



MONITORING REPORT

CARBON OFFSET UNIT (CoU) PROJECT



Title : 250 kW Ground Mounted Solar Power Project By
M/s Tara Solar Power PV Plant

Version : 1.0

MR Date : 28/01/2023

First CoU Issuance Period : 01 Year 09 Months

First Monitoring Duration : 26/04/2021 to 31/12/2022



Monitoring Report (MR)

CARBON OFFSET UNIT (CoU) PROJECT

BASIC INFORMATION

Title of the project activity	250 kW Ground Mounted Solar Power Project By M/s Tara Solar Power PV Plant
UCR Project Registration Number	156
Version	1.0
Completion date of the MR	28/01/2023
Monitoring period number and duration of this monitoring period	Monitoring Period Number: 01 Duration of this monitoring Period: (first and last days included (26/04/2021 to 31/12/2022)
Project participants	Creduce Technologies Private Limited (Project Aggregator) M/s Tara Solar Power PV Plant (Project Owner)
Host Party	India
Applied methodologies and standardized baselines	Applied Baseline Methodology: AMS-I. D: “Grid connected renewable electricity generation”, version 18
Sectoral Scope	01 Energy industries (Renewable/Non-Renewable Sources)
Estimated amount of GHG emission reductions for this monitoring period	2021 : 194 CoUs (194 tCO _{2e}) 2022 : 287 CoUs (287 tCO _{2e})
Total:	481 CoUs (481 tCO _{2e})

SECTION - A - Description of project activity

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

The proposed project activity with title under UCR “250 kW Ground Mounted Solar Power Project By M/s Tara Solar Power PV Plant”, is a grid connected renewable power generation activity which incorporates installation and operation of solar photovoltaic power generation project at Shamshi village, Kullu district, in the state of Himachal Pradesh, in India. The purpose of this solar power project is to sell the electricity generated to Himachal Pradesh State Electricity Board Ltd. (HPSEBL). The promoter of the project activity is ‘M/s Tara Solar Power PV Plant’ (herein after called as project proponent or PP). PP has ownership of the project activity. The project has aggregated installed capacity of 0.25 MW (250 kW). This project has been commissioned on 26/04/2021. Here the date of electricity generation has been started is considered as commissioning date. The project is an operational activity with continuous reduction of GHG, currently being applied under “Universal Carbon Registry” (UCR).

A.1.1 Purpose of the project activity:

The project activity aims to harness the solar radiation of sun which is a renewable source, to generate electricity. The electricity generated is being transferred to the NEWNE grid as per PPA signed between HPSEBL (Himachal Pradesh State Electricity Board Limited) and PP. In pre-project scenario the state utility was importing the required electricity from the NEWNE grid to meet its requirement of electrical energy. Currently, NEWNE grid is connected to large numbers of fossil fuel-based power plants. Hence, project activity is displacing the gross electricity generation i.e., 536 MWh from the NEWNE grid, which otherwise would have been imported from the grid. The project activity doesn't involve any GHG emission sources.

The annual and the total CO_{2e} emission reduction by the project activity over the defined monitoring period is as per **Annexure I**.

A.1.2 Description of the installed technology and equipment:

The project activity involves ground-mounted photovoltaic (PV) plant having aggregated installed capacity of 250 kW. The project activity uses bifacial mono n-type solar photovoltaic technology to generate clean energy. Solar radiation is converted directly into electricity by solar cells (photovoltaic cells). In such cells, a small electric voltage is generated when light strikes the junction between a metal and a semiconductor (such as silicon) or the junction between two different semiconductors. 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 as PV Array.

A.1.3 Relevant dates for the project activity (e.g., construction, commissioning, continued operation periods, etc.)

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

UCR Project ID : 156
Start Date of Crediting Period : 26/04/2021
The project was commissioned on : 26/04/2021

A.1.4 Total GHG emission reductions achieved or net anthropogenic GHG removals by sinks achieved in this monitoring period

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

Summary of the Project Activity and ERs Generated for the Monitoring Period	
Start date of this Monitoring Period	26/04/2021
Carbon credits claimed up to	31/12/2022
Total ERs generated (tCO ₂ e)	481 tCO ₂ e
Leakage Emission	0
Project Emission	0

A.1.5 Baseline Scenario

As per the approved consolidated methodology AMS-I.D. Version 18, if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following: **“The baseline scenario is that the electricity delivered to the grid by the project activity would have otherwise, been generated by the operation of grid-connected power plants and by the addition of new generation sources into the grid”.**

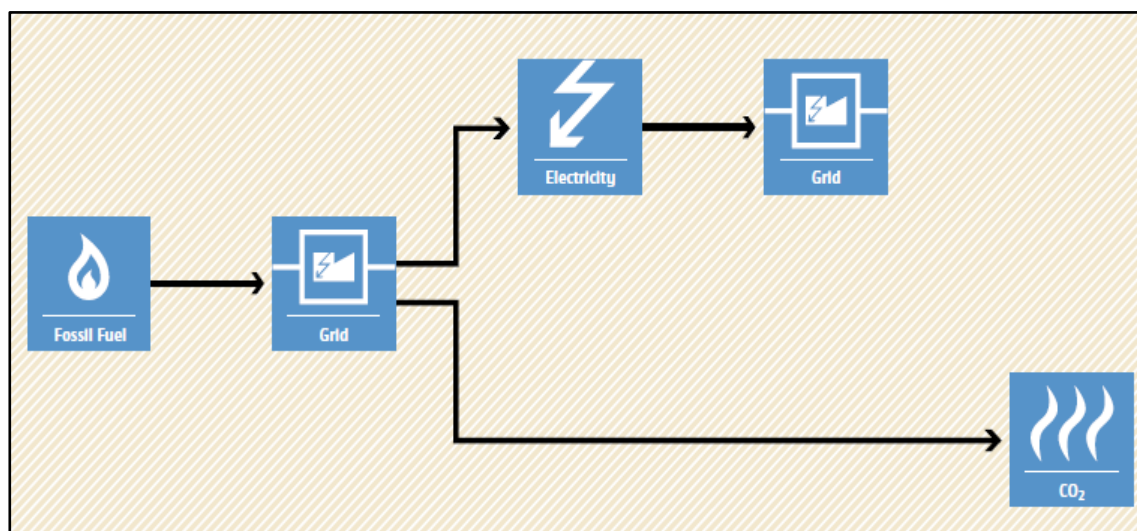


Figure 1 Baseline Scenario

A.2 Location of Project Activity

The project site is in village Shamshi of Kullu district, Himachal Pradesh. The nearest railway station

is Jogindernagar Railway Station at a distance of about 95 kms from the project site. The nearest airport is Bhuntar Airport at a distance of 1.5 kms from the project site. The project site is well connected from airport and railway station. The geographic co-ordinates of the project location have been given below.

Latitude :31°53'11"N

Longitude :77°08'41"E

The representative location map is included below:

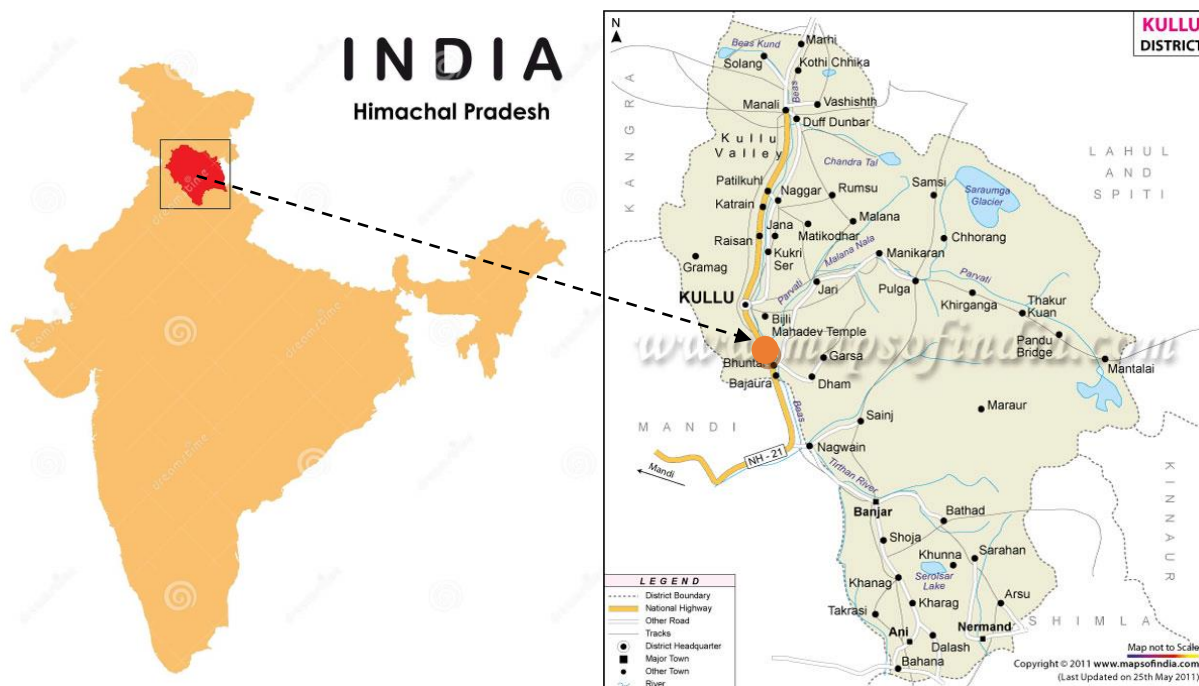


Figure-1- Location of the project activity (courtesy: google images and www.mapofindia.com)

A.3 Parties and project participants

Party (Host)	Participants
India	Creduce Technologies Private Limited (Aggregator) Contact person : Shailendra Singh Rao Mobile : +91 9016850742, 9601378723 Address : 2-O-13,14 Housing Board Colony, Banswara, Rajasthan -327001, India M/s Tara Solar Power PV Plant in Gujarat, India (Project Owner) Address: V.P.O - Shamshi, Tehsil – Bhunter, Dist – Kullu, Himachal Pradesh, Pin Code-175126, India.

A.4 Methodologies and standardized baselines

Sectoral Scope : 01 Energy industries (Renewable/Non-Renewable Sources)

Type : Renewable energy projects

Category : AMS-I. D: “Grid connected renewable electricity generation”, Version 18

A.5 Crediting period of project activity

Start date of the crediting period: 26/04/2021

Crediting period corresponding to this monitoring period: 26/04/2021 to 31/12/2022 (Both dates are inclusive)

A.6 Contact information of responsible persons/entities

Contact person : Shailendra Singh Rao

Mobile : +91 9016850742, 9601378723

Address : 2-O-13,14 Housing Board Colony,
Banswara, Rajasthan -327001, India

SECTION - B - Implementation of project activity

B.1 Description of implemented registered project activity

B.1.1 Provide information on the implementation status of the project activity during this monitoring period in accordance with UCR PCN

The project consists of ground mounted photo voltaic solar plant with aggregated installed capacity of 250 kW. The plant was commissioned on 26/04/2021 by the respective authority of Government of Himachal Pradesh. The project generates clean energy by utilizing the Solar Radiations.

B.1.2 For the description of the installed technology, technical process, and equipment, include diagrams, where appropriate

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 as PV Array. The project activity has used the reliable and proven technology from supplier to ensure that an environmentally safe and sound technology is only being implemented in the proposed project activity leading to the GHG reduction.

Technical details for the solar power project installed at Shamshi with a capacity of 250 kW are as follows:

Parameter	Description
Total number of Photovoltaic Modules	657
Rating of Photovoltaic Module	380 Wp
Module make	Canadian
Technology	Bifacial mono n-type
No. of Inverter/Capacity	5 (60 kWp*4 + 10 kWp*1)
Module mounting structure	Fixed tilt angle
Cable	Copper/Aluminium

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

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)', final document on revised classification of Industrial Sectors under Red, Orange, Green and White Categories (07/03/2016), 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 regulation, environmental and social impact assessment is not required for Solar Projects.

The Government of India has stipulated the following indicators for sustainable development in the interim approval guidelines for such projects which are contributing to GHG mitigations. The Ministry of Environment, Forests & Climate Change, has stipulated economic, social, environmental, and technological well-being as the four indicators of sustainable development. It has been envisaged that

the project shall contribute to sustainable development using the following ways:

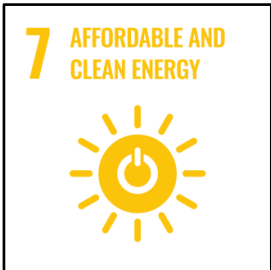
Social well-being: The project would help in generating direct and indirect employment benefits accruing out of ancillary units for installing and maintenance during operation of the project activity. It will lead to the development of infrastructure around the project area in terms of improved road network etc. and will also directly contribute to the development of renewable infrastructure in the region.

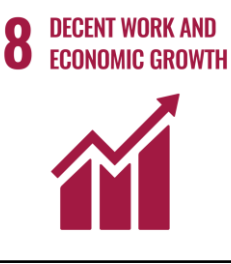
Environmental well-being: The project utilizes Solar energy for generating electricity which is a clean source of energy. The project activity will not generate any air pollution, wind pollution or solid waste to the environment which otherwise would have been generated through fossil fuels. Also, it will contribute to the reduction of GHG emissions. Thus, the project causes no negative impact on the surrounding environment contributing to environmental well-being.

Economic well-being: Being a renewable resource, using Solar energy to generate electricity contributes to the conservation of precious natural resources. The project contributes to economic sustainability through the promotion of decentralization of economic power, leading to the diversification of the national energy supply, which is dominated by conventional fuel-based generating units. Locally, improvement in infrastructure will provide new opportunities for industries and economic activities to be set up in the area. Apart from getting better employment opportunities, the local people will get better prices for their land, thereby resulting in overall economic development.

Technological well-being: The project activity leads to the promotion of 250 kW PV power generation project into the region and will promote practice for small scale industries to reduce the dependence on carbon intensive grid supply to meet the captive consumption requirement of electrical energy and also increasing energy availability and improving quality of power under the service area. Hence, the project leads to technological well-being.

The project activity contributes to the following SDGs;

SDG	Description
Goal 7 	➤ The project activity will generate 536 MWh of clean energy, which with increased shared 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	➤ Decent work and economic growth. ➤ This project activity generates additional employment for skilled and unskilled, also the project situated in a remote area will provide

	employment opportunities to unskilled people from villages. Training on various aspects including safety, operational issues, and developing skill sets will also be provided to employees.
Goal 13 	➤ This 250kW solar power project meets the SDG 13 goal by saving fossil fuel and producing clean energy. ➤ This project has avoided 481 tons of CO₂ emissions during this monitoring period. ➤ SDG 13 on clean energy is closely related and complementary. ➤ 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.

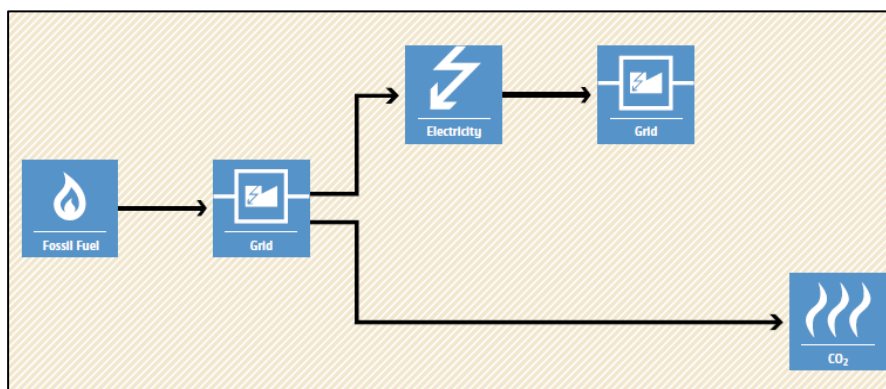
B.3 Baseline Emissions

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

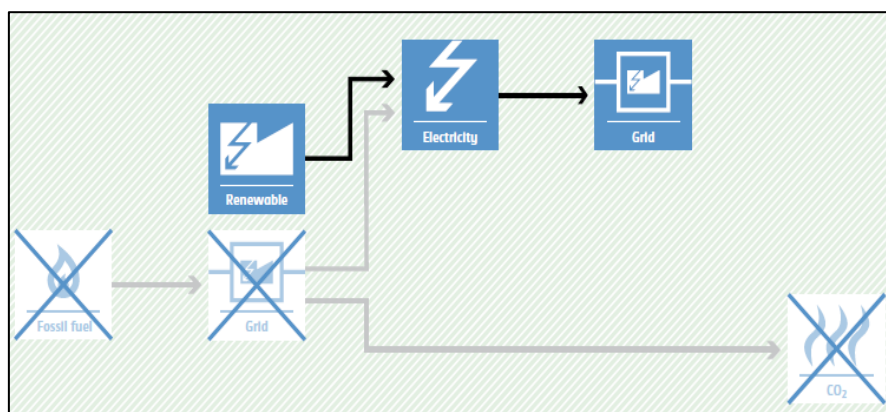
In the absence of the project activity, the equivalent amount of electricity would have been imported from the grid (which is connected to the unified Indian Grid system (NEWNE Grid)), which is carbon intensive due to being predominantly sourced from fossil fuel-based power plants. Hence, the baseline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



Thus, this project activity was a voluntary investment that replaced an equivalent amount of electricity from the Indian grid. The project proponent was not bound to incur this investment as it was not mandatory by national and sectoral policies. Thus, the continued operation of the project activity would continue to replace fossil fuel-based power plants and fight against the impacts of climate change. The Project Proponent hopes that revenues from the carbon credits generated will help repay the loans and help in the continued maintenance of this project activity.

B.4. De-bundling

This project activity is not a bundled component of a larger project activity.

SECTION - C - Application of methodologies and standardized baselines

C.1 References to methodologies and standardized baselines

Sectoral scope	:	01, Energy industries (Renewable/Non-renewable sources)
Type	:	I-Renewable energy projects
Category	:	AMS. I.D. (Title: “Grid connected renewable electricity generation”, version 18)

C.2 Applicability of methodologies and standardized baselines

The project activity involves the generation of grid-connected electricity from the construction and operation of a solar power-based project electricity selling through PPA is signed between M/s Tara Solar Power PV Project and HPSEBL

The project activity has an installed capacity of 250 kW which will qualify for a small-scale project activity under Type-I of the small-scale methodology. The project status is corresponding to the methodology AMS-I.D., version 18, and the applicability of the methodology is discussed below:

Applicability Criterion	Project Case
1. This methodology comprises renewable energy generation units, such as photovoltaic, hydro, tidal/wave, wind, geothermal and renewable biomass: (a) Supplying electricity to a national or a regional grid; or (b) Supplying electricity to an identified consumer facility via national/regional grid through a contractual arrangement such as wheeling.	The project activity is a Renewable Energy Project i.e., a solar power project which falls under applicability criteria option 1 (a). Hence the project activity meets the given applicability criterion.
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 the existing reservoir, with no change in the volume of the reservoir; or b) The project activity is implemented in the existing reservoir, where the volume of the reservoir(s) is increased and the power density as per definitions given in the project emissions section, is greater than 4 W/m². c) The project activity results in new reservoirs and the power density of the power plant, as per definitions given in the project emissions section, is greater than 4 W/m²	The project activity involves installation of Solar PV (SPV). 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 250 kW solar power project, i.e., only component is renewable power project below 15 MW, thus the criterion is not applicable 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 distinct from the existing units.	The proposed project is a greenfield 250 kW solar power project, i.e., the only component is a renewable power project below 15 MW, thus the criterion is not applicable to this project activity.
7. In the case of retrofit, rehabilitation or replacement, to qualify as a small-scale project, the total output of the retrofitted, rehabilitated or replacement power plant/unit shall not exceed the limit of 15 MW.	This is a green field project and no expansion and retrofitting were carried out. Hence this criterion is not applicable.
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	The proposed project is a greenfield 250 kW Solar power project; hence, this criterion is not applicable to this project activity.

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.	
9. In case biomass is sourced from dedicate plantations, the applicability criteria in the tool “Project emissions from cultivation of biomass” shall apply.	No biomass is involved, the project is only a solar power project and thus the criterion is not applicable to this project activity.

C.3 Applicability of double counting emission reductions

The project was not applied under any other GHG mechanism. Hence the project will not cause double accounting of carbon credits (i.e., CoUs).

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

As per applicable methodology AMS-I.D. Version 18.0, “The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system.”

Thus, the project boundary includes the solar photovoltaic 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 ₂ O	No	Minor emission source
		Other	No	No other GHG emissions were emitted from the project
Project	Greenfield Electric Power project Activity	CO ₂	No	No CO ₂ emissions are emitted from the project
		CH ₄	No	Project activity does not emit CH ₄
		N ₂ O	No	Project activity does not emit N ₂ O
		Other	No	No other emissions are emitted from the project

C.5 Establishment and description of the baseline scenario

As per the approved consolidated methodology AMS-I.D. Version 18, if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:

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

The project activity involves setting up of a new solar power plant to harness the solar energy and transfer it to the Indian grid through PPA. In the absence of the project activity, the equivalent amount of power would have been generated by the operation of grid-connected fossil fuel-based power plants and by the addition of new fossil fuel-based generation sources into the grid. The power produced from 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 CO₂ emission factor (tCO₂/MWh) that 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 2013 - 2020 years as a fairly conservative estimate for Indian projects not previously verified under any GHG program. Also, for the vintage 2021-2022, the combined margin emission factor calculated from the CEA database in India results in higher emissions than the default value. Hence, the same emission factor has been considered to calculate the emission reduction under a conservative approach.

C.5.1 Net GHG Emission Reductions and Removals

Thus, $ER_y = BE_y - PE_y - LE_y$

Where:

ER_y = Emission reductions in year y (tCO₂/y)

BE_y = Baseline Emissions in year y (t CO₂/y)

PE_y = Project emissions in year y (tCO₂/y)

LE_y = Leakage emissions in year y (tCO₂/y)

- **Baseline Emissions**

Baseline emissions include only CO₂ emissions from electricity generation in power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid-connected power plants. The baseline emissions are to be calculated as follows:

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

BE_y = Baseline emissions in year y (t CO₂)

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

$EF_{grid,y}$ = UCR recommended emission factor of 0.9 tCO₂/MWh has been considered.
(Reference: General Project Eligibility Criteria and Guidance, UCR Standard, page 4)

Hence

Baseline Emissions Calculation				
Sr.No	Year	EGpy (MWh)	EF _{grid,y}	BE _y
1	2021	216.65	0.9	194
2	2022	319.32	0.9	287
3	BE (tCO ₂ e) for the period of 2021 to 2022			481

Estimated annual baseline emission reductions (BE_y)

= 536 MWh/year *0.9 tCO₂/MWh

= 481 tCO₂/year

- **Project Emissions**

As per Paragraph 39 of AMS-I.D. version-18, only emissions associated with fossil fuel combustion, emissions from the operation of geothermal power plants due to the release of non-condensable gases, emissions from a water reservoir of hydro should be accounted for the project emission. Since the project activity is a Solar electric power project, project emission for renewable energy plants is nil.

Thus, PE = 0

- **Leakage Emission**

As per paragraph 42 of AMS-I.D. version-18, 'If the energy generating equipment is transferred from another activity, leakage is to be considered.' In the project activity, there is no transfer of energy-generating equipment and therefore the leakage from the project activity is considered zero.

Hence, LE = 0

The actual emission reduction achieved during the first CoU period is calculated below:

Hence Net GHG emission reduction, = 481-0-0 = 481 tCO₂/year (i.e., 481 CoUs/year)

C.6 Prior History

The project was not applied under any other GHG mechanism. Hence the project will not cause double accounting of carbon credits (i.e., CoUs).

C.7 Changes to the start date of crediting

The crediting period under UCR has been considered from the date of the generation of electricity. There is no change in the start date of crediting period.

C.8 Permanent changes from MR monitoring plan, applied methodology, or applied standardized baseline

Not applicable.

C.9 Monitoring period number and duration

Total Monitoring Period: 01 Year 09 Months

Date: 26/04/2021 to 31/12/2022 (inclusive of both dates).

C.10 Monitoring Plan

The project activity essentially involves generation of electricity from solar radiations, the employed SPV can only convert solar energy into electrical energy and does not use any other input fuel for electricity generation, thus no special ways and means are required to monitor leakage from the project activity. The recording of the electricity fed to the state utility grid is carried out jointly at the incoming feeder of the state power utility.

Data and Parameters available:

Data / Parameter	UCR recommended emission factor
Data unit	tCO ₂ /MWh
Description	A "grid emission factor" refers to a CO ₂ emission factor (tCO ₂ /MWh) which will be associated with 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. Hence, the same emission factor has been considered to calculate the emission reduction under conservative approach.
Source of data	https://a23e347601d72166dcd6-16da518ed3035d35cf0439f1cdf449c9.ssl.cf2.rackcdn.com//Documents/UCRCoUStandardAug2022updatedVer6_090822220127104470.pdf
Value applied	0.9
Measurement methods and procedures	-
Monitoring frequency	Fixed parameter
Purpose of Data	For the calculation of Emission Factor of the grid
Additional Comment	The combined margin emission factor as per CEA database (current version 16, Year 2021) results into higher emission factor. Hence for 2021 vintage UCR default emission factor remains conservative.

Data and Parameters to be monitored (ex-post monitoring values):

Data / Parameter	$EG_{PJ, facility, y}$
Data unit	MWh
Description	Net electricity supplied to the NEWNE grid facility by the project activity during 26/04/2021 to 31/12/2022.
Source of data	Joint metering reading report of monthly generation HPSEBL
Measurement procedures (if any):	Data Type: Measured Monitoring equipment: Energy Meters are used for monitoring Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually Archiving Policy: Paper & Electronic Calibration frequency: 5 years (as per CEA provision) The electricity generation by the solar power plant is recorded at the sub-station. At the end of every month, JMR is generated.
Measurement Frequency:	Monthly
Value applied:	536 (Ex-post estimate)
QA/QC procedures applied:	Continuous monitoring, hourly measurement monthly recording. Tri-vector (TVM)/ABT energy meters with accuracy class 0.2s
Purpose of data:	The Data/Parameter is required to calculate the baseline emission.
Any comment:	Data will be archived electronically for a period of 36 months beyond the end of crediting period.

ANNEXURE I (Emission Reduction Calculation)

250 kW Ground Mounted Solar Power Project By M/s Tara Solar Power PV Plant												
Month - Wise Aggregated Energy Delivered to Grid (in KWh)												
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2021	0	0	0	6892	25703	34515	25840	30780	24750	25420	25525	17225
2022	16895	24165	29540	29795	27685	26225	26980	29800	26170	32695	25980	23390
Year-Wise Emission reduction calculation for the project activity												
Year	Total No. of Electricity delivered in kWh				Recommended emission factor tCO2/MWh				Total CoUs generated			
2021	2,16,650				0.9				194			
2022	3,19,320				0.9				287			
Total CoUs to be issued for the first monitoring period (Year: 2021 to 2022)												481