



Monitoring Report

CARBON OFFSET UNIT (CoU) PROJECT



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

Version 1.0

Date 02/05/2023

First CoU Issuance Period: 03 Years and 03 Months

Monitoring Period: 01/10/2019 to 31/12/2022



Monitoring Report (MR) CARBON OFFSET UNIT (CoU) PROJECT

Monitoring Report	
Title of the project activity	6 MW Bundled Small Scale Hydro Power Project in Andhra Pradesh
UCR Project Registration Number	235
Version	1.0
Completion date of the MR	Small Scale
Monitoring period number and duration of this monitoring period	Monitoring Period Number: 01 Duration of this monitoring Period: 3 years 3 months (first and last days included (01/10/2019 to 31/12/2022))
Project participants	<p>Project Proponent: M/s Khandaleru Power Company Limited Priti Nandita Residency, Flat No, G-2, D.No.10-2-289/86, Shanti Nagar, Masab Tank, Hyderabad-500028, India.</p> <p>Aggregator: Energy Advisory Services Pvt. Ltd. Bangalore, Karnataka. Email: manoj@easpl.co.in</p>
Host Party	INDIA
Applied methodologies and standardized baselines	<p>CDM UNFCCC Methodology AMS-1.D.: Grid connected renewable electricity generation version-18 & UCR Standard for Emission Factor</p>
Sectoral scopes	01 Energy industries (Renewable/Non-Renewable Sources)
Estimated amount of GHG emission reductions for this monitoring period in the registered PCN	2019: 4,153 CoUs (4,153 tCO _{2eq})
	2020: 13,189 CoUs (13,189 tCO _{2eq})
	2021: 19,336 CoUs (19,336 tCO _{2eq})
	2022: 27,843 CoUs (27,843 tCO _{2eq})
	Total: 64,521 CoUs (64,521 tCO _{2eq})

SECTION A. Description of project activity

A.1. Purpose and general description of project activity >>

a) Purpose of the project activity and the measures taken for GHG emission reductions >>

The proposed project activity involves construction and operation of Small-Scale hydel project at Khandaleru 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 19,852 Tonnes of CO₂e/year during the crediting period.

Total cumulative installed capacity of the project would be 6MW with an annual gross energy generation of 21,024 MWh/y. It involves 2*3MW 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.

b) Brief description of the installed technology and equipment>>

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 3MW hydro Turbine and Generators with an aggregated installed capacity of 6MW.

The 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

c) Relevant dates for the project activity (e.g. construction, commissioning, continued operation periods, etc.)>>

UCR Project ID: 235

Start Date of Crediting Period: 01/10/2019

Project Commissioned: 24/09/2016, Unit – 1.
10/05/2021, Unit – 2.

d) Total GHG emission reductions achieved or net anthropogenic GHG removals by sinks achieved in this monitoring period>>

The total GHG emission reductions achieved in this monitoring period is as follows:

Summary of the Project Activity and ERs Generated for the Monitoring Period	
Start date of this Monitoring Period	01/10/2019
Carbon credits claimed up to	31/12/2022
Total ERs generated (tCO _{2eq})	64521 tCO _{2eq}
Leakage	0.00

e) Baseline Scenario>>

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

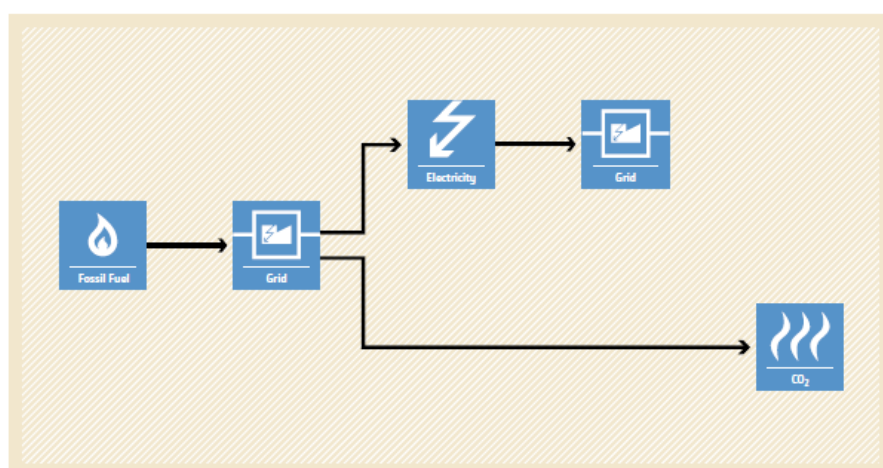
As per the approved consolidated methodology AMS-I.D. Version 18, if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

“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.

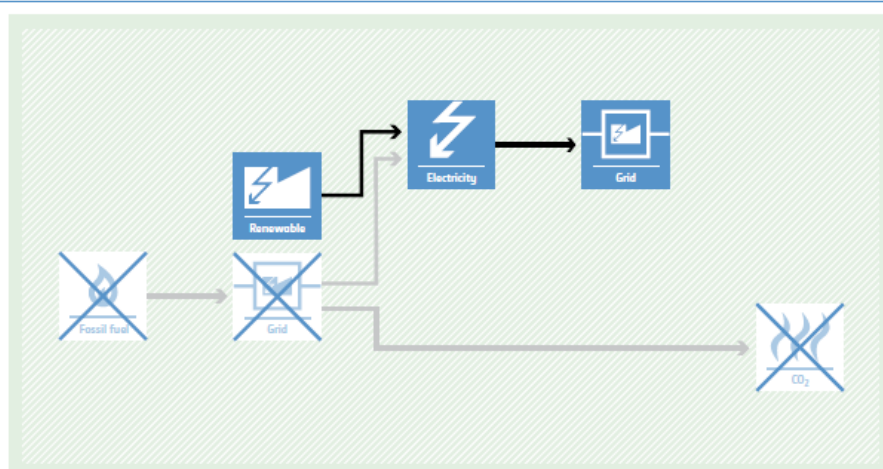
BASELINE SCENARIO

Electricity provided to the grid by more-GHG-intensive means.



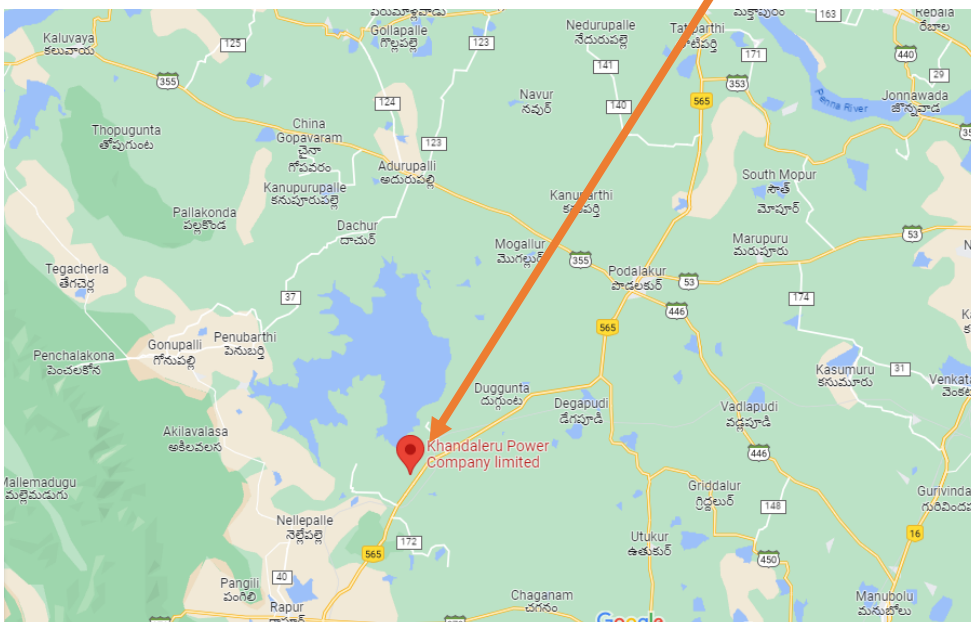
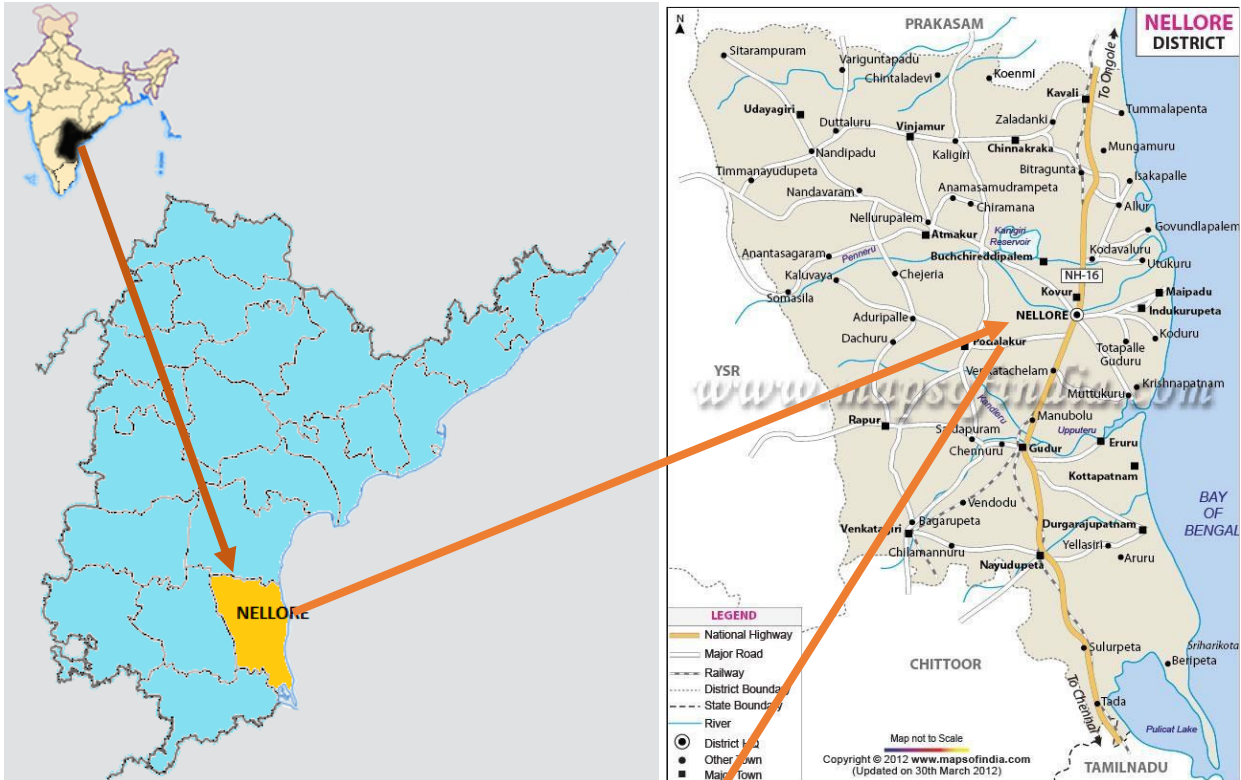
PROJECT SCENARIO

Electricity is generated and supplied to the grid using renewable energy technologies.



A.2. Location of project activity>>

Country: INDIA
 Village: KHANDALERU
 Tehsil: RAPUR
 District: SPS NELLURU
 State: ANDHRA PRADESH
 Pincode: 524414
 Coordinates: Latitude : 14°16'46" N
 Longitude : 77°36'10" E



A.3. Parties and project participants >>

Party (Host)	Participants
INDIA	Project Proponent: M/s Khandaleru Power Company Limited Aggregator: Energy Advisory Services Pvt. Ltd.

A.4. 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)

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 6MW 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:

A.5. Crediting period of project activity >>

Length of the crediting period corresponding to this monitoring period: 03 years – 03 months
01/10/2019 – 31/12/2022

A.6. Contact information of responsible persons/entities >>

Name : Manoj Vyas
Contact No : +91 7303201778
E-Mail : manoj@easpl.co.in

SECTION B. Implementation of project activity

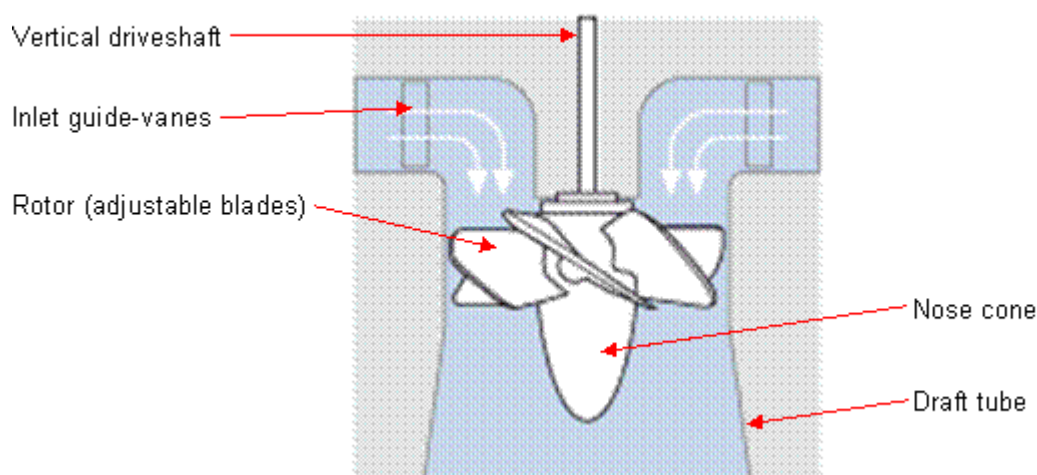
B.1. Description of implemented registered project activity >>

a) Provide information on the implementation status of the project activity during this monitoring period in accordance with UCR PCN>>

The project consists of two hydro turbines having an installed capacity of 3000kW (3MW) each, which were commissioned on 24/09/2016(Unit-1) and 10/05/2021 (Unit-2) at Khandarelu village of District SPS Nellur, Andhra Pradesh. M/s Khandaleru Power Company Limited is the owner of this project. The project generates clean energy by utilizing the kinetic energy of flowing water from Khandarelu reservoir into the canal.

b) For the description of the installed technology(ies), technical process and equipment, include diagrams, where appropriate>>

The project activity involves two Vertical Kaplan Turbine of 3MW (3000kW) each, with alternator, internal electrical lines connecting the project activity with a local evacuation facility. The generators generate power at 3.3 kV, which can further be stepped up to 33 kV. The project activity operates at a frequency of 50 Hz and a voltage of 3.3 kV $\pm 10\%$. The average life of the generator is around 35 years as per the equipment supplier specification.



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

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

The Government of India has stipulated the 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, environmental, 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 project stage and during the operation and maintenance of the equipment of this project. It will lead

to the 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: The project is a clean technology investment decision based on carbon revenue support, which signifies the flow of clean energy investments into the host country. The project activity requires temporary and permanent, skilled and semi-skilled manpower at the project location; this will create additional employment opportunities in the region.

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 employs state of art technology hydro turbines which has high power generation potential. The successful operation of project activity would lead to the promotion of this technology and would further push R&D efforts by technology providers to develop more efficient and better machinery in the future. Hence, the project leads to technological well-being.

Environmental well-being: The project activity will generate power using zero emissions hydro-based power generation facility which helps to reduce GHG emissions and specific pollutants like SO_x, NO_x, and SPM associated with the conventional thermal power generation facilities. The project utilizes the kinetic energy of flowing water 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. Thus, the project causes no negative impact on the surrounding environment contributing to environmental well-being.

B.3. Baseline Emissions>>

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

“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”.

Thus, this project activity was a voluntary investment which replaced equivalent amount of electricity from grid connected power plants. The project proponent was not bound to incur this investment as it was not mandatory by national and sectoral policies. Thus, the continued operation of the project activity would continue to replace thermal energy from non-renewable fuel (coal/oil/gas) and fight the impacts of climate change. The Project Proponent hopes that carbon revenues from 2019-2022 accumulated because of carbon credits generated will help repay the loans and in the continued maintenance of this project activity.

B.4. Debundling>>

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

SECTION C. Application of methodologies and standardized baselines

C.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)

C.2. Applicability of methodologies and standardized baselines >>

Applicability Criterion	Project Case
<p>1. This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass:</p> <p>(a) Supplying electricity to a national or a regional grid; or</p> <p>(b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.</p>	<p>The project activity is a Renewable Energy Project i.e. micro hydro power.</p> <p>Unit-I of KPCL sells energy to an identified customer hence it falls under applicability criteria 1(b).</p> <p>Whereas Unit-II of KPCL sells energy to the national grid, hence it falls under applicability criteria option 1(a)</p> <p>Hence the project activity meets the given applicability criterion.</p>
<p>2. This methodology is applicable to project activities that:</p> <p>(a) Install a Greenfield plant;</p> <p>(b) Involve a capacity addition in (an) existing plant(s);</p> <p>(c) Involve a retrofit of (an) existing plant(s);</p> <p>(d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or</p> <p>(e) Involve a replacement of (an) existing plant(s).</p>	<p>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.</p>
<p>3. Hydro power plants with reservoirs that satisfy at least one of the following conditions are eligible to apply this methodology:</p> <p>(a) The project activity is implemented in existing reservoir, with no change in the volume of the reservoir; or</p> <p>(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.</p> <p>(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 4W/m².</p>	<p>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, criteria 3(a) is applicable.</p>

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 2*3MW Micro 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 Micro Hydro Power Project and thus, this 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 2*3MW Micro-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 2*3MW Micro 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.
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 2*3MW 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 Micro Hydro Power Project and thus this criterion is not applicable to this project activity.

C.3 Applicability of double counting emission reductions >>

The project was not applied under any other GHG mechanism. Hence project will not cause double accounting of carbon credits (i.e., COUs), due to the following reasons:

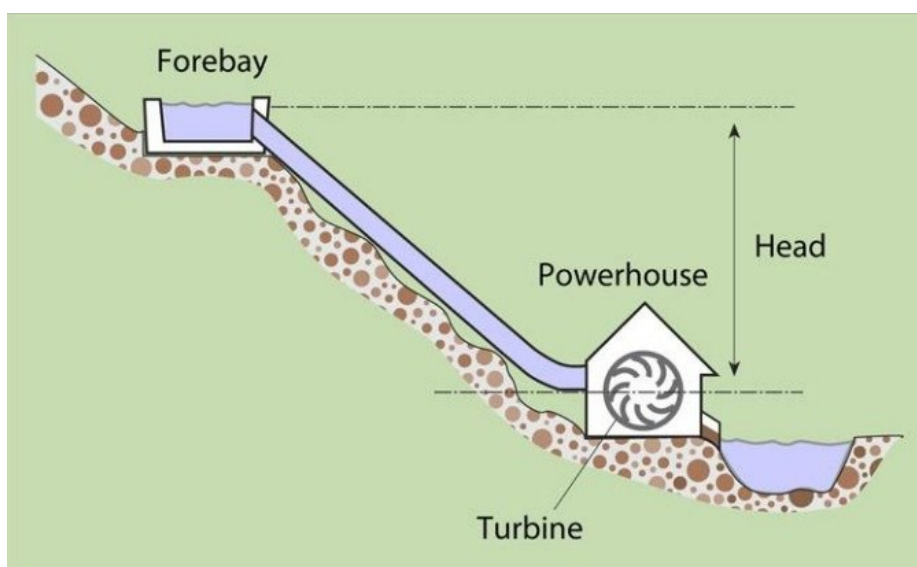
- Project is uniquely identifiable based on its location coordinates,

- Project has a dedicated commissioning certificate and connection point,
- Project is associated with energy meters which are dedicated to the consumption point for the project developer.

C.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 hydropower plant and the Indian grid system.



	Source	GHG	Included?	Justification/Explanation
Baseline	<i>Emissions from grid connected power plants using non-renewable energy sources as fuel</i>	CO ₂	Included	Major source of emission
		CH ₄	Excluded	Negligible source of emission
		NO ₂	Excluded	Minor source of emissions
		Others	Excluded	No other GHG emissions were emitted from the project
Project Activity	<i>Emissions from on-site electricity use</i>	CO ₂	Excluded	Project activity does not emit CO ₂
		CH ₄	Excluded	Project activity does not emit CH ₄
		NO ₂	Excluded	Project activity does not emit NO ₂
		Others	Excluded	Project activity does not emit any other GHG gases

C.5. Establishment and description of baseline scenario (UCR Protocol) >>

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 a new micro hydropower plant to harness the kinetic energy of flowing water. 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.

A "grid emission factor" refers to a CO₂ emission factor (tCO₂/MWh) that 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 conservative estimate for Indian projects not previously verified under any GHG program.

Also, for the vintage 2021-2023, the combined margin emission factor calculated from the CEA database in India results in higher emissions than the default value.

Hence, the same emission factor has been considered to calculate the emission reduction under a conservative approach.

C.5.1 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 emissions in year y (tCO₂/y)
 LE_y = Leakage emissions in year y (tCO₂/y)

• 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 are to be calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,y}$$

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)

$EF_{grid,y}$ = UCR recommended emission factor of 0.9 tCO₂/MWh has been considered.

(Reference: General Project Eligibility Criteria and Guidance, UCR Standard, page 4)

• **Baseline Emissions Calculation**

Sr No	Year	$EG_{PJ,y}$ (MWh)	$EF_{grid,y}$	BE_y
1	2019	4,614.70	0.9	4,153
2	2020	14,654.00	0.9	13,189
3	2021	21,484.55	0.9	19,336
4	2022	30,936.50	0.9	27,843
tCO₂ for the period October 2019 to December 2022				64,521

• **Project Emissions Calculation**

As per Paragraph 39 of AMS-I.D. version-18, only emissions associated with fossil fuel combustion, emissions from the operation of geothermal power plants due to the release of non-condensable gases, and emissions from a water reservoir of hydro should be accounted for the project emission. Since the project activity is a hydroelectric power project, project emission for renewable energy plants is nil.

Thus, PE = 0

• **Leakage Emission Calculation**

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 zero.

Hence, LE = 0

• **Net Emission**

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

Hence,

Net GHG emission reduction, = **64,521-0-0 = 64,521 tCO₂** (i.e., **64,521 CoUs**)

C.6. Prior History>>

The project was not applied under any other GHG mechanism. Hence the project will not cause double accounting of carbon credits (i.e., CoUs).

C.7. Monitoring period number and duration>>

First Issuance Period: 3 years, 3 months – 01/10/2019 to 31/12/2022 (inclusive of both dates)

C.8. Changes to start date of crediting period >>

The crediting period starts from 01/10/2019 and ends on 31/12/2022

C.9. Permanent changes from PCN monitoring plan, applied methodology or applied standardized baseline >>

Not Applicable

C.10. Monitoring plan>>

Parameter	<i>EG_{PJ,y}</i>
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.
Source of data Value(s) applied	Monthly Electricity Logbook maintained at each Power Plant
Procedures	The Net electricity generation by the hydro power plant is recorded at the sub-station. At the end of every month Electricity generation report is generated based on the total monthly electricity exported to the grid or consumed by the nearby local community.
Monitoring frequency	Monthly
Purpose of data	To calculate the baseline emission

Parameter	<i>EF_{grid,y}</i>
Data and Parameters available at validation (ex-ante values)	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 - 2020 years as a 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://cea.nic.in/wp-content/uploads/baseline/2023/01/Approved_report_emission_2021_22.pdf and UCR Document

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 18, Year 2022) results into higher emission factor. Hence for 2022 vintage UCR default emission factor remains conservative.

Data/Parameter	Date of commissioning of the units
Data unit	Date
Description	Actual date of commissioning of the project unit
Source of data Value(s) applied	Commissioning report issued by State grid transmission corporation or State electricity board
Measurement methods and procedures	The construction processes are maintained from its initiation to completion dates for the biogas unit. Thus, the start date of each of the unit installed is recorded in the monitoring report.
Monitoring frequency	As and when commissioned and fixed and recorded in the monitoring report
Purpose of data	To estimate baseline emissions