL	Nellore	Unit-I	1 X 3000 kW	10/05/2021
2	KPCL	Nellore	Unit-II	1 x 3000 kW	24/09/2016

Hence, project activity is displacing the estimated annual net electricity generation i.e., 21,024 MWh from the Indian grid system, which otherwise would have been generated by the operation of fossil fuel-based grid-connected power plants. The estimated annual CO_2e emission reductions by the project activity are expected to be 18,921 tCO_2e.

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

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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 6 MW Small Scale hydro turbine generators into the region and will promote practice for small scale industries to reduce the dependence on carbon intensive energy supply 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.
- No increase in volume of reservoir and no land inundation, hence no disturbance to the natural habitat.

For the PP, 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 region in the state of Andhra 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. Also, the project activity is a Hydro power project owned and managed by the proponent for which all required NOCs and approvals are received. 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

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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.

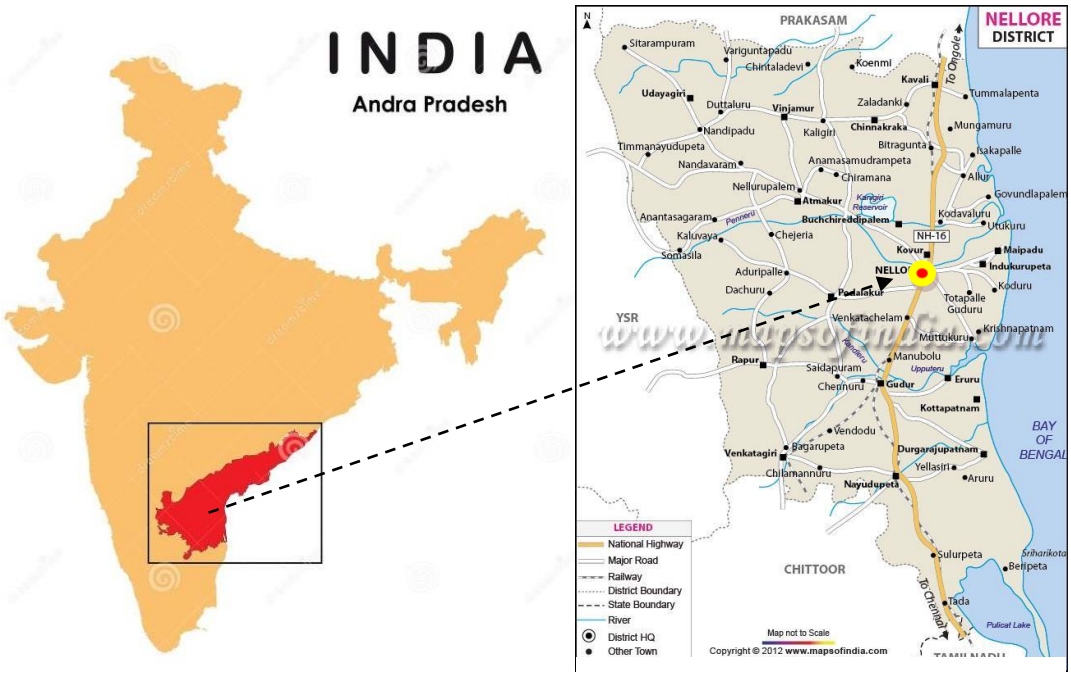
Rational: as per 'Central Pollution Control Board (Ministry of Environment & Forests, Govt. of India)', final document on revised classification of Industrial Sectors under Red, Orange, Green and White Categories (07/03/2016), it has been declared that hydro project activity falls under the "White category". 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 Hydro Projects.

A.3. Location of project activity >>

Country : India
State : Andhra Pradesh

Sr. No.	Project Proponent	Village	District	Latitude	Longitude
1	KPCL	Vepinapi	Nellore	14°16'46.1"N	79°36'12.0"E
2	KPCL	Vepinapi	Nellore	14°16'46.1"N	79°36'12.0"E

The representative location map of the project locations is indicated below:



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A.4. Technologies/measures >>

The project activity involves 2 hydro turbine generators of vertical full Kaplan turbine with vertical shaft synchronous generator of 3000 kW and 1 turbine of Francis make of 1500 kW and aggregated installed capacity of the hydro power project is 6 MW.

The other salient features of the technology of KPCL turbines are:

Sr. No.	Parameter	KPCL UNIT-I	KPCL UNIT-II
1	Make of Turbine	BFL	BFL
2	Type	Vertical Full Kaplan	Vertical Full Kaplan
3	Rated Capacity	3205 kW	3205 kW
4	Year of Manufacturing	2015	2015
5	Rated Head	10 Meter	10 Meter
6	Rated Speed	201 RPM	201 RPM

In the absence of the project activity the equivalent amount of electricity would have otherwise been generated by the operation of fossil fuel-based grid-connected power plants and fed into unified India grid system, hence baseline scenario of the project activity is the grid-based electricity system, which is also the pre-project scenario as discussed in the previous section.

A.5. Parties and project participants >>

Party (Host)	Participants
India	**Project Owner: M/s Khandaleru Power Company Limited** Address: Priti Nandita Residency, Flat No, G-2, D.No.10-2-289/86, Shanti Nagar, Masab Tank, Hyderabad-500028, India. **Project Aggregator:** Energy Advisory Services Pvt Limited, Bangalore, Karnataka. Email: manoj@easpl.co.in

A.6. Baseline Emissions>>

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

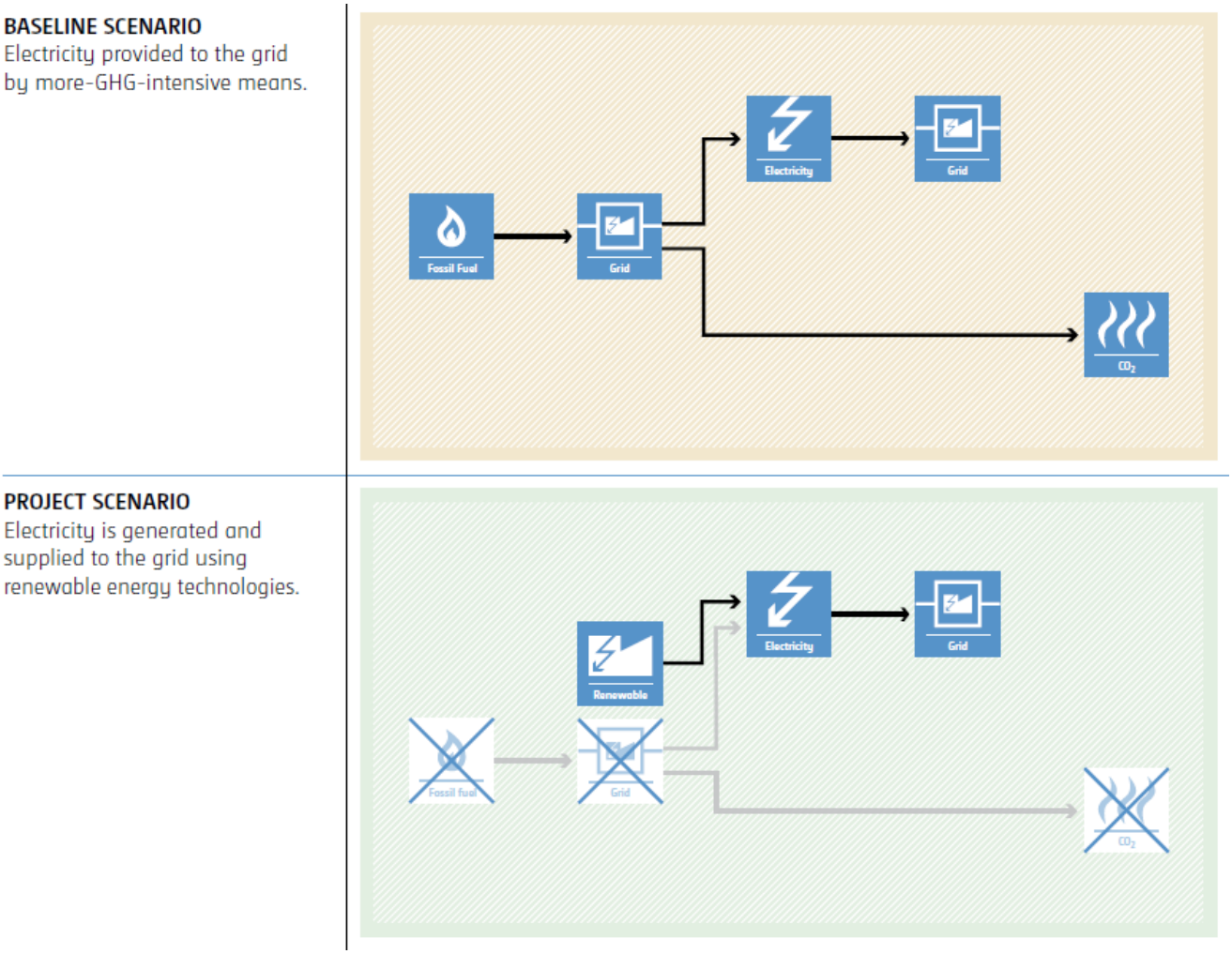
- Grid

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 or regional 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.

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Schematic diagram showing the baseline scenario:

Project Scenario:



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 plant to harness the green power from Hydro energy. In the absence of the project activity, the equivalent amount of power would have been supplied by the Indian grid, which is fed mainly by fossil fuel fired plants. Hence, the baseline for the project activity is the equivalent amount of power produced at the Indian grid.

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A.7. Debundling>>

This project activity is not a debundled component of a larger project activity.

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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 6 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: (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.	The project activity is a Renewable Energy Project. Unit-I of KPCL sells energy to an identified customer hence it falls under applicability criteria (b). Whereas Unit-II of KPCL sells energy to the national grid, hence it falls under applicability criteria option 1 (a) i.e., "Supplying electricity to a national or a regional grid". 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.

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3. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology: (a) 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/m2. (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/m2.	This Small-Scale Hydro Project is implemented on an irrigation channel of an existing reservoir with no change in the volume of the reservoir. Thus, point (a) of the criteria 3 is applicable.
4. 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 6 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.
6. 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 6 MW Hydro Power Project, and it does not involve capacity addition to an 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 6 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.

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8. 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 6 MW hydro power project hence, this criterion is not applicable to this project activity.
9. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	No biomass is involved, the project is only a Hydro Power Project and thus the criterion is not applicable to this project activity.

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

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

- Project has dedicated commissioning certificate and connection point.
- Project 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
Baseline	Grid connected electricity generation	**CO2**	**Yes**	**CO2 emissions from electricity generation in fossil fuel fired power plants**
		CH4	No	Minor emission source
		N2O	No	Minor emission source
		Other	No	No other GHG emissions were emitted from the project
Project	Greenfield Hydro Power Project Activity	CO2	No	No CO2 emissions are emitted from the project
		CH4	No	Project activity does not emit CH4
		N2O	No	Project activity does not emit N2O
		Other	No	No other emissions are emitted from the project

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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. 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 2013-2020 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.

- Emission reductions are calculated as follows:

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

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)

Baseline Emissions

Baseline emissions include only CO2 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 in year y can be calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{Grid,y} \quad \textbf{(Eq. 2)}$$

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Where,

BE_y	= Baseline emissions in year y (t CO2)
$EG_{PJ,y}$	= Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh)
$EF_{Grid,y}$	= Grid emission factor in year y (t CO2/MWh)

Project Emissions

As per paragraph 39 of AMS-I.D. version-18, Since this is a run of river type of hydro project on an existing reservoir, project emission for renewable energy plant is nil.
Thus,

PE_y = 0 (Eq. 3)

Leakage Emissions

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.
Thus,

LE_y = 0 (Eq. 4)

Estimated annual baseline emission reductions (BE_y)

= 21,024 MWh/year *0.9 tCO_2/MWh

= 18,921 tCO_2/year (i.e., 18,921 CoUs/year)

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 >>

There is no change in the starting date of the crediting period.

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

There are no changes in the PCN monitoring plan, applied methodology or applied standardized baseline.

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B.9. Monitoring period number and duration>>

First Monitoring Period : 05 Years and 04 Months

24/09/2016 to 31/12/2021 (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 2013 - 2021 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/UCRStandardAug2022updatedVer5_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	$\mathbf{EG_{PJ,y}}$
Data unit	MWh
Description	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).
Source of data Value(s) applied	JMR

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Procedures	The Net electricity generation by the Hydro power Plant is recorded by the project proponent in the record logs. At the end of every month, JMR report is generated based on the total monthly electricity exported to the grid.
Monitoring frequency	Monthly
Purpose of data	To estimate Baseline Emission

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