PROJECT CONCEPT NOTE
CARBON OFFSET UNIT (CoU) PROJECT

Title: 10 MW solar Power plant in Karnataka by M/s Bhoruka Power Corporation Limited
Version 1.0
Date 24/01/2025
First CoU Issuance Period: 9 years, 1 month and 20 days
Date: 12/11/2014 to 31/12/2023

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

BASIC INFORMATION	
Title of the project activity	10 MW solar Power plant in Karnataka by M/s Bhoruka Power Corporation Limited
The scale of the project activity	Small Scale Project
Completion date of the PCN	24/01/2025
Project participants	Bhoruka Power Corporation Limited, Bangalore.
Host Party	India
Applied methodologies and standardized baselines	AMS.I-D Grid-connected electricity generation from renewable sources --- Version 18.0
Sectoral scopes	01 Energy industries (Renewable/Non - Renewable Sources)
Estimated amount of total GHG emission reductions	To be estimated during verification An ex-ante estimate is 171,363 CoUs (171,363) tCO2eq)

SECTION A. Description of project activity

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

The Project activity titled, "10 MW Solar Power Plants in Karnataka by Bhoruka Power Corporation Limited, Bangalore." is a Solar power Project located in located in Rangenahalli, Sidlayyanakotte and Bidarakere Village, Hiriyur Taluk, Chitradurga Dist, Karnataka.

It has been operational since 12 Nov 2014, owned by Bhoruka Power Corporation Limited (hereinafter referred to as the Project Proponent or PP).

Company Name	Plant Capacity (MW)	Location	Commissioning Date
Bhoruka Power Corporation Limited	10	Rangenahalli, Sidlayyanakotte and Bidarakere Village, Hiriyur Taluk, Chitradurga Dist, Karnataka	12/11/2014

The power produced by the 10MW is evacuated at the 66 KV Rangenahalli substation located at Rangenahalli, Hiriyur Taluk, Chitradurga Dist, Karnataka.

Purpose of the project activity:

The core objective of this project activity is to displaces an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant electricity grid. The estimated lifetime of the project activity is considered as 25 years for solar technology. In the Pre- project scenario the entire electricity, consumed by the customers or delivered to the grid by, would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources.

The generation of power from solar photovoltaics is a clean technology as there is no fossil fuel-fired or no GHG gases are emitted during the process. A photovoltaic module consists of several photovoltaic cells connected by circuits and sealed in an environmentally protective laminate, which forms the fundamental building blocks of the complete PV generating unit. Several PV panels mounted on a frame are termed PV Array. Thus, project activity leads to a reduction the GHG emissions as it displaces power from fossil fuel-based electricity generation in the regional grid. The technological details have been provided in Section A.4. Since the project activity generates electricity through solar energy, a clean renewable energy source it will not cause any negative impact on the environment and thereby contributes to climate change mitigation efforts.

The Crediting Period of the Project activity is 10 years in which total estimated electricity generation is 196,486 MWh and total GHG emission reduction estimated is 171,363 tCO_2e. Also, the annual average estimated emission reductions from project activity are 17,136 tCO_2e/annum with the average plant load factor of 22.43%. This annual average net electricity generation and annual average GHG emission reductions are with application of degradation factor of 0.70% from second year.

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.

This project is a greenfield activity where grid power is the baseline. Indian grid system has been predominantly dependent on power from fossil fuel powered plants. 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.

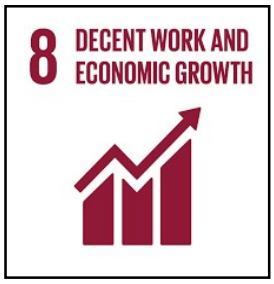
There was no harm identified from the project and hence no mitigation measures are applicable. Rational: as per 'Central Pollution Control Board (Ministry of Environment & Forests, Govt. of India)', the final document on the revised classification of Industrial Sectors under Red, Orange, Green, and White Categories, it has been declared that Solar 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 regulations, Environmental and Social Impact Assessment is not required for Solar Projects. Additionally, there are social, environmental, economic, and technological benefits that contribute to sustainable development. The key details have been discussed below:

- **Social benefits:**
- The project activity will lead to the development of supporting infrastructure such as road network etc., in the wind park location, the access to which is also provided to the local population.
- The project will create job opportunities for local residents, both temporary during construction and permanent during operation. This will boost income and improve the standard of living in the community.

- **Economic benefits:**
- The project activity requires temporary and permanent, skilled and semi-skilled manpower at the wind park; this will create additional employment opportunities in the region.
- The generated electricity will be fed into the NEWNE regional grid through local grid, thereby improving the grid frequency and availability of electricity to the local consumers (villagers & sub- urban habitants) which will provide new opportunities for industries and economic activities to be set up in the area thereby resulting in greater local employment, ultimately leading to overall development.

- **Technical benefits:**
- The project activity is step forward in harnessing the untapped solar potential technology in the region. The project activity leads to the promotion and demonstrates the success of solar projects in the region which further motivate more investors to invest in solar power projects. Hence, the project activity leads to technological well-being.

- **Environmental benefits:**
- The project activity employs renewable energy source for electricity generation instead of fossil fuel- based electricity generation which would have emitted gaseous, liquid and/or solid effluents/wastes.
- Being a renewable resource, using wind energy to generate electricity contributes to resource conservation. Thus, the project causes no negative impact on the surrounding environment and contributes to environmental well-being.

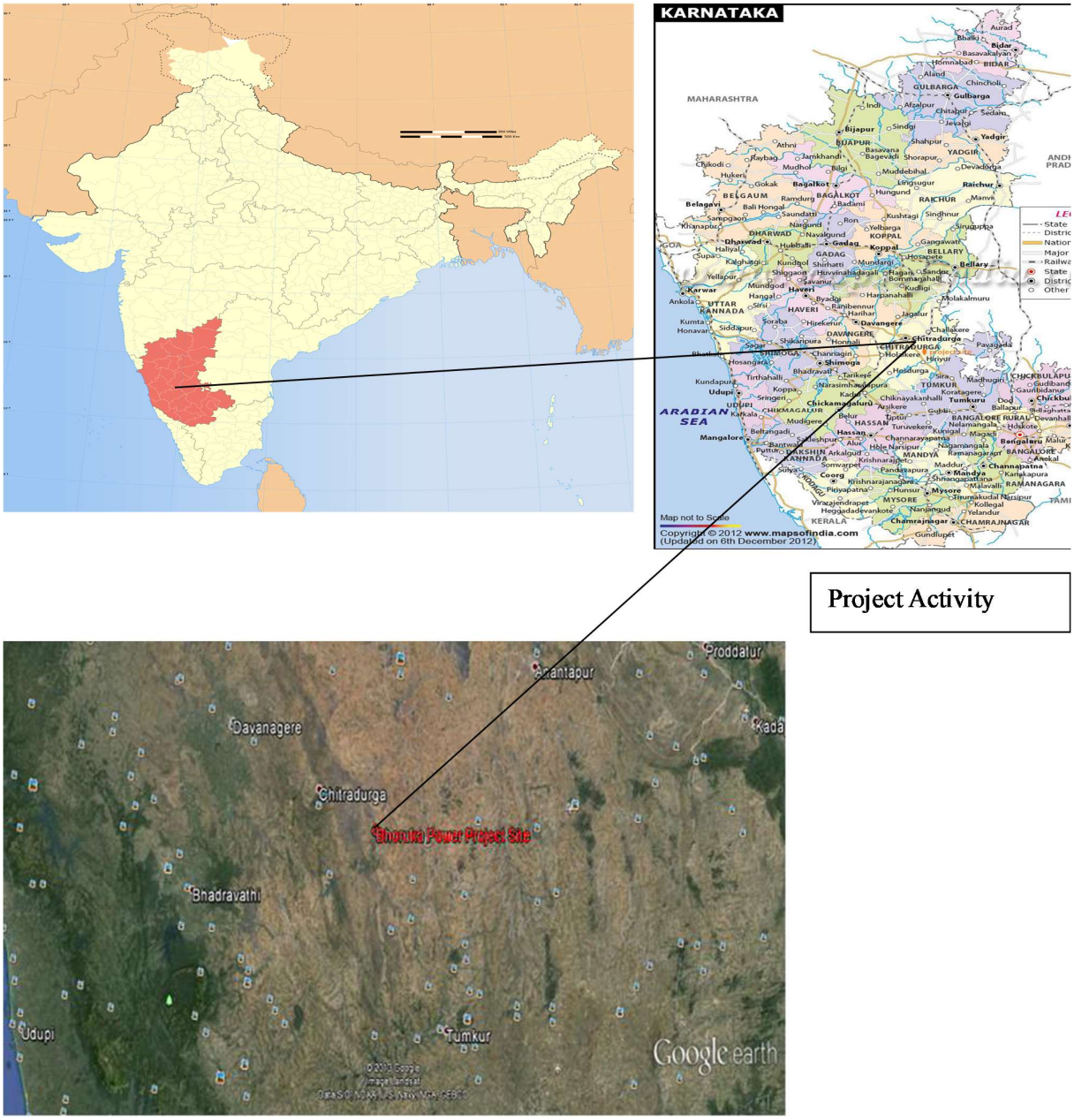
SDG Goals	Description
Goal 7 	➢ The project activity will generate clean energy, which with increased sharing will increase the affordability at a cheaper rate to end user. The project activity will utilize solar energy (renewal resource) to generate power. The project activity will increase the share of renewable resource-based electricity to global mix of energy consumption
Goal 8 	➢ This project activity generates additional employment in the operations and maintenance of the Solar Plant for the local people. This project will achieve full and productive employment and decent work.
Goal 13 	➢ This 10 MW Solar power project meet the SDG 13 goal by saving fossil fuel and produce clean energy. This project is expected to reduce CO_2 emission 17,683 ton per year. ➢ In a Greenfield project, electricity delivered to the grid by the project would have otherwise been generated by the operation of grid connected power plants. Thereby the project activity reduces the dependence on fossil fuel-based generation units and as there are no associated emissions with this project it contributes to the reduction of greenhouse gases (GHG) emissions.

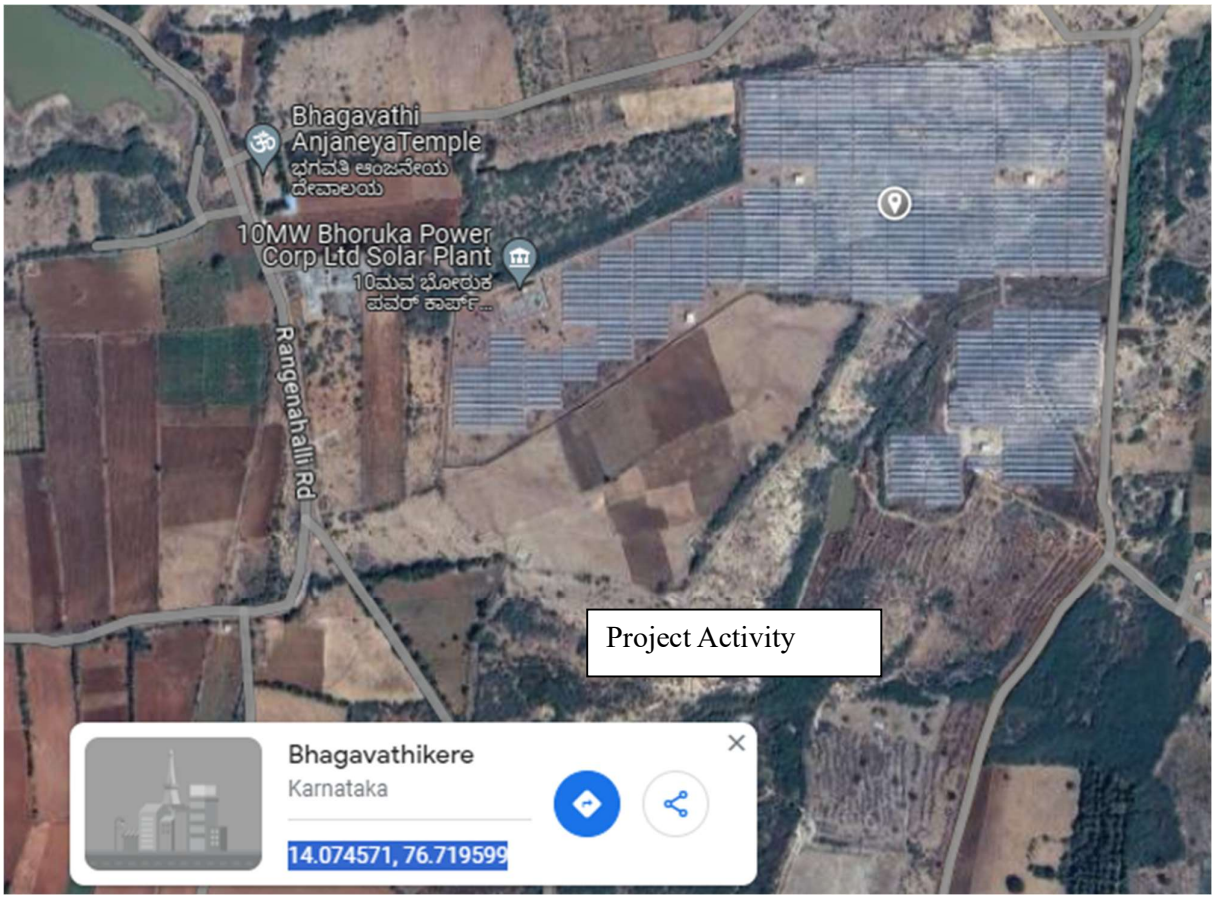
A.3. Location of project activity >>

Country: India
District: Chitradurga
Village: Rangenahalli
Tehsil: Hiriyur
State: Karnataka.

The geographic co-ordinates of the project location have been given below:
Latitude : 14° 4.7' N
Longitude : 76°43.2' E

The representative Location of map is included below:





A.4. Technologies/measures >>

The project activity is using clean renewable solar energy to produce electricity. The applied technology is one of the most environment friendly technologies available as the operation of the Solar photovoltaic does not emit any GHGs or any other harmful gases unlike the operation of conventional power plants.

The Project Activity is a new facility (Greenfield) and the electricity generated by the project is exported to the national grid of India to be purchased by Bangalore Electricity Supply Company Ltd (BESCOM).

The project activity displaces an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant electricity grid. The estimated lifetime of the project activity is considered as 25 years for solar technology. In the Pre- project scenario the entire electricity, consumed by the customers or delivered to the grid by, would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources.

Technology used in Project Activity

The main components include:

Solar PV modules: – Solar PV modules convert solar radiation directly into electricity through the photovoltaic effect in a silent and clean process that requires no moving parts. The photovoltaic effect is a semiconductor effect whereby solar radiation falling onto the semiconductor PV cells generates electron movement. The output from a solar PV cell is direct current (DC) electricity. A PV power plant contains many cells connected together in modules and many modules connected together in strings to produce the required DC power output.

Inverters – Invertors are required to convert the DC electricity to alternating current (AC) for connection to the utility grid. Many modules in series strings and parallel strings are connected to the inverters

Step-up transformers: – The output from the inverters generally requires a further step-up in voltage to reach the AC grid voltage level. The step-up transformer takes the output from the inverters to the required grid voltage (33 kV)

Module mounting systems: Fixed mounting systems keep the rows of modules at a fixed tilt angle while facing a fixed angle of orientation for maximising the energy incident on the collector plane. The optimum tilt angle is generally between 10º and 35º, facing true south.

Parameter	
Project Capacity	10MW
Type of system	PV Ground mounted
Expected annual generation	19,648
Project Capacity	10MW
Invertor Make	ABB
Invertor rating	1000kW
Number of Invertor	10
Capacity of Module	250Wp
Tilt angle	18º
Transformer Make	
Transformer details	2 MVA, 400 V / 11 kV
Number of Transformer	5
Efficiency of Panels	14%-16%
Number of modules	42,208
Solar panel make	Canadian Solar Inc.
Capacity of modules	250 Wp
Type of modules	Multi-crystalline

Type of Mounting Structure	Fixed Tilt
Expected life of Power Plant	25 Years

A.5. Parties and project participants >>

Party (Host)	Participants
India	Bhoruka Power Corporation Limited

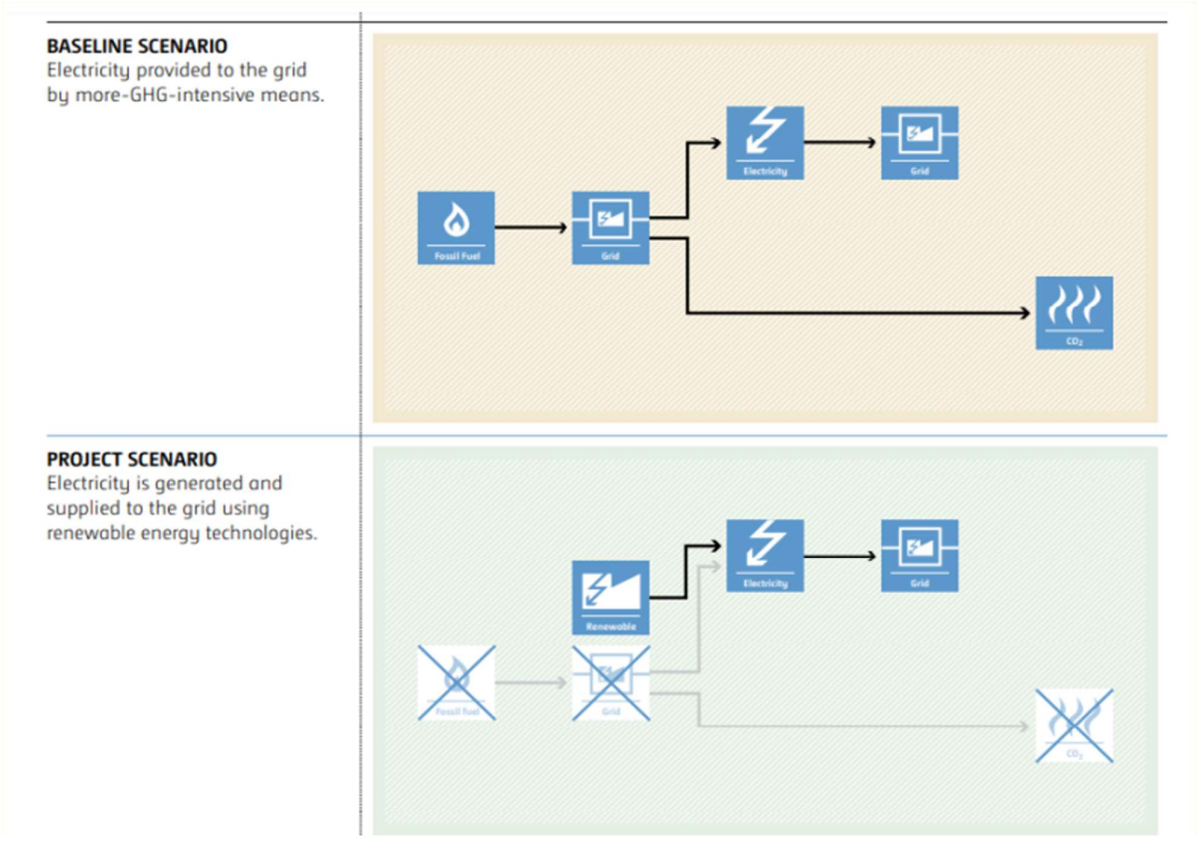
A.6. Baseline Emissions>>

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

The scenario existing prior to the implementation of the project activity, is electricity delivered to the facility by the project activity that would have otherwise been generated by the operation of grid connected power plants and by the addition of new generation sources. This is a green field project activity. There was no activity at the site of the project participant prior to the implementation of this project activity. Hence pre-project scenario and baseline scenario are the same.

As per the approved AMS-I.D.: "Grid connected renewable electricity generation", version 18 if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following: "If the project activity is the installation of a Greenfield power plant, 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 to the grid".

Schematic diagram showing the baseline scenario.



A.7. Debundling>>

This project is not a De-bundled 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: AMS-I.D.: "Grid connected renewable electricity generation", version 18

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

The project activity involves generation of grid connected electricity from the construction and operation of a new solar power project activity has installed capacity of 10 MW which will qualify for a Large scale project activity. The project status is corresponding to the methodology AMS-I.D.: "Grid connected renewable electricity generation", version 18 and applicability of methodology is discussed below:

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

There is no double accounting of emission reductions in the project activity due to the following reasons:
• Project is uniquely identifiable based on its location coordinates,
• Project has dedicated commissioning certificate and connection point,
• Project is associated with energy meters which are dedicated to the consumption point for project developer

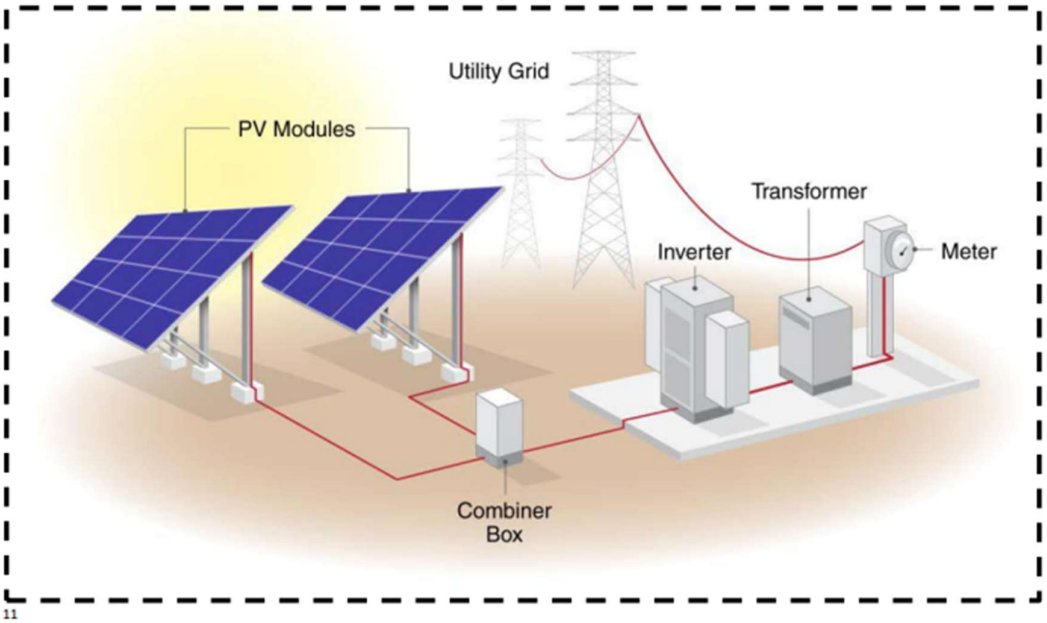
B.4. Project boundary, sources and greenhouse gases (GHGs)>>

According to the methodology, the spatial extent of the project boundary includes the project power plant/unit and all power plants/units connected physically to the electricity system that the project power plant is connected to. Hence, the project boundary includes the project site where the power plant has been installed, associated power evacuation infrastructure, energy metering points, switch yards and other civil constructs and the connected national grid of India.

Applicability Criterion	Project Case
1) This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	The project activity is a Renewable Energy Project i.e., solar power project which falls under applicability criteria option 1 (a) i.e., "Supplying electricity to a national or a regional grid"

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 an existing reservoir with no change in the volume of the reservoir; (b) The project activity is implemented in an existing reservoir, where the volume of the reservoir is increased and the power density of the project activity, 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	The project activity involves the installation of a Solar Power Plant 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 project is a 10MW solar power project, i.e., the only component is renewable power project below 15 MW, thus the criterion does not apply to this project activity.
5) Combined heat and power (co-generation) systems are not eligible under this category.	This is not relevant to the project activity as the project involves only solar power generating units.
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 distinct1 from the existing units	There is no other existing renewable energy power generation facility at the project site. Therefore, this criterion is not applicable.

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 project activity is a new installation, it does not involve any retrofit measures nor any replacement and hence is not applicable for the 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.	This is not relevant to the project activity as the project involves only solar power generating units.
9. In case biomass is sourced from dedicated plantations, the applicability criteria in the tool "Project emissions from cultivation of biomass" shall apply.	Not biomass is involved, the project is only a solar power project and thus the criterion is not applicable to this project activity.



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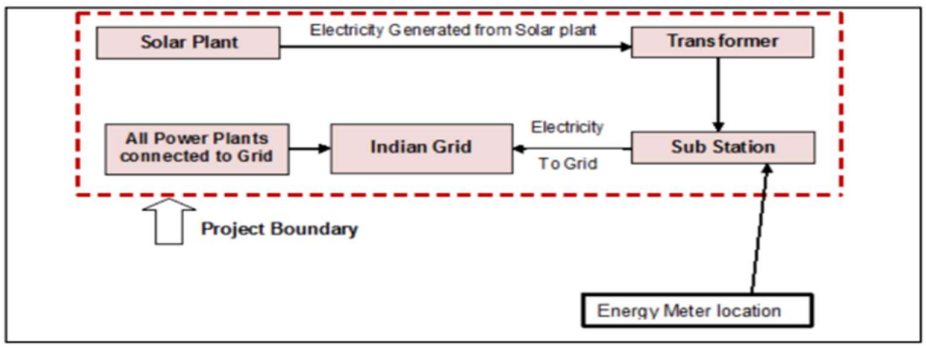
Project Boundary



The table below provides an overview of the emissions sources included or excluded from the project boundary for determination of baseline and project emissions.

Source		GHG	Included?	Justification/Explanation
Baseline	CO2 emissions from electricity generation in grid-connected power plants that are displaced due to the project activity	CO_2	Yes	Major source of emission
		CH_4	No	Minor source of emission
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small
Project Activity	Emissions from on-site electricity use in the project activity	CO_2	No	The quantity of electricity delivered to the project plant/unit from the grid has been deducted from the quantity of electricity supplied by the project plant/unit to the grid when calculating the baseline emission, hence onsite electricity use in the project does not need to be considered as project emission
		CH_4	No	Excluded for simplification. This emission source is assumed to be very small
		N_2O	No	Excluded for simplification. This emission source is assumed to be very small

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

As per the approved AMS-I.D.: "Grid connected renewable electricity generation", version 18, if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

"The baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise, been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid.

The project activity involves setting up of a new grid connected solar power plant to harness the green

power from solar energy. In the absence of the project activity, the equivalent amount of power would have been supplied by the Indian grid, which is fed mainly by fossil fuel fired plants. 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 each unit of electricity provided by an electricity system. The UCR recommends an emission factor of 0.9 tCO_2/MWh for the 2013-2020 years as a fairly conservative estimate for Indian projects not previously verified under any GHG program. Also, for the vintage 2021, the combined margin emission factor calculated from CEA database in India results into higher emission than the default value. Hence, the same emission factor has been considered to calculate the emission reduction under conservative approach.

As per approved consolidated AMS-I.D.: "Grid connected renewable electricity generation", version 18, emission reduction is estimated as difference between the baseline emission and project emission after factoring into leakage.

Emission Reduction:

Thus, $ER_y = BE_y - PE_y - LE_y$

Where:

ER_y : Emission reductions in year y (tCO_2e/year)
BE_y: Baseline emission in year y (tCO_2e/year)
PE_y: Project emission in year y (tCO_2e/year)
LE_y : Leakage Emission in the year y (tCO_2/year)

Baseline Emission
As per the CDM approved AMS-I.D.: "Grid connected renewable electricity generation", version 18 Baseline emissions include only CO2 emissions from electricity generation in fossil fuel fired 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 as existing grid-connected power plants and the addition of new grid-connected power plants.

The baseline emissions are to be calculated as follows:

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

Where;

BE_y : Baseline emissions in year y (tCO_2/year)
$EG_{PJ, y}$: Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the GCC project activity in year y (MWh/year)
$EF_{grid,CM, y}$: Combined margin CO_2 emission factor for grid connected power generation in year y (tCO_2/MWh)

Project Emission

As per paragraph 39 of AMS-I.D. version-18, only emission associated with the fossil fuel combustion, emission from operation of geo-thermal power plants due to release of noncondensable gases, emission from water reservoir of Hydro should be accounted for the project emission. Since the project activity is a solar power project, project emission for renewable energy plant is nil.

$PE_y = 0.$

$ER_y = BE_y – PE_y$
$= (EG_{facility, y} * EF_{grid, CM, y}) – PE_y$
ERy= (*0.9)-0
ERy= (tCO_2e/year.)

Therefore, $ER_y = BE_y$

The start date of the Project is from **12/11/2014** which is the Commissioning date, duration of the crediting period is started from **12/11/2014 to 31/12/2023**.

Year	**Net Generation**	**Baseline Emissions**	**Project Emissions**	**Leakage**	**Emission Reductions**
	MWh	**(tCO_2e)**	**(tCO_2e)**	**(tCO_2e)**	**(tCO_2e)**
Year 1	17,683	17,683	0	0	17,683
Year 2	17,559	17,559	0	0	17,559
year 3	17,436	17,436	0	0	17,436
Year 4	17,314	17,314	0	0	17,314
Year 5	17,193	17,193	0	0	17,193
Year 6	17,073	17,073	0	0	17,073
Year 7	16,953	16,953	0	0	16,953
Year 8	16,835	16,835	0	0	16,835
Year 9	16,717	16,717	0	0	16,717
Year 10	16,600	16,600	0	0	16,600
Total Emission reduction		**1,71,363**	**0**	**0**	**1,71,363**
Annual Average ER		17,136	0	0	17,136

Leakage Emission

The Leakage emissions potentially arising due to activities such as power plant construction and upstream emissions from fossil fuel use (e.g. extraction, processing, transport etc.) are neglected According to the applied methodology AMS-I.D Paragraph 42, Version 18 guidance on leakage, there is no leakage emission from this project activity has been considered.
Thus, $LE_y = 0.$
Hence no other leakage emissions are considered.

Estimated Annual or Total baseline emission reductions (BEy) = 17,136 CoUs /year (17,136 tCO2eq/year)
The actual emission reduction achieved during the first CoU period shall be submitted as a part of first monitoring and verification. However, for the purpose of an ex-ante estimation, the following calculation has been submitted:

Estimated annual baseline emission reductions (BEy) = 19,648 MWh/year × 0.9 tCO_2/MWh = 17,683 tCO_2e/year (i.e., 17,136 CoUs/year)

B.6. Prior History>>

1. The project activity initially submitted a Prior Consideration under the Clean Development Mechanism (CDM) of the UNFCCC for registration on 03/04/2015[1]. However, the project proponent did not pursue CDM registration afterward. Another project activity was submitted for prior consideration under CDM for registration on 01/10/2015[2], which is different from the current project activity. The project is now being applied under UCR to issue carbon credits and receive carbon financing.
2. The project has not been applied under any other greenhouse gas (GHG) mechanism except for CDM. Additionally, for any period under UCR, CDM validation and verifications have not been conducted, and no credits have been issued. Therefore, the project will not cause double accounting of carbon credits (i.e., COUs).

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

The start date of crediting under UCR is considered as 12/11/2014 and no GHG emission reduction has been claimed so far.

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

Not applicable.

B.9. Monitoring period number and duration>>

First Issuance Period: 9 years, 1 months and 20 days – 12/11/2014 to 31/12/2023.

B.8. Monitoring plan>>

Data and Parameters available at validation (ex-ante values):

Data/Parameter	$EF_{grid, y}$
Data unit	tCO_2 / MWh
Description	A "grid emission factor" refers to a CO_2 emission factor

[1] https://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html?s=1340
[2] https://cdm.unfccc.int/Projects/PriorCDM/notifications/index_html?s=1220

	(tCO2/MWh) which will be associated with each unit of electricity provided by an electricity system. The UCR recommends an emission factor of 0.9 tCO2/MWh for the 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 Value(s) applied	0.9 (UCR recommendation value) https://a23e347601d72166dcd6-16da518ed3035d35cf0439f1cdf449c9.ssl.cf2.rackcdn.com//Documents/UCRCoUStandardAug2022updatedVer6_090822220127104470.pdf
Measurement methods and procedures	-
Monitoring frequency	Ex-ante fixed parameter
Purpose of data	For the calculation of Baseline Emission

Data and Parameters to be monitored

Data/Parameter	**$EG_{y, net}$**
Data unit Description	MWh Net electricity supplied to the grid by the Project activity.
Source of data Value(s) applied	Energy Meter records and/or monthly generation statement.
Measurement methods and procedures	Data Type: Measured Monitoring equipment: Energy Meters are used for monitoring Calibration frequency :once in five years(as per CEA Indian provision) Cross checking: Quantity of net electricity supplied to or consumed at PP's facility will be cross checked from the monthly bills or invoices raised by d Chamundeshwari Electricity Supply Company Ltd (CESCOM) And Bangalore Electricity Supply Company Ltd (BESCOM) whichever is applicable. The Net electricity supplied to the grid will be calculated by the values of Electricity export to the grid.The Net electricity is recorded as follows: Thus, $EG_{PJ,y} = EG_{Net,Export}$
Monitoring frequency	The net energy exported to the grid is measured every month using a calibrated energy meter by the State Electricity Board authorities in the presence of the project implementer or its representatives. The meter/s

	shall be jointly inspected, and sealed by authorized representatives of the company and the state utility. Measuring procedure: This will be measured by an export-import energy meter. The net electricity exported by the project plant would either be directly sourced as a measured parameter or be calculated by deducting the amount of imported electricity from the total amount of exported electricity. Accuracy class of energy meter: 0.2s Calibration Frequency: As per the Central Electricity Authority the testing and calibration frequency should be minimum once in five years.
Value applied	31,427(Annualized average value has been considered here for an ex-ante estimation only, whereas this is an-ex post parameter hence actual value shall be applied during monitoring and verification)
QA/QC procedures	Monitoring frequency: Continuous Measurement frequency: Hourly Recording frequency: Monthly
Purpose of data	Calculation of Baseline Emission