PROJECT CONCEPT NOTE

CARBON OFFSET UNIT (CoU) PROJECT

Title: 7 MW Clean Energy project by Gro Solar

Version 1.1

Date: 27/05/2025

First CoU Issuance Period: 03 years, 06 months, 07 days

Monitoring period: 25/06/2021 to 31/12/2024

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

BASIC INFORMATION	
Title of the project activity	7 MW Clean Energy Project by Gro Solar
Scale of the project activity	Small Scale Project
Completion date of the PCN	27/05/2025
Project participants	Gro Solar Energy Pvt. Ltd
Host Party	India
Applied methodologies and standardized baselines	**CDM UNFCCC Methodology** AMS-I.D.: Grid connected renewable electricity generation --- 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 122,619 CoUs (122,619 tCO_2eq)

SECTION A. Description of project activity

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

The Project "7 MW Clean Energy Project by Gro Solar" is a solar-based power generation facility, it is a grid connected solar power project located in District - Dhule in Maharashtra state of India, where it is connected through the 11 kV line from 7MW Solar PV Plant to 11 kV Bay of Degaon Substation. The project has been operational since 25/06/2021. The project is owned by Gro Solar Energy Pvt. Ltd (hereinafter referred to as the Project Proponent or PP). 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.

A.1.1 Purpose of the project activity:

The purpose of the proposed project activity is to generate electricity using a clean and renewable source of energy i.e., solar radiation. The project activity replaces anthropogenic emissions of greenhouse gases (GHG's) into the atmosphere, by displacing the equivalent amount of electricity generation through the operation of existing fuel fossil fuel- based power plants and future capacity expansions connected to the grid. In the absence of the project activity the equivalent amount of electricity would have been generated from the fossil fuel-based power plant. Whereas the electricity generation from the operation of Photovoltaic stations is emission free. Commissioning dates of the Solar plant is shown below :

Sr. No.	Location	Type	Total installed capacity MWp	Commissioning Date
1	Dhule, Maharashtra, India	Ground Mounted	7 MW (AC)	25/06/2021

The project will generate approximately 153,300 MWh of electricity per annum. The project activity has been helping in greenhouse gas (GHG) emission reduction by using renewable resources (solar energy) for generating power which otherwise would have been generated using grid mix power plants,

which is dominated by fossil fuel based thermal power plants. The estimated annual average and the total CO_2e emission reduction by the project activity is expected to be 11,147 t/CO_2e & 122,619 t/CO_2e respectively, whereas actual emission reduction achieved during the first CoU period shall be submitted as a part of first monitoring and verification. The power produced from the 7MW Solar PV Plant is evacuated to 11 kV Bay of Degaon Substation. From this substation, the power can then be further transmitted to other parts of the electrical grid for consumption. This process ensures the generated solar power is integrated into the larger power supply system.

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.

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.

- **Social benefits:**
  - The project activity will lead to the development of supporting infrastructure such as road network etc., in the solar park location, the access to which is also provided to the local population.
  - The project activity will lead to alleviation of poverty by establishing direct and indirect benefits through employment generation and improved economic activities by strengthening of local grid of the state electricity utility.
  - Use of a renewable source of energy reduces the dependence on imported fossil fuels and associated price variation thereby leading to increased energy security.

- **Environmental benefits:**
  - The project activity employs renewable energy sources 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 solar 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.

- **Economic benefits:**
  - The project activity requires temporary and permanent, skilled and semi-skilled manpower at the solar park; this will create additional employment opportunities in the region.
  - The generated electricity will be fed into the Indian 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 setup in the area thereby resulting in greater local employment, ultimately leading to overall development.

- **Technical benefits:**
  - Increased interest in solar energy projects will further push R&D efforts by technology providers to develop more efficient and better machinery in future.

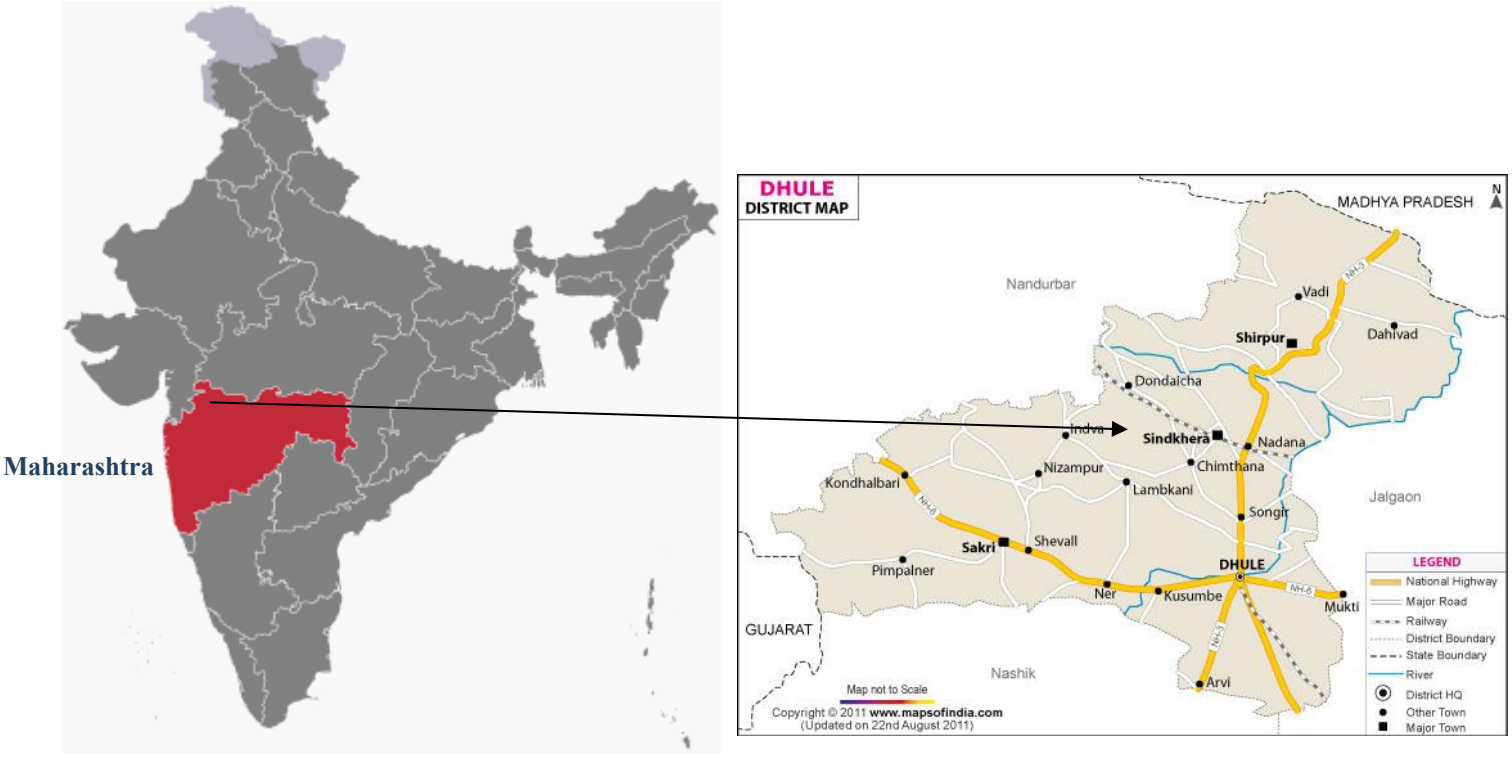
United Nations Sustainable Development Goals:

The project activity generates electrical power using solar energy, which is generated from solar mills, thereby displacing non-renewable fossil resources resulting in sustainable, economic and environmental development. In the absence of the project activity an equivalent amount of power generation would have taken place through fossil fuel dominated power generating stations. Thus, the renewable energy generation from project activity will result in reduction of the greenhouse gas emissions.

SDG Goals	Description
Goal 4 	This Project activity promotes educational amenities that can directly and indirectly help students achieve quality or better education. Also Support underprivileged or rural schools with required and unlocked various opportunities for school children.
Goal 7 	The project activity will generate clean energy, which with increased share 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 farm for the local people. This project will achieve full and productive employment and decent work.
Goal 13 	This 7 MW solar power project meets the SDG 13 goal by displacing fossil fuel with clean energy. This project is expected to reduce 11,147 tCO_2 emissions per year.

A.3. Location of project activity >>

The representative Location of map is included below:



Project Activity

The project activity entails a 7MW Solar PV Project at Degaon, Taluka -Shindkheda (Dhule) and its Overhead line from 7MW Solar PV plant to the substation and Bay at 33/11KV substation.

The following table shows the details for the project activity:

Site Address	Degaon village, Dhule district, Maharashtra state
Latitude	21° 10' 39" N
Longitude	74° 34' 02" E
Map link	https://maps.app.goo.gl/YZmwhRPYhvnQAusJA
Elevation	178 Meter
Ground type	Free field with 2-3 meter undulations are Observed

A.4. Technologies/measures >>

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

Photovoltaic module consists of 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 as PV Array. The project activity has used the reliable and proven technology to ensure that environmentally safe and sound technology is only being implemented in the proposed project activity leading to the GHG reduction. In the absence of the project activity, the equivalent amount of electricity would have been utilized from the fossil fuel dominated Indian Grid, hence baseline scenario of the project activity is the grid-based electricity system, which is also the pre-project scenario.

Some of the salient features of the project equipment can be found in the below-mentioned table.

Sr. No.	Parameters	Value
1.	Rated AC Capacity of plant	7 MW
2.	Rated DC Capacity of plant	10 MW
3.	Number of installed modules	30,300
4.	Module Wattage	330 Wp
5.	PV Array capacity	9,999 KWp
6.	PV technology	Poly crystalline
7.	Solar inverter	200 KW @ 50 Deg C
8.	Inverter technology	Utility range string inverter
9.	Total inverters	Approximately 35 Nos. (7 MW)
10.	Power Evacuation	Power evacuation at 11kV

11.	No. Of Units with independent 11 kV Transformer	3
12.	No. of String Inverters	35
13.	No. Of Module in Series in each String	30~32
14.	Nominal Power of a Single PV Module	330 Wp
15.	Max. / Min Rated Capacity of a string	9.9/10.56 kWp
16.	Module Voltage Vmpp	33.9 VDC
17.	Inverter Input Voltage	*600 V DC– 1500 VDC*

Major Components of Solar Power Plant:

- Solar PV module: -
  - International Electro-technical Commission (IEC), the leading global organization that publishes consensus-based International Standards for electric and electronic products, systems and services has well established standards for the solar plant components. Most of the Indian requirements established by Bureau of Indian Standards (BIS) are based on these IEC norms.
  - IEC 61215, IEC 61646 and IEC 62108 standards; PV safety testing as per IEC 61730 standards IEC 61730 Part 1 &2 Part 1 Covers Construction Requirements & Mandatory design characteristics. Part 2 covers - defines 3 different classes, a) Panel design / b) Specifying type of use/c) Related qualification tests IEC 61701: Solar panels in a highly corrosive atmosphere (coastal areas) must qualify Salt Mist Corrosion Testing

- Module mounting structure:
  - The structure shall be designed to allow easy replacement of any module & shall be in line with the site requirements. The leveling of site will be done before placing the modules on the ground.
  - The support structure design & foundation shall be designed to withstand wind speed up to-140 Kmph. The module mounting structure is single central Post design for better structural stability and longevity. The module alignment & tilt angle shall be calculated to provide the maximum annual energy output. This shall be decided based on the location of array installation.
  - The material used will be Hot/Cold Formed with average thickness of 80 microns of galvanization & Module mounting Purlins and Rafters are Galvalume / pre galvanized material. All the mounting structures will be tilted at an angle of 20 degree from the horizontal and will be at a height of appx 0.75 meter on the mounting structure from the ground level ensuring proper ventilation and passage for gusty wind and facing south direction to have maximum energy generation throughout the year

- Structure Foundations
  - The structure foundation will be made with cement concrete as per design based on site related data, keeping in mind local conditions. The min. distance between the lower edge of the Solar PV Panels and GL shall conform to international standards.
  - The module mounting structure foundation design will take into consideration all the loads from solar

PV modules with mounting structures and live loads as per the manufacturer's loading data and soil formation and soil SBC data. The design and construction will be done as per the provisions laid down in IS Standards.

- Utility String Inverter
  - Utility string solar inverters of capacity 200 KW will be used for converting DC power into AC for the 7 MW systems. We propose SUNGROW/Growatt / Solis makes of Inverter for the project. Inverter is based on highly efficient IGBT technology with a generation voltage of 800 Vac, three phase, 50 Hz at a rated power factor. The inverters have Maximum Power Point Tracker (MPPT). The enclosure of the inverter is dust, vermin and waterproof.
  - Inverter has Maximum system efficiency up to 99%., Single MPPT wide MPPT voltage range, No derating up to 50 Deg C. One inverter fails, the other units maintain safety operation
  - 12 MPPTs with maximum efficiency 99%, Compatible with bifacial module, Built-in Anti-PID and PID recovery function, Compatible with Al and Cu AC cables, DC 2 in 1 connection enabled, Q at night function, IP66 and C5 protection Type II SPD for both DC and AC, Compliant with global safety and grid code Compatible with Al and Cu AC cables, DC 2 in 1 connection enabled, Qat night function

- Step up Inverter Duty transformer:
  - Depending upon the desired Power Evacuation Voltage, 3 MVA & 4 MVA, 0.800/11 kV will be provided to step up the voltage to 11 kV. The transformer provides galvanic isolation of the solar farm, this protect the solar farm from power distortion in the grid. All protection equipment as specified by the utility will be provided for the transformers. Transformers are with IP54 level of protection. The ratings of the transformer will be designed based on the load from the solar farm and the grid ratings. The synchronization takes place in the inverter module. However, the final scheme will be arrived at during detailed designing.

- 11 KV HT Panel:
  - Features of 11 kV HT panel/Cubicle: as per required voltage:
  - Alternating Current Circuit breakers (VCB as quenching medium)
  - Voltage transformers
  - Current transformers
  - AC metal enclosed switchgear and control gear for rated voltages
  - Direct acting indicating digital measuring instruments & accessories
  - AC Energy meters
  - AC Watt hour meters
  - Electrical Relays for power system protection
  - Push button/switches
  - Bushings
  - Common spec. for high voltage switchgear & Control gear standards
  - High voltage alternating current circuit breakers

- Earthing System
  - On LT Side-Chemical earthing

        - The earthing for array and LT power system shall be made with Gl pipe of suitable length, 40mm diameter including accessories and providing masonry enclosure with cast iron cover plate and back fill chemical compound. Necessary provisions shall be made for bolted isolated joints of each earthing pit for periodic checking of earthing resistance.
        - Each array structure of the Solar PV Yard shall be grounded properly. The array structures are to be connected to earth pits as per standards.
        - The earthing conductions shall run through appropriate pipes partly buried and partly on the surface of the control room building. The complete earthing system shall be mechanically and electrically connected to provide independent return to earth. All equipment shall have two distinct earth connections.

    - On HT Side
        - The 11kV equipment and parts shall be earthed as required as per provisions of the applicable standards and specifications.
        - A safety earthing system consisting of a buried Gl flat conductor earthing grid will be provided for the switchyard. The earthing system will be formed to limit the grid resistance to below 1 ohm. In the switchyard area, the touch potential and step potential will be limited to the safe values. The earthing design will be as per IS 3043 recommendations
        - The buried earthing grid will be connected to earthing electrodes buried underground.
        - Neutral point of generator transformer, non-current carrying parts of equipment, lighting arrestors, fence etc, will be earthed rigidly. The following factors will be considered for earthing system design:
            - Magnitude of fault current.
            - Duration of fault.
            - Soil resistivity.
            - Resistivity of surface material.
            - Material of earth conductor

- Lightening Protection System
    - Lightning protection system shall be provided for the solar PV array and other equipment including inverters, transformers and control room building. The protection consists of air terminals, and down conductors, which will be provided for the powerhouse structure and other taller structures of the solar PV power plant.

- Control Room
    - Control room building will be designed and constructed as per applicable standard codes. The analysis and design of the structures shall be carried out by limit state method and by using standard computer programs as per technical specifications and Indian standards and using reinforced concrete and HYSD reinforcement steel bars conforming to standards. The building shall be designed to suit the climatic conditions of the region. Roofs of the building will be water proof and leak-proof under all conditions. The building will have exhaust air duct for individual inverters to remove the hot air from the inverter.

- PV Monitoring

- The PV system is fully monitored to assess the potential of PV technology and performance of the system with the local power grid. The monitoring system will be designed to meet the guideline of standard IEC 61724. The monitoring system will be used for monitoring electrical and metrological parameters as given below:
    - DC voltage for PV arrays, Solar irradiance, DC current PV, Total irradiance (reference cell), DC power PV for PV array, Module temperature, Ambient temperature, Wind speed, Status of the inverter, Fault of all the inverter, Frequency, Grid voltage, Grid current, Current and 'Voltage', Daily energy, Monthly Energy, Annual energy etc

- Cables
    - Solar DC String Cable: Solar cables are designed to be UV resistant and weather resistant. It can be used within a large temperature range and are generally laid outside. Single-core cables
    - with a maximum permissible DC voltage of 1.8 kV and a temperature range from -40°C to +90°C are generally used.
    - AC side cable: All AC side cables LT and HT shall be with aluminum conductors

A.5. Parties and project participants >>

Party (Host)	Participants
India	GRO SOLAR ENERGY PVT LTD

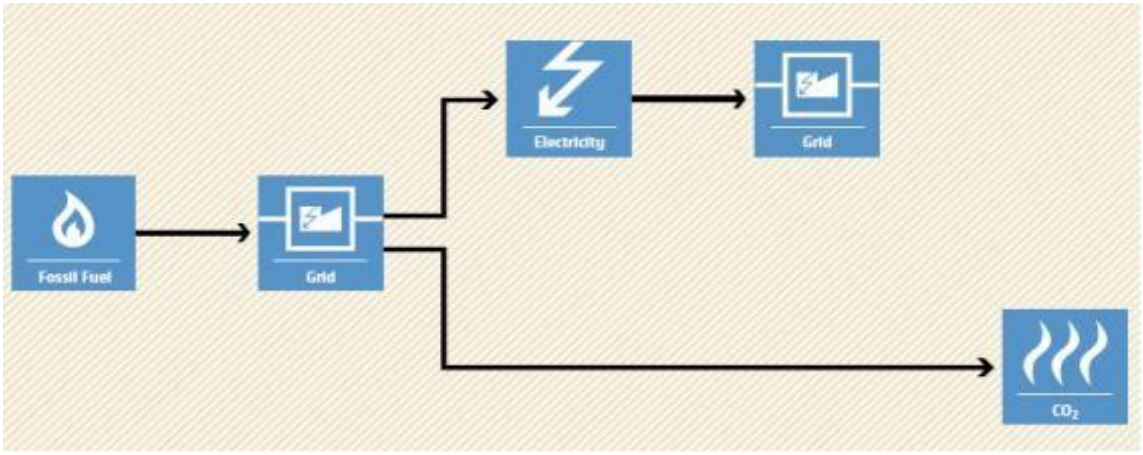
A.6. Baseline Emissions>>

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

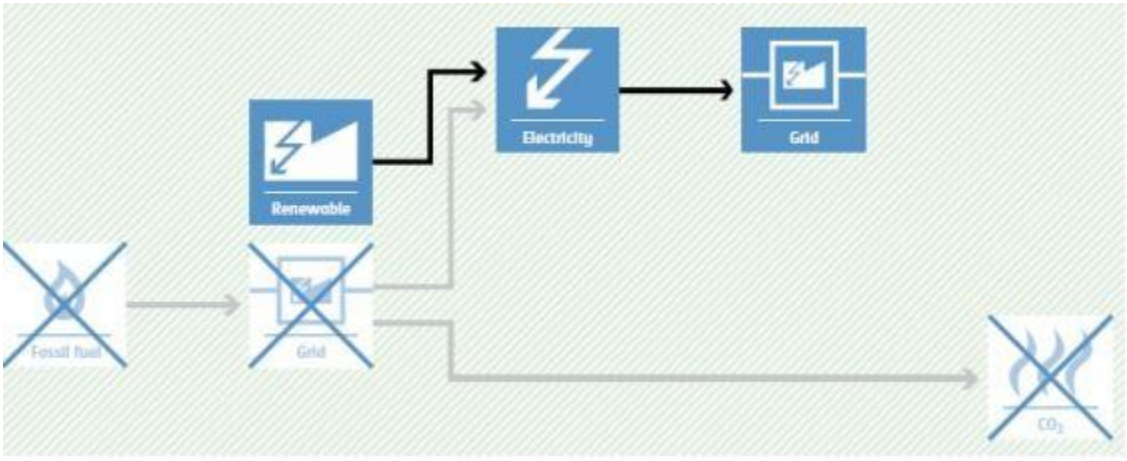
In the absence of the project activity, the equivalent amount of electricity would have been generated from fossil fuel-based power plants and exported to the regional grid (which is connected to the unified Indian Grid system) as national grid is predominantly sourcing from fossil fuel-based power plants. Hence, the baseline scenario of the project activity is the grid-based electricity system, which is also the pre-project scenario.

Schematic diagram showing the baseline scenario:

Baseline Scenario:



Project Scenario:



A.7. Debundling>>

This project is not a debundled component of a larger registered carbon offset 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 18.0.”

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-based power project for selling it to grid. The project activity has an installed capacity of 7 MW which will qualify for a Small-scale project activity. The project status corresponds to the methodology AMS-I.D., and the applicability of methodology is discussed below.

Applicability Criteria.	**Project Case**
1)This methodology is applicable to grid-connected renewable energy power generation project activities that: (a) Install a Greenfield power plant; (b) Involve a capacity addition to (an) existing plant(s); (c) Involve a retrofit of (an) existing operating plant(s)/unit(s); (d) Involve a rehabilitation of (an) existing plant(s)/unit(s); or (e) Involve a replacement of (an) existing plant(s)/unit(s).	The proposed project activity is a green field Plant, that is to connected Grid. Therefore, the project activity satisfies the point (a).
2) In case the project activity involves the integration of a BESS, the methodology is applicable to grid-connected renewable energy power generation project activities that: (a)Integrate BESS with a Greenfield power plant; (b) Integrate a BESS together with implementing a capacity addition to (an) existing solar photovoltaic1 or solar power plant(s)/unit(s); (c) Integrate a BESS to (an) existing solar photovoltaic or solar power plant(s)/unit(s) without implementing any other changes to the existing plant(s); (d) Integrate a BESS together with implementing a retrofit of (an) existing solar photovoltaic or solar power plant(s)/unit(s).	The project activity is the installation of 7 MW Solar power project and does not involve the integration of a Battery Energy Storage System (BESS). This condition is not applicable for this project.
3)The methodology is applicable under the following conditions: (a) Hydro power plant/unit with or without reservoir, solar power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; (b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for solar , 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 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 proposed project activity is the installation of a new Solar power plants without BESS integration. Therefore, the said criterion is not applicable

the project activity; (c) In case of Greenfield project activities applicable under paragraph 5 (a) above, the project participants shall demonstrate that the BESS was an integral part of the design of the renewable energy project activity (e.g. by referring to feasibility studies or investment decision documents); (d) The BESS should be charged with electricity generated from the associated renewable energy power plant(s). Only during exigencies 2 may the BESS be charged with electricity from the grid or a fossil fuel electricity generator. In such cases, the corresponding GHG emissions shall be accounted for as project emissions following the requirements under section 5.4.4 below. The charging using the grid or using fossil fuel electricity generator should not amount to more than 2 per cent of the electricity generated by the project renewable energy plant during a monitoring period. During the time periods (e.g. week(s), months(s)) when the BESS consumes more than 2 per cent of the electricity for charging, the project participant shall not be entitled to issuance of the certified emission reductions for the concerned periods of the monitoring period.	
4)In case of hydro power plants, one of the following conditions shall apply: a)The project activity is implemented in an existing single or multiple reservoirs, with no change in the volume of any of reservoirs; or b)The project activity is implemented in an 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 c)The project activity results in new single or multiple reservoirs and the power density calculate equation (7), is greater than 4 W/m^2. d)The project activity is an integrated hydro power project involving multiple reservoirs, where the power density of 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. i)The power density calculated using the total installed capacity of the integrated project, as per equation (8) is greater than 4W/m^2; ii)Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m^2 shall be: Lower than or equal to 25 MW; and	The proposed project activity is the installation of Solar power plants/units. Therefore, the said condition is not applicable.

Less than 10% of the total iii) installed capacity of integrated hydro power project	
5)In the case of integrated hydro power projects, project proponent shall: 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 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 indifferent 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 five years prior to implementation of CDM project activity.	The proposed project activity is the installation of a solar power plants/units. Therefore, the said criteria is not applicable
6)The methodology is not applicable to: 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. b) Biomass fired power plants;	The proposed project activity is Greenfield solar power project and does not fall under any of the options (a) (b) (c). Therefore, the said criteria is not applicable.
7)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 proposed project activity is the installation of solar power plants. Therefore, the said criteria is not applicable.

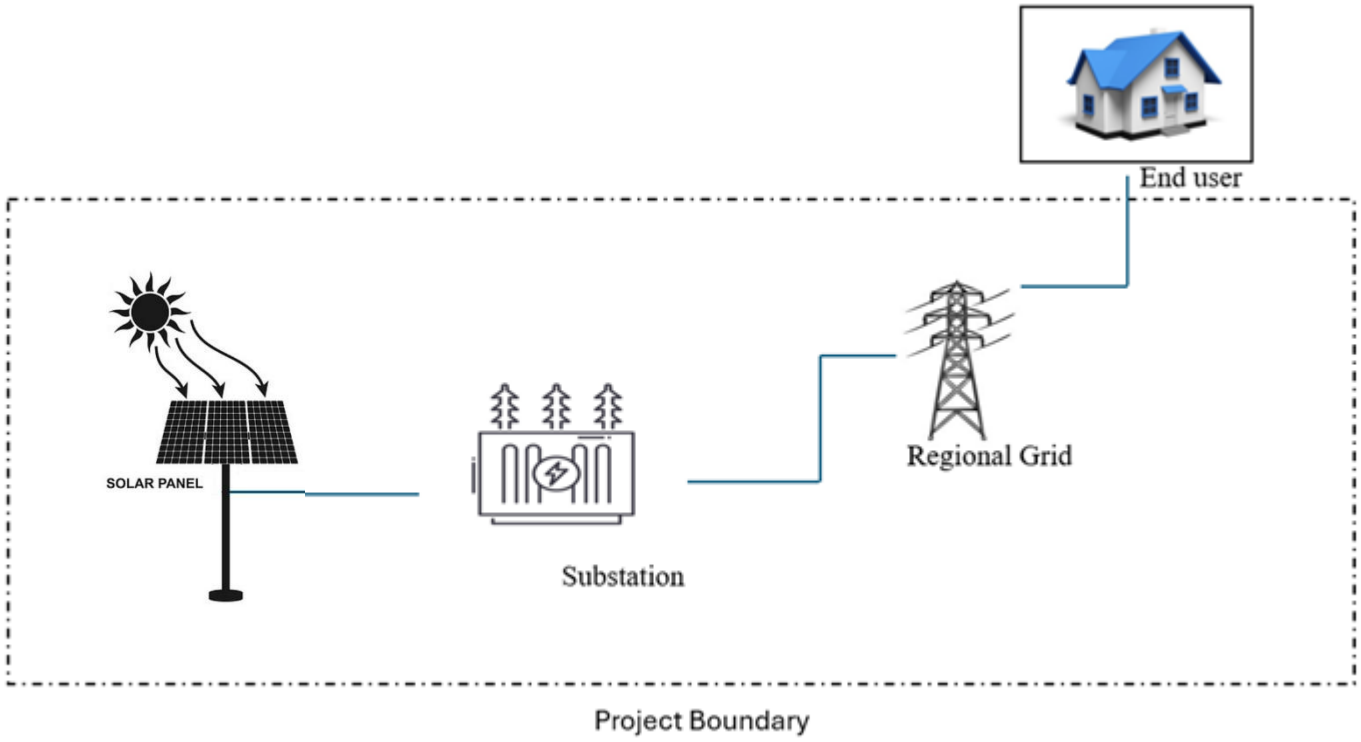
B.3. Applicability of double counting emission reductions >>

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)>>

As per applicable methodology, the spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the project power plant is connected to. 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 connected to the regional grid of Maharashtra.



Thus, the project boundary includes the Solar plant and the Indian grid system.

Source		Gas	Included?	Justification/Explanation
Baseline	Grid connected electricity generation	CO_2	Yes	Main Emission Source
		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 Solar Power Project Activity	CO_2	Yes	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

B.5. Establishment and description of 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, the baseline scenario is the following: "The baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid".

The project activity involves setting up a new solar power plant to harness the green power from solar energy and sell it to the grid by signing a PPA. 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[2]" 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 2013-2023 years and as a 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. Also, for vintage of 2024 in accordance with the UCR standard all UCR Indian RE projects shall use the new conservative grid emission factor of 0.757 tCO_2/MWh in their emission reduction calculations for the 2024 vintage year, the same has been complied with.

- Emission reductions are calculated as follows:

$$ER_y = BE_y - PE_y \qquad \textbf{(Eq. 1)}$$

Where,

ER_y = Emissions reductions in year y (t CO2)

BE_y = Baseline emissions in year y (t CO2)

PE_y = Project emissions in year y (t CO2)

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.

[2] https://a23e347601d72166dcd6-16da518ed3035d35cf0439f1cdf449c9.ssl.cf2.rackcdn.com//Documents/UCRCoUStandardAug2022updatedVer6_0908222220127104470.pdf

https://medium.com/@UniversalCarbonRegistry/ucr-cou-standard-update-2024-vintage-ucr-indian-grid-emission-factor-announced-ddb790cdc603

❖ The Baseline emissions in year y can be calculated as follows:

$BE\text{y} = EG_{\text{PJ,y}} \times EF\text{Grid,y},$ **(Eq. 2)**

Where,

$BE\text{y}$	= Baseline emissions in year y (t CO_2)
$EG_{\text{PJ,y}}$	= Quantity of net electricity generation that is produced and fedinto the grid as a result of the implementation of the CDM project activity in year y (MWh)
$EF\text{Grid,y}$	= Grid emission factor in year y (t CO_2/MWh)

Project Emissions

As per Paragraph 39, Version 18.0 only emission associated with fossil fuel combustion. Since the project activity is a solar power project, project emission for renewable energy plant is nil.

Thus,

PE_y = 0 (Eq. 3)

Leakage Emissions

No other leakage emissions are considered. The 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 which is accordingly to Paragraph 42, Version 18.0.

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, following calculation has been submitted:

Total Baseline emissions,

$BE_y = \sum_{i=1}^{3} 15{,}330\ \text{MWh/year} \times 0.9\ tCO_2/\text{MWh} + \sum_{i=4}^{10} 15{,}330\ \text{MWh/year} \times 0.757\ tCO_2/\text{MWh}$

= 122,619 tCO_2eq/year.

Estimated annual baseline emission reductions (BE_y) = 122,619 tCO_2e /10 years = 11,147 tCO_2e per year

Estimated Annual or Total baseline emission reductions (BE_y) = 11,147 CoUs /year (11,147 tCO_2eq/year)

Year	Net Power produced (MWh)	Baseline emissions (tCO_2/year)	Project emissions (tCO_2/year)	Emission reductions (tCO_2/year)
Year 1	15330	13797	0	13797
Year 2	15330	13797	0	13797
Year 3	15330	13797	0	13797
Year 4	15330	11604.81	0	11604
Year 5	15330	11604.81	0	11604
Year 6	15330	11604.81	0	11604
Year 7	15330	11604.81	0	11604
Year 8	15330	11604.81	0	11604
Year 9	15330	11604.81	0	11604
Year 10	15330	11604.81	0	11604
Total	**153,300**	**122,625**	**0**	**122,619**
Annual average emission reductions				**11,147**

B.6. Prior History>>

The project activity is a small-scale solar power project, and this project was never applied under any other GHG mechanism prior to this registration with UCR. Also, the capacity or the total project has not been applied for any other environmental crediting or certification mechanism. Hence 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 the crediting period is considered from 25/06/2021

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

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

B.9. Monitoring period number and duration>>

First Issuance Period : 25/06/2021 to 31/12/2024 (03 years 06 months 07 days)

B.10. 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 (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 - 2023 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. For vintage of 2024 in accordance with the UCR standard all UCR Indian RE projects shall use the new conservative grid emission factor of 0.757 tCO_2/MWh in their emission reduction calculations for the 2024 vintage year, the same has been complied with
Source of data	https://a23e347601d72166dcd6-16da518ed3035d35cf0439f1cdf449c9.ssl.cf2.rackcdn.com//Documents/UCRCoUStandardAug2022updatedVer6_090822220127104470.pdf https://medium.com/@UniversalCarbonRegistry/ucr-cou-standard-update-2024-vintage-ucr-indian-grid-emission-factor-announced-ddb790cdc603
Value applied till 2023	0.9
Value applied for 2023 onwards	0.757
Measurement methods and procedures	-
Monitoring frequency	Ex-ante fixed parameter
Purpose of Data	For the calculation of Emission Factor of the grid

Data and Parameters to be monitored.

Data / Parameter	$\mathbf{EG_{,pj,y}}$
Data unit	MWh
Description	Net electricity supplied to the India grid facility by the project activity.
Source of data	Joint Meter Reading Report/Energy generation report
Measurement procedures (if any):	Data Type: Measured Monitoring equipment: Energy Meters are used for monitoring Archiving Policy: Electronic Calibration frequency: Once in 5 years (considered as per provision of CEA India). The net electricity generated by the project activity will be calculated.
Measurement Frequency:	Monthly

QA/QC procedures applied:	Calibration of the main meters will be carried out once in five (5) years as per national standards (as per the provision of CEA, India) and faulty meters will be duly replaced immediately as per the provision of the power purchase agreement.
Purpose of data:	The Data/Parameter is required to calculate the baseline emission.
Value applied:	To be applied as per actual data
QA/QC procedures applied:	Calibration of the Main meters will be carried out once in five (5) years as per National Standards (as per the provision of CEA, India) and faulty meters will be duly replaced immediately as per the provision of power purchase agreement. Cross Checking: Quantity of net electricity supplied to the grid will be cross checked from the invoices raised by the project participant to the grid.
Purpose of data:	Calculation of baseline emission.