# Monitoring Report

CARBON OFFSET UNIT (CoU) PROJECT

**Title:** Wanger Homte Hydro Electric Project

Version 02
Date: 12/07/2022
First CoU Issuance Period: 0 years, 10 months and 17 days
Monitoring Period: 15/02/2021 to 31/12/2021

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

| Monitoring Report | |
|---|---|
| Title of the project activity | Wanger Homte Hydro Electric Project |
| UCR Project Registration Number | 134 |
| Version | 02 |
| Completion date of the MR | 12/07/2022 |
| Monitoring period number and duration of this monitoring period | Monitoring Period Number: 01<br>Duration of this monitoring Period Inclusive of both the days):15/02/2021 to 31/12/2021 |
| Project participants | M/s Panchhor Hydro Power Pvt. Ltd. (Project Proponent) |
| Host Party | INDIA |
| Applied methodologies and standardized baselines | ACM0002 Version 20.0: Large-scale Consolidated Methodology: Grid-connected electricity generation from renewable sources<br><br>Baseline is $CO_2$ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity |
| Sectoral scopes | 01 Energy industries (Renewable/Non-Renewable Sources) |
| Estimated amount of GHG emission reductions for this monitoring period in the registered PCN | 98,942 CoUs (98,942 $tCO_2e$) |
| **Total:** | 98,942 CoUs (98,942 $tCO_2e$) |

## SECTION A. Description of project activity

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

The proposed project activity with title under UCR "Wanger Homte Hydro Electric Project", is a grid connected Hydro Electric Power project located in Kinnaur district in the state of Himachal Pradesh (India). The project is an operational activity with continuous reduction of GHG, currently being applied under "Universal Carbon Registry" (UCR). This project is a run-of river project.

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

Wanger-Homte Hydro Electric Project is a run – of – the River type development on Bhabha Khad, a tributary of River Satluj. The project involved diversion of Bhabha Khad inflows by constructing a raised crested type diversion weir. The diverted inflows will be carried through conveyance channel/tunnel to a surface desilting tank, which will be designed to exclude all silt particles down to 0.20 mm size. The silt free water will be carried through power tunnel up to underground Surge Tank. The inflows will be lead to surface power house through a surface penstock to feed three Francis turbines driven generating units of 8.20 MW each (Total 24.60 MW). Power house is located near village Kafnu at El ± 2440 m. Electricity will be generated at 11KV and stepped up to 66KV through three no's of 12.5 MVA transformers. Further, the electricity from the project activity will be exported to the grid system of Himachal Pradesh state electricity board limited. The project activity started commercial operation and generated electricity will be exported to a grid system of Himachal Pradesh state electricity board limited from 15$^{th}$ Feb 2021.

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

The proposed Wanger-Homte SHEP is a run of River scheme on Bhabha Khad, a tributary of Satluj River located in District Kinnaur. The project envisages the construction of Trench Type weir across Bhabha Khad, Feeder Channel (from Intake to Control Structure) Feeder Tunnel (from Control Structure to Desilting Tank), Underground Desilting Tank, Head Race Tunnel (from Desilting Tank to Head Pond), Head Pond and Chamber, Head Race / Penstock Tunnel (from Head Pond to Surge Tank), Under Ground Surge Tank, Surface Penstock and a Surface Power House having 24.60 MW installed capacity on the right bank of Bhabha Khad at Kafnu village. Bhabha Khad is a tributary of Satluj River and Wanger-Homte 24.6 MW SHP by M/s Panchhor Hydro Power Private Limited joins it from right bank near Wangtu of Himachal Pradesh. It is a perennial Nallah, which emanates at an Elevation of ± 5315 M and flows mostly in south-westerly to westerly direction before it joins Satlu.

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

Relevant dates for the project activity are as follows:

| | |
|---|---|
| UCR Project ID | : 134 |
| Trail run period | : 30/01/2021 to 14/02/2021 |
| Start Date of Crediting Period | : 15/02/2021 |
| Project Commissioned | : 14/02/2021 |
| Commercial operation date | : 15/02/2021 |

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

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

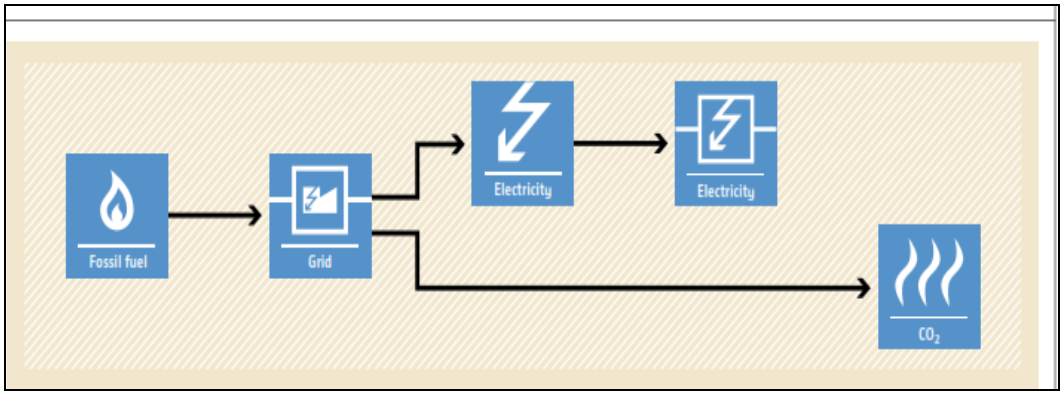
The total GHG emission reductions achieved in this monitoring period is as follows:

| **Summary of the Project Activity and ERs Generated for the Monitoring Period** | |
|---|---|
| Start date of this Monitoring Period | 15/02/2021 |
| Carbon credits claimed up to | 31/12/2021 |
| Net Emission Reductions ($tCO_{2eq}$) | 95,956 |
| Leakage | 0 |

e) Baseline Scenario>>

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

- 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, by more-GHG-intensive means as reflected in the Emission Factor of the connected grid system.

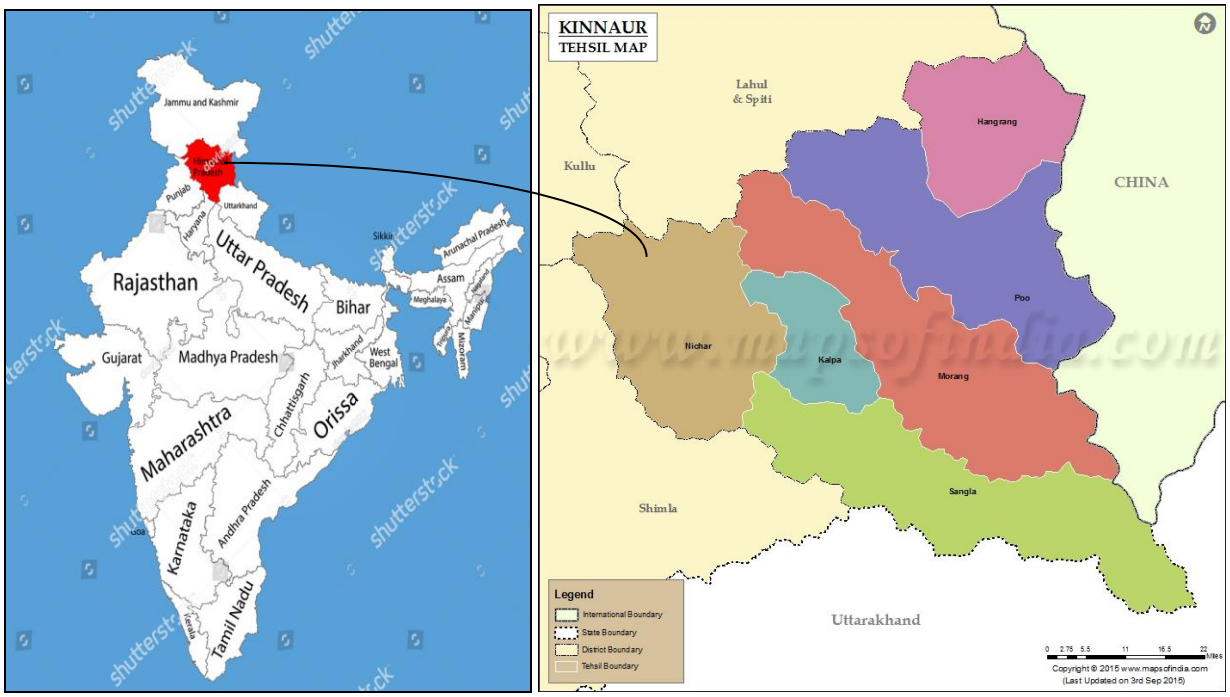



A.2. Location of project activity>>

Country: India
Village: Kafnu
Tehsil: Nichar
District: Kinnaur
State: Himachal Pradesh
PIN Code: 171009

The project location is situated in village Kafnu of Kinnaur district in the state of Himachal Pradesh. The nearest railway station to the project site is at Shimla at a distance of 205 kms. The project location can be approached by road with a distance of 182 Kms from Shimla up to Wangtu on NH 22 and link Road from Wagtoo up to Kafnu about 22 Kms. Nearest Airport is at Shimla.

The geographic co-ordinate of the project locations are $31^0$ 37'07" N and $78^0$ 01'16"E,
The representative location map is included below:



## A.3. Parties and project participants >>

| Party (Host) | Participants |
|---|---|
| INDIA | M/s Panchhor Hydro Power Pvt Ltd<br>Registered/correspondence office:<br>Address: Plot No.226, Road No.78, Phase-III, Jubilee hills, Hyderabad-500096. |

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

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

TYPE I – Renewable Energy Projects

CATEGORY- Grid-connected electricity generation from renewable sources

The applied methodologies - ACM0002 Version 20.0: Large-scale Consolidated Methodology Grid-connected electricity generation from renewable sources

## A.5. Crediting period of project activity >>

Start date: 15/02/2021
Length of the crediting period corresponding to this monitoring period: 00 years 10 months 17 Days: 15/02/2021 to 31/12/2021 (Both the dates are included)

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

**Contact Person-1 (Project Proponent)**

Name : Mereddy Keshav Reddy

Plot No. 226, Road No.78, Phase – III, Jubilee hills,

Hyderabad – 500 096

Contact No: +91 81256 19989

E-mail: asthagreen@gmail.com

**Contact Person-2 (Consultant)**

Name : Narendar Bolledhu

Ramky Grandiose, Gachibowli,

Hyderabad-500032

Contact No: +91 81868 79038

E-mail: narendra@zenithenergy.com

## 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 three hydro power generation units each of 8.2 MW rated generation capacity (with an aggregated capacity of 24.6 MW) which stated commercial operation on 15/02/2021 as per letter dated 17.02.2021 by Himachal Pradesh State Electricity Board Limited (HPSEBL). The project is located at Kafnu village of District Kinnaur, Himachal Pradesh and it generates clean energy by utilizing the kinetic energy of flowing water at Bhabha Khad, a tributary of River Satluj by M/s Panchhor Hydro Power Pvt Ltd, the promoter of this project.

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

The Wanger-Homte SHEP is a run of River scheme on Bhabha Khad, a tributary of Satluj River located in District Kinnaur. The project envisages the construction of Trench type weir across Bhabha Khad, Feeder Channel (from Intake to Control Structure) Feeder Tunnel (from Control Structure to Desilting Tank), Underground Desilting Tank, Head Race Tunnel (from Desilting Tank to Head Pond), Head Pond and Chamber, Head Race / Penstock Tunnel (from Head Pond to Surge Tank), Under Ground Surge Tank, Surface Penstock and a Surface Power House having 24.60 MW installed capacity on the right bank of Bhabha Khad at Kafnu village. Bhabha Khad is a tributary of Satluj River and Wanger-Homte 24.6 MW SHP by Panchhor Hydro Power Private Limited joins it from right bank near Wangtu of Himachal Pradesh. It is a perennial Nallah, which emanates at an Elevation of ± 5315 M and flows mostly in south-westerly to westerly direction before it joins Satluj.

| Specification | Value |
|---|---|
| Design Discharge | 15.79 cumecs |
| Diversion Weir | Trench Type Weir, 15 M Long, 3M Wide |
| Desilting Tank | Underground Conventional hopper type.<br>One Chamber of 60.00 M x 11.00 M size |
| Head Pond & Chamber | Size 4.00 M x 5.00 M |
| Surge Shaft | Circular Underground, Size 11.75 M dia,<br>31.60 M Height |
| Penstock | Circular, Steel Penstock,<br>Main Penstock of 2500 MM Dia and Three branch Penstocks of 1450 MM Dia |
| Power House | Surface type, of Size of 65 mtr x 18 mtr.<br>Installed Capacity 24.60 MW,<br>Gross Head ± 186.77M, Net Head ± 182.49M, |
| Turbines | Horizontal Shaft Francis Turbine, Three Numbers each of Capacity 8200 kW,<br>Speed 750 rpm |
| Generators | Horizontal shaft synchronous, brushless,<br>Three generators each of rated capacity 8200 kW, Frequency 50 Hz, |

| Specification | Value |
|---|---|
| | Rated Voltage 6.6 kV,<br>Overload capacity 20% |
| Power & Energy Generation | Energy generation in 75% dependable year 130.62 MU |
| Transformer | Three transformers each of rated capacity 12.5 MVA,<br>Make: Transformers and Rectifiers (India) Pvt Ltd<br>Frequency 50 Hz,<br>Primary voltage: 11 KV<br>Secondary voltage: 66 kV, |
| Tail Race | Tunnel of size 3.40 m x 3.40 m to Bhabha Khad |
| Diesel Generator | Capacity-62.5 KVA<br>Make: SUDHIR POWER LTD |

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

**Social benefits:**

Social impacts and benefits of the project activity are summarised below:

- The project area lies in Inner Himalayas and is one of the backward areas of the State due to harsh climate and difficult communication.
- The local population depends on forest for fuel, heating requirements. This project shall provide electricity to the population for domestic use and thus it shall help in reducing the pressure on forest.
- The project operation will help to conserve kerosene, oil products and wood used for space heating, cooking, lighting and other purposes by local people.
- The project will promote small-scale industrial unit for local needs.
- The Power generated from this project is proposed to be supplied to the HPSEBL/HPPTCL grid so as to mitigate power crises in northern region. This power can be used locally which will reduce long transmission losses
- Local labour will be deployed during construction and operation of the project and only skilled and specialists would be brought from outside.

The other objectives of the project are:

- To increase productivity and output in rural areas by reducing the cost of energy thereby increases efficiency and profitability.
- To add to the standard of living in village communities i.e., to promote entrepreneurship and formation of NGO's.
- To create employment opportunities and thus help check rural migration to urban areas.

**Environmental benefits:**

Environmental impacts and benefits of the project activity are summarised below:

- Wanger-Homte Hydro Electric Project is a Run-of- the River type development without any storage of water.
- The Project activity shall not endanger the species of flora and fauna in the area. Fish ladder shall be provided at the diversion weir and adequate provision shall be made that the sufficient water is left in the river.
- The components of the project are proposed on barren land and very small area of the cultivable land is required for the project.
- The construction of project facilities does not involve felling of any tree.
- The danger of erosion and disturbance to hill slopes is minimal.
- No major construction of road is required. The construction of roads and project components will not involve felling of neither any tree nor lead to deposition of excavated material in the Khad to affect environment adversely.
- Only skilled and specialists would be brought from outside and thus a small colony shall only be needed.

The project also contributes towards other environmentally beneficial objectives like:

- To conserve kerosene, oil products and wood used for space heating cooking, lighting and other purposes by local people.
- To conserve forests those are being knocked down at an alarming rate to meet rural energy needs.
- To reduction in emission of green house gases.
- To preserve biological diversity.
- To arrest the pollution of water.
- To preserve ozone layer.
- To reduce global warming

**Economic benefits:**

Economic impacts and benefits of the project activity are summarised below:

- Helps to conserve kerosene, oil products and wood used for space heating cooking, lighting and other purposes by local people.
- Employment for Local labour deployed during construction and operation of the project and only skilled and specialists would be brought from outside
- The Power generated from this project is proposed to be supplied to the HPSEBL/HPPTCL grid so as to mitigate power crises in northern region. This Power can be used locally which will reduce long transmission losses
- The project will promote small-scale industrial unit for local needs.

The State of Himachal Pradesh presently has installed capacity of 326 MW (excluding central sector projects). At present the state does not face any shortage so far as energy availability is concerned, but there is peak load deficit to the tune of 12% in winter. However, the state is expected to face shortages both in peak load and energy availability in future. In view of resource crunch and administrative reasons the Govt. of Himachal Pradesh decided to invite Private Investors for harnessing the hydro power potential available in the State on selective basis.

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.

## B.3. Baseline Emissions>>

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

The baseline scenario is 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, by more-GHG-intensive means as reflected in the Emission Factor of the connected grid system.

## B.4. Debundling>>

The project activity is not of 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: Grid-connected electricity generation from renewable sources

Applied Baseline Methodology: ACM0002 Version 20.0: Large-scale Consolidated Methodology Grid-connected electricity generation from renewable sources

### C.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 an installed generation capacity of 24.6 MW and the CDM methodology ACM0002 Version 20.0 Consolidated Methodology for "Grid-connected electricity generation from renewable sources" is selected. The applicability of methodology to the project case is justified below:

| | Applicability Criterion | Project Case |
|---|---|---|
| 1 | This methodology is applicable to grid-connected renewable energy power generation project activities that:<br><br>(a) Install a Greenfield power plant;<br><br>(b) Involve a capacity addition to (an) existing plant(s);<br><br>(c) Involve a retrofit of (an) existing operating plants/units;<br><br>(d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or<br><br>(e) Involve a replacement of (an) existing plant(s)/unit(s). | The project activity involves installation of a new green field renewable energy power plant/unit of one of types hydro power plant/unit without reservoir |
| 2 | The methodology is applicable under the following conditions:<br><br>(a) The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit;<br><br>(b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for wind, solar, wave or tidal power capacity addition projects) the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of | The project activity involves a renewable energy power plant of types hydro power plant/unit without reservoir<br>The Project activity is green field type and no capacity addition, retrofit or rehabilitation or replacement is existing plant/unit is involved. |

| | | |
|---|---|---|
| | five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity. | |
| 3 | In case of hydro power plants, one of the following conditions shall apply:[1]<br><br>(a) The project activity is implemented in existing single or multiple reservoirs, with no change in the volume of any of the reservoirs; or<br><br>(b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density, calculated using equation (7), is greater than 4 $W/m^2$; or<br><br>(c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (7), is greater than 4 $W/m^2$; or<br><br>(d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (7), is lower than or equal to 4 $W/m^2$, all of the following conditions shall apply:<br><br>(i) The power density calculated using the total installed capacity of the integrated project, as per equation (8), is greater than 4 $W/m^2$;<br><br>(ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity;<br><br>(iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 $W/m^2$ shall be:<br><br>a. Lower than or equal to 15 MW; and<br><br>b. Less than 10 per cent of the total installed capacity of integrated hydro power project. | The project activity is implemented as a run of the river project without a reservoir. |
| 4 | In the case of integrated hydro power projects, project proponent shall:<br><br>(a) Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or | The project activity is not part of an integrated hydro power projects |

[1] Project participants wishing to undertake a hydroelectric project activity that results in a new reservoir or an increase in the volume of an existing reservoir, in particular where reservoirs have no significant vegetative biomass in the catchments area, may request a revision to the approved consolidated methodology.

| | | |
|---|---|---|
| | (b) Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore, this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum of five years prior to the implementation of the CDM project activity. | |
| 5 | The methodology is not applicable to:<br><br>(a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site;<br><br>(b) Biomass fired power plants/units. | The Project activities does not involve (a)switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; or (b) Biomass fired power plants/units or (c) retrofits, rehabilitations, replacements, or capacity additions, |
| 6 | In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance". | The Project activities does not involve retrofits, rehabilitations, replacements, or capacity additions. |

## C.3 Applicability of double counting emission reductions >>

The project activity has not applied to any other GHG program for generation or issuance of carbon offsets or credits for the said crediting period.

## C.4. Project boundary, sources and greenhouse gases (GHGs)>>

According to ACM0002, for the baseline emission factor, the spatial extent of the project boundary includes the project site and all power plants connected physically to the electricity system that the project power plant is connected to.

The spatial extent of project boundary encompasses the physical extent of the Indian electricity grid, which includes the project site and all power plants connected physically to the electricity system.

Details of GHG sources in baseline and project scenario are given below

| | Source | GHG | Included? | Justification/Explanation |
|---|---|---|---|---|
| Baseline | $CO_2$ emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity | $CO_2$ | Included | Major source of emission |
| | | $CH_4$ | excluded | Minor source of emission |
| Project Activity | Emissions of $CO_2$ and $CH_4$ from the reservoir | $CO_2$ | Excluded | Electricity is generated from hydropower; hence these emissions are not accounted for. |
| | | $CH_4$ | Excluded | Project activity is a run of the river facility without reservoir |

Leakage Emissions is not applicable as per the applied methodology ACM0002, version 20.

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

According to the applied CDM methodology ACM0002, Version 20.0, for project activities that do not modify or retrofit an existing electricity generation facility, the baseline scenario is the "Electricity delivered to the grid by the project would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM).

As per ACM 00002,

Estimated Emission Reductions: $ER_y = BE_y - PE_y$

Where,

$ER_y$ = Emissions reductions in a year y (t $CO_{2e}$/yr).
$BE_y$ = Baseline Emissions in a year y ( t $CO_2$e/yr).
$PE_y$ = Project Emissions in a year y ( t $CO_2$e/yr).

For the green field hydro project activity, the baseline emissions are to be calculated as follows:

$$BE_y = EG_{PJ,y} \times EF_{grid,CM,y} \quad \text{Equation (1)}$$

Where:

$BE_y$ = Baseline emissions in year *y* (t $CO_2$/yr)

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

$EF_{grid,CM,y}$ = Combined margin $CO_2$ emission factor for grid connected power generation in year *y* calculated using the latest version of "TOOL07: Tool to calculate the emission factor for an electricity system" (t $CO_2$/MWh)

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. An emission factor of 0.9 $tCO_2/MWh$ for the 2014- 2020 years, recommended by the UCR as a fairly conservative estimate for Indian projects not previously verified under any GHG program is used for baseline emission calculation.

As per the DPR for the Project 0.5 % power to be consumed in auxiliaries, 0.5% in transformation losses, 2% in Transmission Losses, 1% towards LADF are considered.

The metered net electricity supplied to the grid by the project activity during this monitoring period is: 105789.91 MWh (after deduction 1% towards LADF as per the PPA)

Therefore, baseline emission of the project activity $BE_y$ = (106620.14 × 0.9) - 2 = 95,956 ($tCO_2/yr$)

A spread sheet giving the details of calculation of $BE_y$ is attached separately.

**Project Emissions from water reservoirs of hydro power plants ($PE_{HP,y}$)**

As the project activity is a-run of the river facility without storage reservoir, project emissions from water reservoirs of hydro power plants considered in ACM0002 version 20.0 is not applicable for the project activity.

Therefore, project emission $PE_{HP,y}$ of the Project activity according to ACM0002, version 20.0, is zero.

The project is equipped with diesel generator of 62.5 kVA to meet emergency requirements of electricity to Power House, the emissions from the usage of fossil fuel (Diesel) in the Diesel Generator will be accounted as project emissions calculated based on the following equation.

$PE_{diesel,y} = F_{i,y} * Density_i * NCV_{deisel} * EF_{CO2,i} * OXID / 10^6$

Where,

$PE_{diesel,y}$ is project emission from combustion of fossil fuel in DG set in the project activity during the year y

$F_{i,y}$ is the quantity of fossil fuel (diesel) combusted in the DG set in the project activity during the year y

$NCV_{diesel}$ is Net calorific value of diesel

$EF_{CO2,i}$ is the Carbon dioxide emission factor of the fuel type i

Oxid is the oxidation factor considered as one as per IPCC 2006

The project emission from DG set for the monitoring period is 2 $tCO_2$.

Therefore, the Project Emission is $PE_y = PE_{HPy} + PE_{diesel}$

**Leakage**

As per paragraph 53 of ACM0002, version 20.0 no other leakage emissions are considered and the emissions potentially arising due to activities such as power plant construction are neglected.
Hence, LEy= 0

Therefore, estimated annual or total baseline emission reductions ($BE_y$) = 95,956 CoUs /year (95,956 $tCO_{2eq}$/yr).

## C.6. Prior History>>

The project activity has not applied to any other GHG program for generation or issuance of carbon offsets or credits for the said crediting period.

## C.7. Monitoring period number and duration>>

First Issuance Period: 0 years, 10 months, 17 days.
From 15/02/2021 to 31/12/2021 (inclusive of both dates)

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

There are no changes to the start date of crediting period.
Crediting period start date is 15/02/2021, as mentioned in the PCN

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

As per PCN, the estimated emission reductions are 112,856 $tCO_2$ per annum. The actual emission reductions for the period from 15/02/2021 to 31/12/2021 i.e., for 320 days are 95,956 tCO2e.

There are no permanent changes to the registered monitoring plan, or permanent deviation of monitoring from the applied methodologies, standardized baselines, or other methodological regulatory documents Changes to project design during the current monitoring period.

## C.10. Monitoring plan>>

| **Data/Parameter** | **$EF_{grid,CM,y}$** |
|---|---|
| Data unit | $tCO_2$ /MWh |
| Description | Combined margin $CO_2$ emission factor for grid connected power generation in year y |
| Source of data<br>Value(s) applied | The UCR Standard<br>0.9 $tCO_2$/MWh for the 2014- 2020 |
| Measurement methods and procedures | As per recommendation by The UCR Standard for the 2014- 2020 years for Indian projects not previously verified under any GHG program |
| Monitoring frequency | Yearly |
| Purpose of data | Calculation of baseline emission |

| **Data/Parameter** | **$EG_{PJ,y}$** |
|---|---|
| Data unit | MWh/yr |
| Description | Quantity of net electricity generated and supplied by the project power plant to the grid in year y. |
| Source of data<br>Value(s) applied | Direct measurement using main meter and Check meters<br><br>**For the period from 15/02/2021 to 06/07/2021**<br><br>**Main Meter** Sr.No.0019002801 |

| | |
|---|---|
| | Make: L&T ER300P<br>Class: 0.2S<br>Calibration frequency: Once in a year<br><br>**Check Meter** Sr.No.0019002786<br>Make: L&T ER300P<br>Class: 0.2S<br>Calibration frequency: Once in a year<br><br>**And From 07/07/2021 to 31/12/2021**<br><br>**Main Meter** Sr.No.0021000059<br>Make: L&T<br>Class: 0.2S<br>Calibration frequency: Once in a year<br><br>**Check Meter** Sr.No.0021000060<br>Make: L&T<br>Class: 0.2S<br>Calibration frequency: Once in a year |
| Measurement methods and procedures | Electricity meters installed at the grid interface for net electricity generation using bi-directional energy meters. 1% is deducted from the metered value towards LADA in accordance with the PPA |
| Monitoring frequency | Continuous measurement and monthly recording |
| QA/QC procedures: | There are two meters (1 main meter and 1 check meter) employed for measuring the electricity generation from the project and reading will be taken on monthly basis. The readings of main and check meters will be compared and a conservative value will be taken if the difference is more than permissible limit.<br><br>The electricity meters will be subjected to regular maintenance and testing in accordance with the stipulation of the meter supplier and/or as per the requirements set by the grid operators or national requirements.<br>The calibration of meters, including the frequency of calibration, are be done in accordance with national standards or requirements set by the meter supplier or requirements set by the grid operators.<br>The accuracy class of the meters is 0.2S which is in accordance with the requirements set by the grid operators or national requirements |
| Purpose of data | Calculation of baseline emission |

| **Data/Parameter** | **$COEF_i$** |
|---|---|
| Data unit | $tCO_2/TJ$ |
| Description | $CO_2$ emission coefficient of fuel type I (Diesel) |
| Source of data | IPCC 2006 upper bound value at 95% confidence interval Web Link: http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationar y_Combustion.pdf. |
| Value(s) applied | 74.8 |

| | |
|---|---|
| Measurement methods and procedures | - |
| Monitoring frequency | - |
| Purpose of data | Calculation of project emission |

| **Data/Parameter** | **$F_{i,y}$** |
|---|---|
| Data unit | Litres |
| Description | Quantity of fossil fuel type I (Diesel) combusted in the project plant during year y |
| Source of data<br>Value(s) applied | On-site measurements |
| Measurement methods and procedures | Fuel purchase bills |
| Monitoring frequency | Every purchase |
| Purpose of data | Calculation of project emission. |
| QA/QC procedures: | The purchase quantity of fuel is being considered to be conservative in the computation of project emissions |

| **Data/Parameter** | **Density $_i$** |
|---|---|
| Data unit | Kg/Litre |
| Description | Density of fossil fuel used for the project site (Diesel) |
| Source of data<br><br><br>Value(s) applied | From supplier or that given in the web page of IS 1460 :1995 or its amendments<br>https://dieselnet.com/standards/in/fuel.php<br><br>845 kg/$m^3$ |
| Measurement methods and procedures | Fuel purchase bills |
| Monitoring frequency | Every purchase |
| Purpose of data | Calculation of project emission. |
| QA/QC procedures: | The purchase quantity of fuel is being considered to be conservative in the computation of project emissions. |

| **Data/Parameter** | **$NCV_i$** |
|---|---|
| Data unit | Tj/Gg |
| Description | Calorific value of Diesel |
| Source of data<br><br><br>Value(s) applied | From IPCC 2006<br>http://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_2_Ch2_Stationary_Combustion.pdf<br><br>43.3 |
| Measurement methods and procedures | - |
| Monitoring frequency | - |
| Purpose of data | Calculation of project emission. |

| | |
|---|---|
| | |
| QA/QC procedures: | |

**Annexures-1 (Emission Reduction Calculations)**

**Wanger Homte Hydro Electric Project by M/s Panchhor Hydro Power Pvt. Ltd.**

**2020-21**

| Month-Wise Energy Delivered to Grid | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Month** | **Export from SS** | **Free Power to Govt** | **Net Export** | **Net Export** | **Recommended Emission factor** | **Total CoUs generated** | **Diesel Consumption** | **Poject Emissions** | **Net Emission Reductions** |
| | **kWh** | **kWh** | **kWh** | **MWh** | **tCO2/MWh** | **tCO2** | **Liters** | **tCO2** | **tCO2** |
| Feb15 th to 28th | 1128750 | 11288 | 1117463 | 1117.463 | 0.9 | 1005.72 | 20 | 0.05 | 1005.66 |
| Mar | 2832294 | 28323 | 2803971 | 2803.971 | 0.9 | 2523.57 | 20 | 0.05 | 2523.52 |
| **Total** | **3961044** | **39610** | **3921434** | **3921.434** | **0.9** | **3529.00** | **40** | **1.00** | **3528.00** |

**2021-22**

| **Month** | **Export from SS** | **Free Power to Govt** | **Net Export** | **Net Export** | **Recommended Emission factor** | **Total CoUs generated** | **Diesel Consumption** | **Poject Emissions** | **Net Emission Reductions** |
|---|---|---|---|---|---|---|---|---|---|
| | **Units** | **Units** | **Units** | **MWh** | **tCO2/MWh** | **tCO2** | **Liters** | **tCO2** | **tCO2** |
| April | 4476219 | 44762 | 4431457 | 4431.457 | 0.9 | 3988.31 | 20 | 0.05 | 3988.26 |
| May | 10617398 | 106174 | 10511224 | 10511.224 | 0.9 | 9460.10 | 20 | 0.05 | 9460.05 |
| Jun | 18565374 | 185654 | 18379720 | 18379.720 | 0.9 | 16541.75 | 40 | 0.11 | 16541.64 |
| Jul | 13964045 | 139640 | 13824405 | 13824.405 | 0.9 | 12441.96 | 40 | 0.11 | 12441.85 |
| Aug | 19643312 | 196433 | 19446879 | 19446.879 | 0.9 | 17502.19 | 30 | 0.08 | 17502.11 |
| Sep | 16633482 | 166335 | 16467147 | 16467.147 | 0.9 | 14820.43 | 40 | 0.11 | 14820.32 |
| Oct | 10170727 | 101707 | 10069020 | 10069.020 | 0.9 | 9062.12 | 40 | 0.11 | 9062.01 |
| Nov | 5441499 | 54415 | 5387084 | 5387.084 | 0.9 | 4848.38 | 40 | 0.11 | 4848.27 |
| Dec | 4224012 | 42240 | 4181772 | 4181.772 | 0.9 | 3763.59 | 40 | 0.11 | 3763.49 |
| **Total** | **103736068** | **1037361** | **102698707.3** | **102698.707** | **0.9** | **92428.00** | **310** | **1.00** | **92427.00** |

r x

| Total emission Reduction calculation For the Project Activity | | | | | | |
|---|---|---|---|---|---|---|
| **Year** | **Export from SS** | **Recommended Emission factor** | **Total CoUs generated** | **Diesel Consumption (tCO2)** | **Poject Emissions ( tCO2)** | **Net Emission Reductions ( tCO2)** |
| 2/15/2021 to 31/12/2021 | 106620.14 | 0.9 | 95958.00 | **350** | **2.00** | **95956.00** |