PROJECT CONCEPT NOTE

CARBON OFFSET UNIT (CoU) PROJECT



Title: 15MW Hydro power plant by Nagarjuna in Karnataka

Version 1.0

Date 05/05/2022

First CoU Issuance Period: 04 years & 00 months

Date: 04/05/2018 to 31/05/2022

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

BASIC INFORMATION	
Title of the project activity	15MW Hydro power plant by Nagarjuna in Karnataka
Scale of the project activity	Small Scale
Completion date of the PCN	05/05/2022
Project participants	Nagarjuna Hydro Energy Private Limited
Host Party	India
Applied methodologies and standardized baselines	ACM0002 ver. 12 - Consolidated baseline methodology for grid-connected electricity generation from renewable sources
Sectoral scopes	1 : Energy industries (renewable - / non-renewable sources)
Estimated amount of total GHG emission reductions	48,195 metric tonnes CO2 equivalent per annum

SECTION A. Description of project activity

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

The purpose of the project is to generate electricity using hydropower potential available in Balekallu Hole, a tributary to river Kemp Hole and also to contribute to the sustainable development in the region. The generated electricity will be exported to a grid system of Karnataka Power Transmission Corporation Limited (KPTCL), a state government owned power transmission Company. Electricity delivered to the grid by the project would have otherwise been generated by the fossil fuel fired power plants that dominate the grid connected to the project activity. The baseline of the project activity is the CO2 emissions generated by the operation of grid-connected power plants. As Kadamane Mini Hydel Scheme - 2 is a Greenfield project activity, the baseline scenario is the same as the scenario existing prior to the start of the project activity.

The annual power generation is expected to be 57.27 GWh with a plant load factor of 43.58%. The Kadamane Mini Hydel Scheme-2 (KMHS-2) which is proposed in the forest land of Hassan district involves construction of diversion weir, head race tunnel, Surge shaft, penstock, power house, tailrace pool, open tail channel and an outdoor switch yard. The powerhouse consists of two turbine generator sets of capacity 7.5 MW each with a total installation of 15 MW.

The project is expected to be commissioned by 01/04/2010

View of project participant about the project activity's contribution to Sustainable Development

Ministry of Environment and Forests (MoEF), Government of India, has stipulated indicators such as Socio-economic wellbeing, Environmental wellbeing and technological wellbeing for sustainable development in the interim approval guidelines for CDM projects.

The project activity contributes to the indicators in the following manner.

Socio-economic wellbeing

- The Mini hydel project contributes to social wellbeing because it generates direct and indirect employment to the local people and provides business opportunities to local stakeholders such as bankers, consultants, suppliers, manufacturers, contractors etc.
- Karnataka state is facing shortage of power and is affecting the manufacturing and domestic user segment. Implementation of KMHS - 2 will help in partially meeting this shortage and shall improve the economic activity of the region. Shortage of power in the state is currently being met by importing from other states. KMHS – 2 will be able to provide power at a comparatively lesser cost.
- More and more industrial setup in surrounding places will improve the infrastructure in the area, which ultimately leads to overall development.
- The project is located in the forest region. There are no habitats in the vicinity of project site area. The stream is not being used for any vegetation or for irrigation, either on upstream or downstream of the weir and tail race channel.
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Environmental wellbeing

- The project activity will lead in mitigation of GHG emissions by generating green power.
- The project activity will aid in conservation of fast depleting reserves of fossil fuels.
- The project would help in avoidance of release of pollutants including SO_x and NO_x etc.
- Hydro power generation is efficient, reliable, and once installed, hydropower systems can be used for both base load and peaking power.
- One of the major beneficial impacts of hydropower projects is the treatment of catchments area of the project to control the soil erosion. This results in regeneration of natural forests and other ecosystems significantly benefiting to the environment.

Technological wellbeing

The technology adopted for the project is a standard, widely accepted practice for hydroelectric power generation and is the best available technology.

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

There are social, environmental, economic and technological benefits which contribute to sustainable development.

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Rational: As per 'Central Pollution Control Board (Ministry of Environment & Forests, Govt. of India)', final document on revised classification of Industrial Sectors under Red, Orange, Green and White Categories (07/03/2016)[1], it has been declared that wind project activity falls under the "White category". White Category projects/industries do not require any Environmental Clearance such as 'Consent to Operate' from PCB as such project does not lead to any negative environmental impacts. Additionally, as per Indian Regulation, Environmental and Social Impact Assessment is not required for Wind Projects.

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

A.3. Location of project activity >>

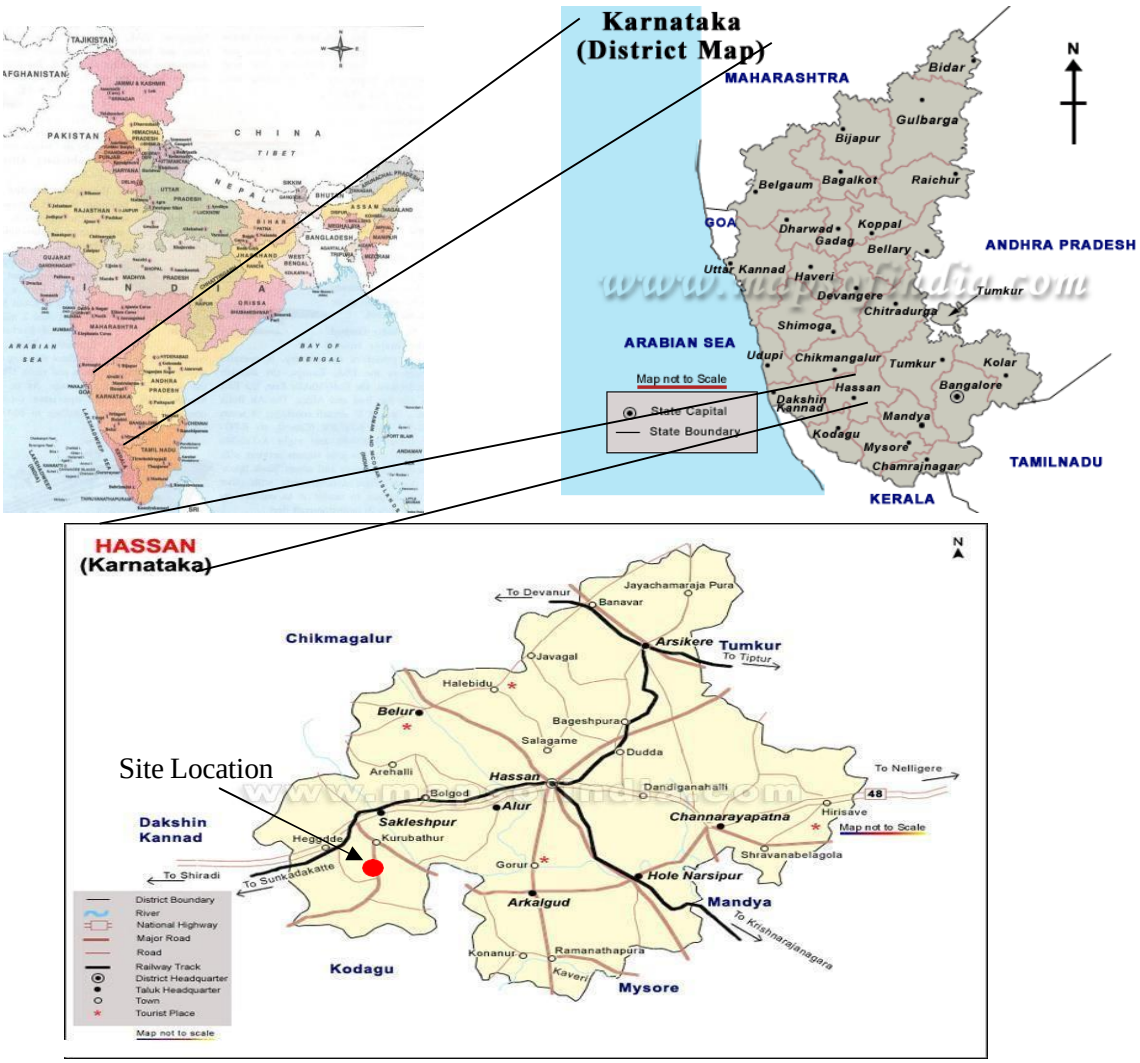
The project is located 12 KM away from the Maranahalli village (towards Mangalore), in Sakleshapura Taluk, Hassan District, Karnataka, India.

Country: India
District: Hassan
Village: Maranhalli
Tehsil: Sakleshapura
State: Karnataka

The plant is located at a distance of 12 kms away from Maranhalli village (towards Mangalore), Sakleshapura Taluka, in the district of Hassan, Karnataka, India. The latitude and longitude of the site are N 12.51806 and E 75.64722. The corresponding latitude and longitude of the diversion weir are N 12.86083 and E 75.64944 and of the power house are N 12.85139 and E 75.64722.

The location maps of the project are furnished below:

[1] http://moef.gov.in/wp-content/uploads/2017/07/Latest_118_Final_Directions.pdf



A.4. Technologies/measures >>

Kadamane Mini Hydel Scheme-2 is proposed across Balekallu Hole, a tributary to the west flowing river Yettina Hole, also called Kemp Hole and Gundia Hole which is in its downward reaches. Kemp hole is a turn tributary to the river Kumardhara, which joins the river Nethravathy near Uppinangadi. This stream originates from the high peaks of the mountain named Balekallu about 4.5 km North-west of Kadamane estate in Sakaleshapura Taluk of Hassan Dist, in Karnataka State and flows for about 15 km almost South- South West before joining Kemp hole. The stream has very steep slope in its entire reach with series of rapids and falls. The stream drops by about 140 m in a stretch of about 3.00 km before its confluence with Kemp hole. The National Highway 48 runs very close to Powerhouse site, about 2 km away.

The project comprises of (i) Diversion weir across Balekallu Hole, (ii) Head race tunnel from diversion weir to surge shaft (iii) Surge shaft, (iv) Penstock tunnel, (v) Single M.S Burried Penstock, bifurcating into two penstocks connecting to two units (vi) Power house to house 2 generating units of 7.5 MW each, (vii) Tailrace pool and open tail channel.

The installed capacity of the project is 15 MW. It was found that upto 15 MW installed capacity, the incremental energy per each MW of increased installed capacity is more than 1.35 GWh and drops below 1.30 GWh for installed capacities beyond 15 MW. The plant load factor (PLF), which is around 43.58% for installation of 15 MW drops to 42% for 16 MW. At higher installed capacities, though more quantum of water could be utilized for power generation, the energy content would be less and it tends to lower the plant load factor, thus lowering the economic viability of the scheme.

It was therefore proposed to have an installation of 15MW which shows an incremental energy of 1.35

GWh/per MW. From the point of view of high PLF, operational flexibility and facility to operate the power station even for smaller inflows during the non monsoon periods, 2 units of 7.5 MW each with a total installation of 15 MW has been adopted. This installation will give an annual energy of 57.27 GWh at an annual PLF of around 43.58%.

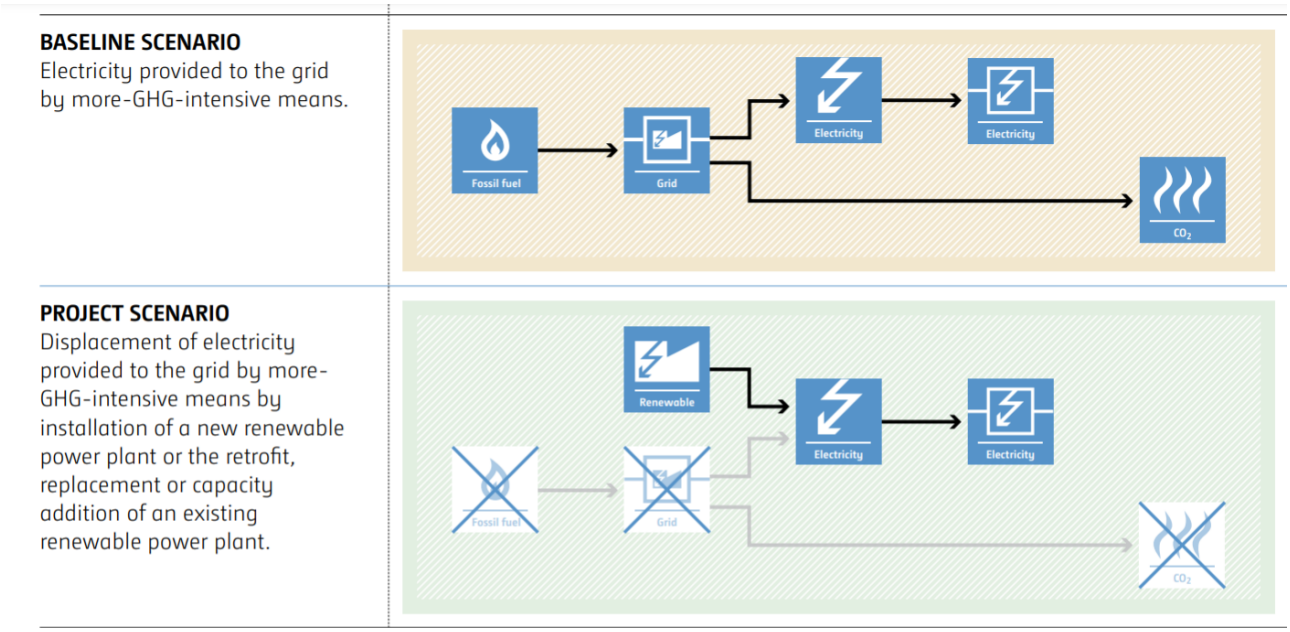
Specification	Value
Turbine	
Type of turbine: Horizontal Francis	No of turbines: 2
Rated turbine output: 7931 kW	Runner dia: 1000 mm
Rated speed: 750 rpm	Average efficiency: 86.00 %
Generators	
Type of generator: Brushless synchronous	No of generators: 2
Rated output: 7500 kW	Rated speed: 750 rpm
Average efficiency: 96.0%	Power Factor: 0.85

A.5. Parties and project participants >>

Party (Host)	Participants
India(Host)	Nagarjuna Hydro Energy PrivateLimited M/s. EKI Energy Services Limited As Aggregator UCR ID -546142885 Contact – Mr. Manish Dabkara Address- EnKing Embassy, Office No. 201, Plot 48, Scheme 78, Part 2 Vijay Nagar, Near brilliant Convention Centre, Indore- 452010 Madhya Pradesh, India. Mobile - 990734900 Email ID: registry@enkingint.org,manish@enkingint.org Website: www.enkingint.org

A.6. 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), which is carbon intensive due to predominantly sourced from fossil fuel-based power plants. Hence, baseline scenario of the project activity is the grid-based electricity system, which is also the pre project scenario.



A.7. Debundling>>

This "15MW Hydro power plant by Nagarjuna in Karnataka" project is not a debundled component of a larger project activity.

SECTION B. Application of methodologies and standardized baselines

B.1. References to methodologies and standardized baselines >>

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

TYPE I - Renewable Energy Projects

CATEGORY- ACM0002 Large-scale Consolidated Methodology: Grid-connected electricity generation from renewable sources Version 20.0[2]

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

The project activity involves generation of grid connected electricity from the construction and operation of a new wind power-based power project for supply to grid. The project activity has installed capacity of 15 MW which qualifies for a large-scale project activity. The project status is corresponding to the methodology ACM0002 version 20.0 and applicability of methodology is discussed below:

[2] https://cdm.unfccc.int/methodologies/DB/XP2LKUSA61DKUQC0PIWPGWDN8ED5PG

Conditions in the methodology	Applicability
The project activity is the installation or modification/retrofit of a power plant/unit of one of the following types: hydro power plant/unit (either with a run-of-river reservoir or an accumulation reservoir), wind power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit.	The proposed project activity is a run-of-river grid connected hydroelectric project. Thus, it fulfils the first applicability condition.
In case of hydro power plants: - The project activity is implemented in an existing reservoir, with no change in the volume of reservoir. - The project activity is implemented in an existing reservoir, where the volume of reservoir is Increased and the power density of the projectactivity, as per definitions given in the Project Emissions section is greater than 4 W/m^2. - The project activity results in new reservoirs and the power density of the power plant, as per definitions	As the project activity involves the utilization of seasonal water diversion of the stream by construction of a weir across the main stream of Balekallu Hole, the project activity is a run of the river hydroelectric project. The project does not involve any reservoirs. Hence this applicability condition is satisfied.
given in the Project Emissions section, is greater than 4 W/m2.	
The geographic and system boundaries for the relevant electricity grid can be clearly identified and information on the characteristics of the grid is available;	The project activity exports the generated electricity to the Southern regional grid. The geographic and system boundaries of the southern grid can be clearly defined and information on the characteristics of the grid is available and being documented in the PDD. Thus, this applicability Condition is also satisfied.
Applies to grid connected electricity generation from landfill gas capture to the extent that it is combined with the approved "Consolidated baseline methodology for landfill gas project activities" (ACM0001)	This condition is not applicable as project activity is not grid connected electricity generation from landfill gas capture.
5 years of historical data (or 3 years in the case of non-hydro project activities) have to be available for those project activities where modification/retrofit Measures are implemented in an existing power plant.	The proposed project activity is a Greenfield project with no modification/retrofit measure being implemented. Thus, this condition is not pertinent to the said project activity.
The methodology is not applicable to 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;	This condition is not applicable as the project activity does not involve switching from fossil fuels to renewable energy at the project site. Hence, the applicability to the methodology is satisfied.
The methodology is not applicable to Biomass fired power plants	This condition is not applicable as the proposed project is a run of river hydroelectric project. Hence, the applicability to the methodology is satisfied.
The methodology is not applicable to Hydro power plants that result in new reservoirs or in the increase in existing reservoirs where the power density of the Power plant is less than 4 W/m2.	This condition is not applicable as the proposed project is a run of river hydroelectric project and does not involve reservoirs. Hence, the Applicability to the methodology is satisfied.

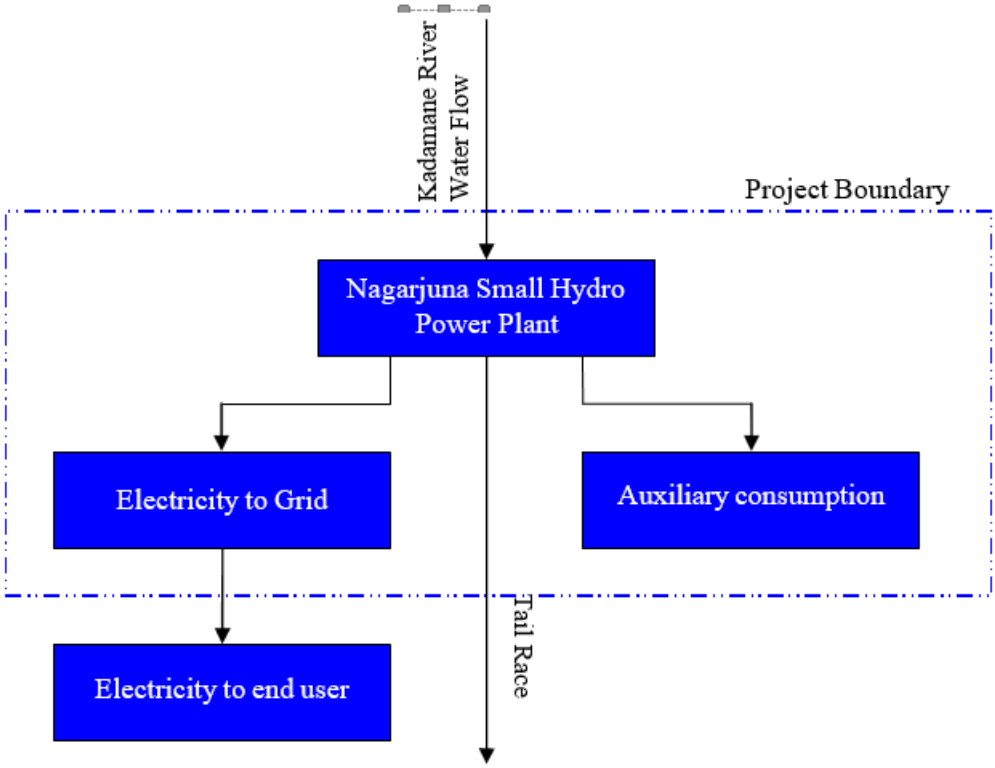
B.3. Applicability of double counting emission reductions >>

PP will request for issuance of carbon offsets in UCR for the post completion of the renewable crediting period (04/05/2018 – 31/05/2022) i.e., crediting period will start from 04/05/2018. The project is registered with voluntary market (National or International) CDM, This project has registered with CDM 4759[3] at 04/05/2011 and project had the crediting period 04/05/2011 to 04/05/2018 and it has expired as renewal of the crediting period is no longer possible. Last verification and issuances of this project in CDM has been done before 03.05.2018. Verification of this project after 03/05/2018 is no longer possible as PP decided to register the project in UCR from 04/05/2018.

Hence, the criteria for double counting are not applicable for the project.

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

As per the guidelines mentioned in ACM 0002 (Version 12.1.0), the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to. Hence, for the project activity under consideration, the project boundary covers the geographical location of the entire project site comprising diversion structure, head race tunnel, penstocks, powerhouse, power evacuation system and tailrace channel. Spatial extent of the project activity covers all power plants that are in operation and connected to the southern regional electricity system.



The following gases and sources have been considered in the project activity.

[3] https://cdm.unfccc.int/Projects/DB/TUEV-SUED1304083671.75/view

Overview on emission sources included in or excluded from the project boundary				
	Source	**Gas**	**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	Yes	Main emission source.
		CH_4	No	Minor emission source.
		N_2O	No	Minor emission source.
Project Activity	For geothermal power plants, fugitive	CO_2	No	The project activity is a run of the river hydroelectric project and not a geothermal project. Thus these emission sources are not applicable to the proposed
	Emissions of CH_4 and CO_2 from non-condensable gases contained in geothermal steam.	CH_4	No	Project.
		N_2O	No	
	CO2 emissions from combustion of fossil fuels for electricity generation in solar thermal power plants and geothermal power plants	CO_2	No	The project activity is a run of the river hydroelectric project and not a solar thermal or a geothermal project. Thus these emission sources are not applicable to the proposed project.
		CH_4	No	
		N_2O	No	
	For hydro power plants, emissions of CH_4 from the reservoir.	CO_2	No	The project activity is a run of the river hydroelectric project and does not involve reservoir. Thus these emission sources are not applicable to the proposed project.
		CH_4	No	
		N_2O	No	

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B.5. Establishment and description of baseline scenario (UCR Standard or Methodology) >>

As per the approved methodology ACM0002 version 20.0, if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

A "grid emission factor" refers to a CO_2 emission factor (tCO_2/MWh) which will be associated with each unit of electricity provided by an electricity system. The UCR recommends an emission factor of 0.9 tCO_2/MWh for the 2014- 2020 years as a fairly conservative estimate for Indian projects not previously verified under any GHG program. Also, for the vintage 2021 and 2022, the combined margin emission factor calculated from CEA database in India results into higher emission than the default value. Hence, the same emission factor has been considered to calculate the emission reduction under conservative approach.

Net GHG Emission Reductions and Removals:

Thus, $ER_y = BE_y – PE_y – LE_y$
Where:
ER_y = Emission reductions in year y (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)

Calculation of Baseline Emissions

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity, calculated as follows;

The Baseline emissions are calculated as per the following equation as specified in ACM0002.

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

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 UCR 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 The UCR recommends an emission factor of 0.9 tCO_2/MWh

As the project activity is a Greenfield renewable energy power plant,

$$EG_{PJ,y} = EG_{facility,y}$$

Where $EG_{facility,y}$ is the Quantity of net electricity generation supplied by the project plant/unit to the

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grid in year y (MWh/yr)

The Combined margin CO2 baseline emission factor ($EF_{grid,CM,y}$) has been calculated using (a) A combined margin (CM), consisting of the combination of operating margin (OM) and build margin (BM) according to the procedures prescribed in the version 02.1.0 of 'Tool to calculate the emission factor for an electricity system'.

Estimated Annual or Total baseline emission reductions (BE_y) = 48,195 CoUs /year (48,195 tCO2eq/yr)

B.6. Prior History>>

The project activity is having prior history of registration CDM mechanism. Refer section B.3

B.7. Changes to start date of crediting period >>

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

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

There are no permanent changes from registered PCN monitoring plan and applied methodology

B.9. Monitoring period number and duration>>

First Issuance Period: 04 years, 00 months – 04/05/2018 to 31/05/2022

B.8. Monitoring plan>>

Data/Parameter	EG_y
Data unit	MWh
Description	Electricity supplied by the project activity to the grid.
Source of data Value(s) applied	NHEPL records
Measurement methods and procedures	Measurement: Energy meter Data Type: Measured Monitoring frequency: Continuous, aggregated Daily Archiving Policy: Paper / Electronic Location: Station yard of the plant
QA/QC procedures tobe applied:	The energy meter would be calibrated once in five years. The minimum accuracy of the meter would be 0.5%. The data will be cross-checked with the tariff invoices submitted to Karnataka Power Transmission Corporation Limited for the electricity supplied to the grid.
Purpose of data	To calculate emission reduction of the project activity

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