Monitoring Report

CARBON OFFSET UNIT (CoU) PROJECT

10 MW Bundled Small Scale Hydro Power Project

Title: 10 MW Bundled Small Scale Hydro Power Project in the State of Sikkim, India

Version 1.0

Date 11/05/2022

First CoU Issuance Period: 08 Years

Monitoring Period: 01/01/2014 to 31/12/2021

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

Monitoring Report	
Title of the project activity	10 MW Bundled Small Scale Hydro Power Project in the State of Sikkim, India
UCR Project Registration Number	046
Version	1.0
Completion date of the MR	11/05/2022
Monitoring period number and duration of this monitoring period	Monitoring Period Number: 01 Duration of this monitoring Period: 08 Years First and last days included (01/01/2014 to 31/12/2021)
Project participants	Creduce Technologies Private Limited (Representator) Sikkim Power Development Corporation Limited (Project Proponent)
Host Party	India
Applied methodologies and standardized baselines	Applied Baseline Methodology: AMS-I.D.: "Grid connected renewable electricity generation", version 18
Sectoral scopes	01 Energy industries (Renewable/Non-Renewable Sources)
Estimated amount of GHG emission reductions for this monitoring period in the registered PCN	2014: 15,651 CoUs (15,651 tCO2eq)
	2015: 26,275 CoUs (26,275 tCO2eq)
	2016: 24,809 CoUs (24,809 tCO2eq)
	2017: 23,755 CoUs (23,755 tCO2eq)
	2018: 29,697 CoUs (29,697 tCO2eq)
	2019: 37,112 CoUs (37,112 tCO2eq)
	2020: 34,106 CoUs (34,106 tCO2eq)
	2021: 36,982 CoUs (36,982 tCO2eq)
Total:	2,28,387 CoUs (2,28,387 tCO2eq)

SECTION A. Description of project activity

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

The proposed project activity with title under UCR "10 MW Bundled Small Scale Hydro Power Project in the State of Sikkim, India", is a small bundled Hydro Power project located in three different locations namely Sisney village of East Sikkim district (Rongli small hydroelectric project), Mangley village of South Sikkim district (Mangley small hydroelectric project) and Lachung village of North Sikkim district (Lachung small hydroelectric project) all are in the state of Sikkim (India). The project is an operational activity with continuous reduction of GHG, currently being applied under "Universal Carbon Registry" (UCR). These are run-of river type projects.

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

The proposed Bundled project activity is promoted by Sikkim Power Development Corporation Limited (herein after called as project proponent PP). The project activity aims to harness kinetic energy of water (renewable source) to generate electricity. The net generated electricity from the project activity is sold to state electricity board. M/S Sikkim Power Development Corporation Limited sells generated electricity to the state electricity department under the Power Purchase Agreement (PPA) signed between the Project Proponent (PP) and the utility. 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. Hence, project activity is displacing the gross electricity generation i.e., 2,53,762 MWh from the NEWNE grid. The project activity doesn't involve any GHG emission sources. The annual and the total CO2e emission reduction by the project activity over the defined monitoring period is as per **Annexure I.**

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

This bundled project envisages a generation of total 10 MW of power from small hydroelectric project (SHEP) by utilizing the available head and discharge from respective river streams. The Project activity comprises of the following different civil structures, combinedly known as hydro power plant. The kinetic energy of water flowing from river is converted into mechanical energy using hydraulic turbine, which is then converted into electrical energy using generator. The water used in this process is again diverted to the river stream through proper arrangements.
Below is the description of different components of a hydro power plant.

1. **Diversion structure (trench weir):** A diversion structure is required across the Nallah for diverting its water for power generation. The nallah bed consists of pebbles, gravels and boulders.
2. **Intake/Power Channel:** The water fed from Desilting tank is led to tunnel inlet portal through a Rectangular R.C.C channel also known as Intake or Power Channel.
3. **Desilting Tank:** A Desilting chamber is considered necessary to remove silt particles to minimize the abrasion effects on the turbine runners.
4. **Forebay Tank:** The Forebay is provided to ensure supply of immediate water demand on starting the generating units and to meet the demand in emergency like breach of power channel.
5. **Penstock:** Water from Forebay is being taken to the Powerhouse to run hydraulic turbine through pressurized penstock pipe running from Forebay tank.
6. **Power House Building:** Power house building is a simple structure housing the generating units, auxiliary equipment, control panels and suitable outlet for tail water discharge.

7. **Tail Race Channel:** Turbine discharge shall be disposed to river through the separate tailrace channel.

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

The duration of the crediting period corresponding to the monitoring period is covered in this monitoring report.

UCR Project ID : 046

Project	Total Installed Capacity	Commissioning date	Start date of Crediting Period
Rongli SHEP	5 MW	06/10/2013	01/01/2014
Mangley SHEP	2 MW	01/07/2008	01/01/2014
lachung SHEP	3 MW	16/01/2009	01/01/2014

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	01/01/2014
Carbon credits claimed up to	31/12/2021
Total ERs generated (tCO_{2eq})	2,28,387 tCO2eq
Leakage	0

e) 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".**

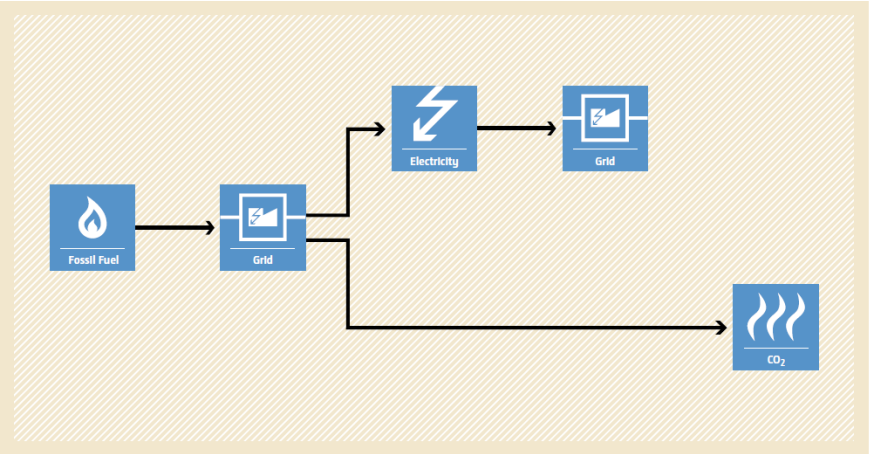


Figure 1 Baseline Scenario

A.2. Location of project activity>>

Country : India
State : Sikkim

The location of first project (Rongli HEP) from this bundled is situated at village Sisney of East Sikkim district in the state of Sikkim. The nearest major railway station is New Jalpaiguri Railway Station which is 165 kms from this site. The nearest airport is at Bagdogra which is 175 kms from this site. This project site is connected to Gangtok by Rongli Kupup State highway The geographic coordinate of the project location as mentioned in the Detailed Project report (DPR) is longitude 88°45'E and latitude 27°45 N (approximately).

The location of second project (Mangley HEP) from this bundled is situated at village Mangley of South Sikkim district in the state of Sikkim. The nearest major railway station is New Jalpaiguri Railway Station which is 102 kms from this site. The nearest airport is at Bagdogra which is 112 kms from this site. The geographic co-ordinate of the project location as mentioned in the Detailed Project report (DPR) is longitude 88°26'18" E and latitude 27°16'29" N (approx).

The location of third project (Lachung HEP) from this bundled is situated at village Lachung of North Sikkim district in the state of Sikkim. The nearest major railway station is New Jalpaiguri Railway Station which is 186 kms from this site. The nearest airport is at Bagdogra which is 196 kms from this site. The geographic co-ordinate of the entire project activity as mentioned in the Detailed Project report (DPR)is: longitude 30° 05' 30"N and longitude 79° 36' 30" E (approx.)

The representative location map is included below:

(Courtesy: google map and images)

Project Site

A.3. 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. **Sikkim Power Development Corporation Limited (Developer)** Address: (Govt. of Sikkim Enterprise) Near STNM Hospital, Arithang, Gangtok, Sikkim, Pincode - 737101, India. Contact: +91 (0359) 2208-186)

A.4. References to methodologies and standardized baselines >>

SECTORAL SCOPE - 01 Energy industries (Renewable/Non-Renewable Sources)

TYPE - Renewable Energy Projects

CATEGORY - AMS-I. D: "Grid connected renewable electricity generation", version 18

A.5. Crediting period of project activity >>

Project	Total Installed Capacity	Start date of Crediting Period
Rongli SHEP	5 MW	01/01/2014
Mangley SHEP	2 MW	01/01/2014
lachung SHEP	3 MW	01/01/2014

Crediting period corresponding to this monitoring period : 08 years
01/01/2014 to 31/12/2021 (Both the dates are included)

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

Name : Shailendra Singh Rao
Contact No : +91 9016850742, 9601378723
E-Mail : shailendra@creduce.tech

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 projects were commissioned by Directorate of Energy, Government of Sikkim on the dates mentioned bellow in the table. Sikkim Power Development Corporation Limited is the promoter of this project. The project generates clean energy by utilizing the kinetic energy of flowing water from the river.

Name of individual project activity	Total installed capacity	Commissioning date
Rongli SHEP	5 MW	06/10/2013
Mangley SHEP	2 MW	01/07/2008
lachung SHEP	3 MW	16/01/2009

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

The project activity involves hydro turbine generators of horizontal Francis, Pelton and Turgo Impulse type with internal electrical lines connecting the project activity with local evacuation facility. All the generators generate power at 3.3kV, which can further be stepped up to 11 kV. The project activity can operate in the frequency range of 47.5 – 51.5 Hz and in the voltage range of 3.3kV ± 10%. The average life time of the generator is around 35 years as per the equipment supplier specification. Turbine's type and no. of turbines installed on particular projects are shown in the below table:

Village	District	Name of stream / river	Type of turbine	Number of turbines	Capacity of single turbine	Total Capacity
Sisney	East Sikkim	Rongli Khola (Tributary of Rongpuchu)	Francis Hydro Turbine	2	2500 kW	5 MW
Mangley	South Sikkim	Khanyara Nallah (Tributary of Teesta)	Francis Hydro Turbine	2	1000 kW	2 MW
Lachung	North Sikkim	Shargopchu lchu (Tributary of Teesta)	Pelton Hydro Turbine	2	1500 kW	3 MW

The other salient features of each project activity are given in the table below:

Specifications	Rongli HEP (5MW)	Mangley HEP (2MW)	Lachung HEP (3MW)
Gross Head	157 m	129.75 m	385 m
Net Head	157 m	118 m	380 m
Diversion Weir			
Type	Trench weir	Trench weir	Trench weir
Shape	Trapezoidal	Rectangular	Rectangular
Length	25 m	17 m	12 m
Design Discharge	4.95 m3/s	2.40 m3/s	1.26 m3/s
Feeder / Intake Channel			
Length	100 m	70 m	1685 m
Shape / Material	Circular / RCC	Rectangular/RCC	Circular/Mild steel
Size	Diameter 1.70 m	Width – 1.40 m Depth – 0.95 m	Diameter 0.908 m
Slope	1 in 300	1 in 300	1 in 300
Design Discharge	4.71 m3/s	2.30 m3/s	1.26 m3/s
Desilting Tank			
Total Length	45.0 m	30.0 m	30.0 m
Width	6.50 m	10.0 m	5.50 m
Full supply depth	3.00 m	1.00 m	3.00 m
Type	Hopper type surface de-silting	Hopper type surface de-silting	Hopper type surface de-silting
Type / Material	R.C.C	R.C.C	R.C.C
Power Channel/ Head Race Pipe			
Length	2194 m	1600 m	1680 m
Shape / Material	Circular / R.C.C	Circular / Steel	Circular / Steel
Size	Diameter 1.80 m	Diameter 1.00 m	Diameter 0.908 m
Design Discharge	4.10 m3/s	1.97 m3/s	1.26 m3/s
Forebay Tank			
Total Length	17.0 m	-	-
Width	7.00 m	-	-
Full supply depth	4.00 m	-	-

Free board	0.60 m	-	-
Type / Material	R.C.C	-	-
Penstock			
Number	One	One	One
Diameter – Main pipe	1296 mm (I.D.)	914 mm (I.D.)	900 mm (I.D.)
After bifurcation	914 mm (I.D.)	650 mm (I.D.)	530 mm (I.D.)

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

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 guide lines 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 projects would help in generating direct and indirect employment benefits accruing out of ancillary units for implementation of the Hydro plant 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.

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.

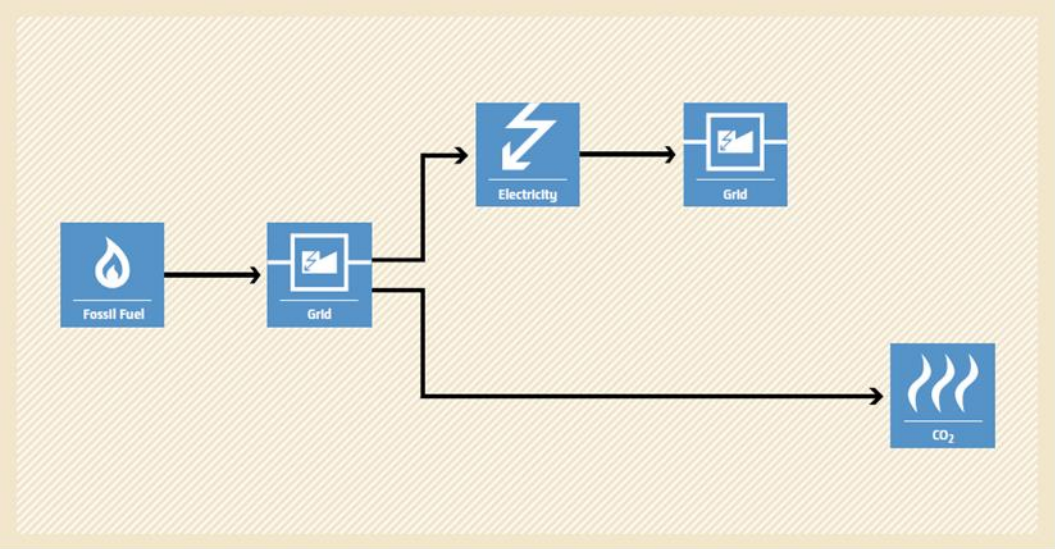
Economic well-being: Being a renewable resource, using Hydro energy to generate electricity contributes to conservation precious natural resources. The project contributes to the economic sustainability through promotion of decentralization of economic power, leading to diversification of the national 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 2500 KW, 1000 kW and 1500 kW 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.

B.3. Baseline Emissions>>

In the absence of the project activity, the equivalent amount of electricity would have been imported from the regional grid (which is connected to the unified Indian Grid system (NEWNE Grid)), which is carbon intensive due to predominantly sourced from fossil fuel-based power plants.

Baseline Scenario:



Thus, this project activity was a voluntary investment which replaced equivalent amount of electricity from the Indian grid. 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 fossil fuel-based power plants and fight against the impacts of climate change. The Project Proponent hopes that carbon revenues from 2014-2021 accumulated as a result of carbon credits generated will help repay the loans and help in the continued maintenance of this project activity.

B.4. Debundling>>

This project activity is not a de-bundled 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

Applied Baseline Methodology: AMS-I.D**.** "Grid connected renewable electricity generation", version 18

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

The Bundled project activity involves generation of grid connected electricity from the construction and operation of a new Hydro power-based project for selling it to state electricity board i.e., Sikkim State Electricity Board (HPSEB) under the Power Purchase Agreement (PPA) signed between the Project Proponent (PP) and the utility. The project activity has installed capacity of 10 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 Bundled project activity is a Renewable Energy Project which 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 1 (a).
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.

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.	It is run of river type of project; hence, this criterion is not 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 bundled project is 10 MW Hydro Power Project, i.e., only component is renewable power project below 15MW, thus the 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 10 MW Hydro Power Project, i.e., only component is renewable power project below 15 MW, thus the 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 10 MW Hydro Power Project, i.e., only component is renewable power project below 15 MW, thus the 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 10 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.

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).

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."

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

Source		Gas	Included?	Justification/Explanation
Baseline	Grid connected electricity generation	**CO_2**	**Yes**	**CO2 emissions from electricity generation in fossil fuel fired power plants**
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
		Other	No	No other GHG emissions were emitted from the project
Project	Greenfield Hydro Power Project Activity	CO_2	No	No CO_2 emissions are emitted from the project
		CH_4	No	Project activity does not emit CH_4
		N_2O	No	Project activity does not emit N_2O
		Other	No	No other emissions are emitted from the project

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

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 bundled project activity involves setting up three new hydro power plant to harness the green power from hydro energy and to use for sale to national grid i.e., India grid system 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 grid. 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 CO_2 emission factor (tCO_2/MWh) which will be associated with 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. Also, for the vintage 2021, the combined margin emission factor calculated from CEA database in India results into same emission factors as that of the default value. Hence, the same emission factor has been considered to calculate the emission reduction.

Net GHG Emission Reductions and Removals

$ERy = BEy – PEy – LEy$

Where:

ER_y = Emission reductions in year y (tCO_2/y) BE_y
= Baseline Emissions in year y (t CO_2/y) PE_y
= Project emissions in year y (tCO_2/y) LE_y
= Leakage emissions in year y (tCO_2/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:

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

Where:

BE_y	=	Baseline emissions in year y (tCO_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)

Hence,

BE = 2,53,762 x 0.9 = 2,28,387 tCO2eq

Project Emissions

As per paragraph 39 of AMS-I.D. version 18, for most renewable energy project activities emission is zero.

Hence,

PE = 0

Leakage Emissions

As per paragraph 42 of AMS-I.D. version-18, all projects other than Biomass projects have zero leakage.

Hence,

LE = 0

Total Emission reduction by the project for the current monitoring period is calculated as below:

Hence,

ER = 2,28,387 – 0 – 0 = 2,28,387 CoUs

C.6. Prior History>>

The project activity is a bundle of three small-scale hydro projects and projects were never applied under any other GHG mechanism prior to this registration with UCR. Also, the capacities or the total project as a whole 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).

C.7. Monitoring period number and duration>>

Name of individual project activity	Start date of Monitoring Period
Rongli SHEP (4.80 MW)	01/01/2014
Mangley SHEP (5.00 MW)	01/01/2014
Lachung SHEP (800 KW)	01/01/2014

First Monitoring Period : 08 Years
01/01/2014 to 31/12/2021 (inclusive of both dates)

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

Name of individual project activity	Crediting period start date
Rongli SHEP (4.80 MW)	01/01/2014
Mangley SHEP (5.00 MW)	01/01/2014
Lachung SHEP (800 KW)	01/01/2014

Crediting period for the bundled project is from 01/01/2014 to 31/12/2021 (inclusive of both dates).

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

PCN Version 2.0 is updated in accordance to the corrections point out by the Verifier.

C.10. Monitoring plan>>

The bundled project activity essentially involves generation of electricity from water, the employed Hydro Power Plant can only convert Hydro energy into electrical energy and cannot use any other input fuel for electricity generation, thus no special ways and means are required to monitor leakage from the project activity. The recording of the electricity fed to the state utility grid is carried out jointly at the incoming feeder of the state power utility (HPSEB).

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 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/UCRStandardNov2021updatedVer2_301121081557551620.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	$EG_{PJ,y}$
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
Procedures	The Net electricity generation by the Hydro power Plant is recorded by the Sub-Station 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

ANNEXURE I (Emission Reduction Calculation)

10 MW Bundled Small Scale Hydro Power Project in the State of Sikkim, India

Month - Wise Energy Delivered to Grid (in kWh)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2014	14,33,101	10,76,408	9,34,775	7,19,500	7,71,647	12,13,525	10,21,245	16,41,800	16,26,605	32,50,180	19,90,435	17,10,430
2015	12,62,420	9,37,420	9,29,560	15,89,010	31,29,380	27,97,790	24,14,430	39,69,400	40,45,698	37,98,400	24,78,290	18,41,830
2016	13,55,520	9,27,610	10,64,400	9,96,450	18,93,230	20,88,530	29,75,600	39,04,260	35,22,820	39,91,190	29,29,040	19,16,060
2017	13,16,950	9,43,720	6,16,180	16,08,540	23,31,970	26,67,140	34,87,510	35,05,080	35,85,850	35,45,620	15,82,360	12,03,320
2018	8,14,330	8,05,310	5,60,360	7,26,740	27,06,360	42,33,960	41,63,996	47,85,220	53,52,146	43,22,110	27,02,750	18,23,250
2019	11,39,640	9,45,430	9,00,799	17,74,290	38,24,300	52,35,730	50,79,950	56,69,105	52,86,910	55,15,820	36,37,840	22,26,210
2020	12,14,780	10,16,780	10,51,860	13,73,110	27,13,120	48,84,820	53,34,040	54,12,160	51,44,840	52,54,180	27,60,660	17,34,400
2021	11,90,740	8,84,700	9,85,620	9,27,000	28,07,180	52,66,600	59,21,040	58,34,260	51,58,880	55,18,880	41,95,060	24,00,560

Year-Wise Emission reduction calculation for the project activity

Year	Total No. of Electricity delivered in MWh	Recommended emission factor tCO2/MWh	Total CoUs generated
2014	17,390	0.9	15,651
2015	29,194	0.9	26,275
2016	27,565	0.9	24,809
2017	26,394	0.9	23,755
2018	32,997	0.9	29,697
2019	41,236	0.9	37,112
2020	37,895	0.9	34,106
2021	41,091	0.9	36,982
Total CoUs to be issued for the first monitoring period (Year: 2014 to 2021)			2,28,387