Gold Standard
for the Global Goals

TEMPLATE

MONITORING REPORT

PUBLICATION DATE **14.10.2020**

VERSION **v. 1.1**

RELATED SUPPORT **- TEMPLATE GUIDE Monitoring Report v. 1.1**

This document contains the following Sections

KEY PROJECT INFORMATION

Key Project Information

GS ID (s) of Project (s)	GS7080
Title of the project (s) covered by monitoring report	72 MW_{ac} Ramnad Solar Power Project
Version number of the PDD/VPA-DD (s) applicable to this monitoring report	05
Version number of the monitoring report	06
Completion date of the monitoring report	07/10/2025
Date of project design certification	26/10/2020
Date of Last Annual Report	30/12/2024
Monitoring period number	02
Duration of this monitoring period	01/01/2021 to 25/10/2023 (Both dates included)
Project Representative	Ramnad Solar Power Limited
Host Country	India
Activity Requirements applied	☐ Community Services Activities ☒ Renewable Energy Activities ☐ Land Use and Forestry Activities/Risks & Capacities ☐ N/A
Methodology (ies) applied and version number	ACM0002: Grid-connected electricity generation from renewable sources - Version 20.0
Product Requirements applied	☒ GHG Emissions Reduction & Sequestration ☐ Renewable Energy Label ☐ N/A

Table 1 - Sustainable Development Contributions Achieved

Sustainable Development Goals Targeted	SDG Impact	Amount Achieved	Units/ Products

SDG 7: Affordable and Clean Energy	MWh of renewable energy generated	341,429.97 MWh	MWh
SDG 8: Decent Work and Economic Growth	Trainings Employees Income (INR)	13 Trainings 13 employees INR 11,233,474	Training Employee INR
SDG 13: Climate Action	Emission Reduction	321, 592 tCO_2e	VERs

Table 2 – Product Vintages

		Amount Achieved		
Start Dates	**End Dates**	**SDG 7: Affordable and Clean Energy** **MWh**	**SDG 8: Decent Work and Economic Growth**	**SDG 13: Climate Action** **VERs**
01/01/2021	31/12/2021	120,385.60 MWh	5 Trainings 13 Employees INR 3,945,312	113,391 GSVERs
01/01/2022	31/12/2022	114,553.80 MWh	6 Trainings 13 Employees INR 3,964,752	107,898 GSVERs
01/01/2023	25/10/2023	106,490.57 MWh	2 Trainings 13 Employees INR 3,323,410	100,303 GSVERs

SECTION A. DESCRIPTION OF PROJECT

A.1. General description of project

The main purpose of this project activity is to generate clean form of electricity through renewable solar energy source for sale of electricity to the grid. Ramnad Solar Power Limited (RSPL) is the promoter of the proposed project activity.

The project activity involves installation of 72 MW_{AC} (corresponding to 86.40 MWp) solar power project. The project is installed in the same project boundary at Village: O. Karisalkulam, Tehsil: Kamuthi, District: Ramanthpuram State: Tamil Nadu.

The electricity generated from project activity will be sold under the Power Purchase Agreement (PPA), signed with Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO) wholly owned by the Government of Tamil Nadu. The electricity generated from the project activity will be evacuated through 110 kV sub-station located at Kamuthi for consumption in the Indian Electricity Grid.

The project has replaced anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 321,592 tCO2e, thereon displacing 341,429.97 MWh amount of electricity from the generation-mix of power plants connected to the Indian electricity grid, which is mainly dominated by thermal/fossil fuel-based power plant.

The project activity is the installation of a new grid-connected renewable power plant/unit and this is not a CPA that has been excluded from a registered GS POA as a result of erroneous inclusion of CPAs. The land for this project activity was private land which has been purchased by the project developer.

Details and chronology of the project:

Capacity in MW (AC)	72
State	Tamil Nadu
Grid	TANGEDCO
Crediting Period	26/10/2018 to 25/10/2023 (both dates included)
Monitoring period 1	26/10/2018 to 31/12/2020 (both dates included)
Monitoring period 2 (current monitoring period)	01/01/2021 to 25/10/2023 (both dates included)
Types of Solar PV Modules	Poly-crystalline
Purchase order date (project start date)	13/06/2015
PPA	04/07/2015

Commissioning date	08/02/2016

Project Boundary

The project activity includes 72 MW installed capacity and is greenfield large solar power plants. The Project is located in village O. Karisalkulam of Ramanthpuram districts in Tamil Nadu state of India and having three meters, one main meter and one check meter and one standby.

Project boundary has ascertained using ACM0002, version 20.0. 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 solar project activity, substation, grid and all power plants connected to the grid. The project activity evacuates power to the Indian grid.

Scenario existing prior to the implementation of the project activity:

As the project activity is the installation of a new grid-connected renewable power plant/unit. The scenario existing prior to the implementation of project activity 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, as reflected in the combined margin (CM) calculations described in the "Tool 7: Tool to calculate the emission factor for an electricity system" (Version 7.0)[1].

Baseline Scenario

Baseline scenario and Scenario existing prior to the implementation of the project activity are both same.

Sustainable Development

The National CDM Authority (NCDMA), which is the Designated National Authority (DNA) for the Government of India (GOI) under the Ministry of Environment, Forest and Climate Change (MoEF&CC), has mentioned four indicators for the sustainable

[1] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v7.0.pdf

development in the interim approval guidelines for Clean Development Mechanism (CDM) projects from India. The Project was initially registered under CDM with ID 10582: 72 MWac Ramnad Solar Power Project[2], however, no carbon credits were claimed under the CDM. The Project was later registered under GS for the crediting period of 26/10/2018 to 25/10/2023, out of which the first monitoring report period was 26/10/2018 to 31/12/2020. The Project Developer wants to clarify that the project is not registered under any other GHG/non-GHG mechanism and the PD has also provided the declaration for no double-counting for the same.

The project's contribution towards sustainable development has been addressed based on the following sustainable development aspects, in line with the requirements of the NCDMA:

1. Social well being

The project activity provides job opportunity to local people during construction, commissioning and maintenance of the solar project. Frequency of visiting to villages and nearby areas by skilled, technical and industrialist has increased due to installation /site visit/operation and maintenance work related to solar plant. This directly and indirectly positively effects the economy of villages and nearby area.

2. Environmental well being

Solar power is one of the cleanest renewable energy powers and does not involve any fossil fuel. There are no GHG emissions. The impact on land, water, air and soil is negligible. Thus, the project activity contributes to environmental well-being without causing any negative impact on the surrounding environment.

3. Economic well being

The project activity generates permanent and temporary employment opportunity within the vicinity of the project. The electricity supply in the nearby area improves which directly and indirectly improves the economy and life style of the area.

4. Technological well being

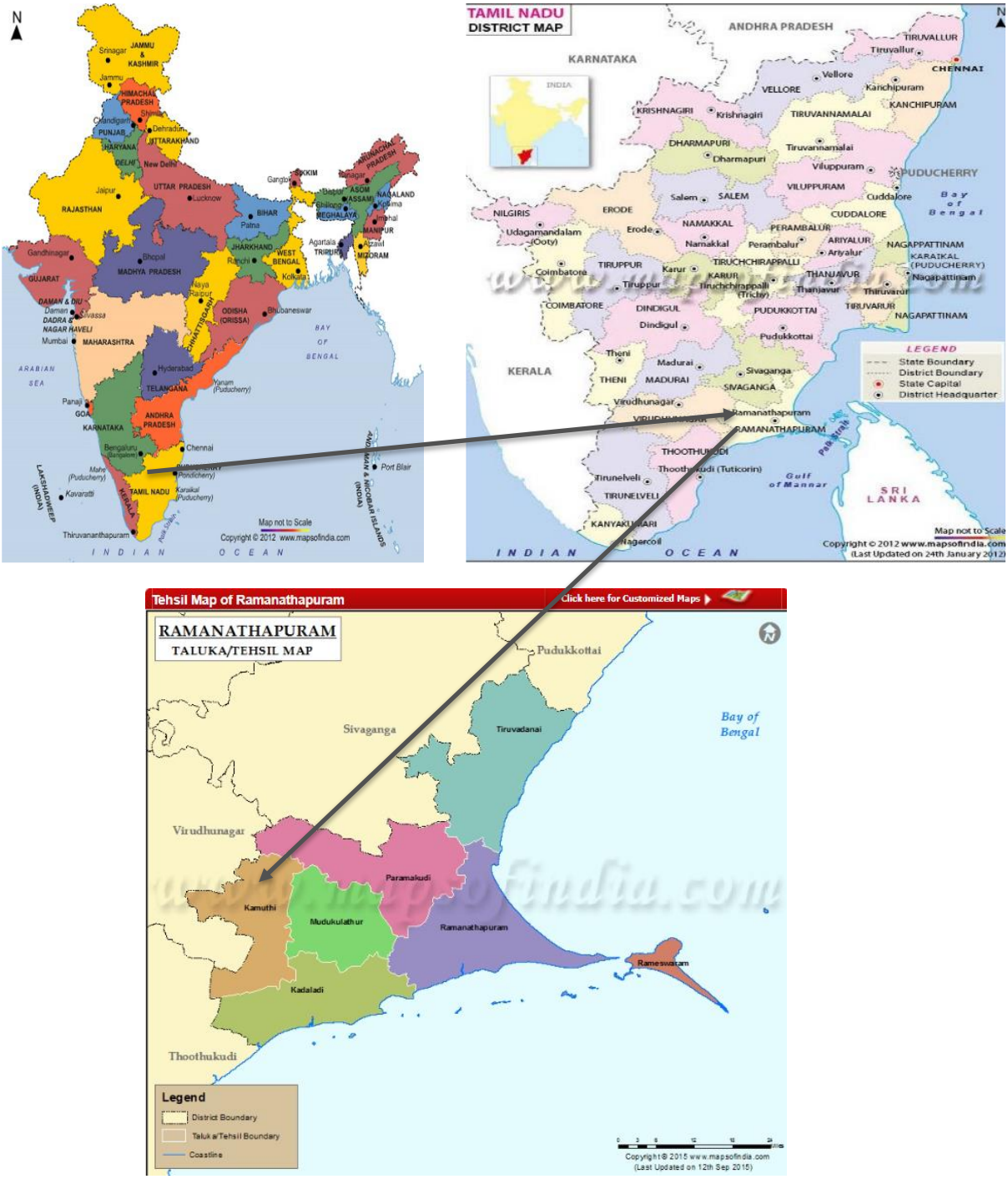
[2] CDM: 72 MWac Ramnad Solar Power Project

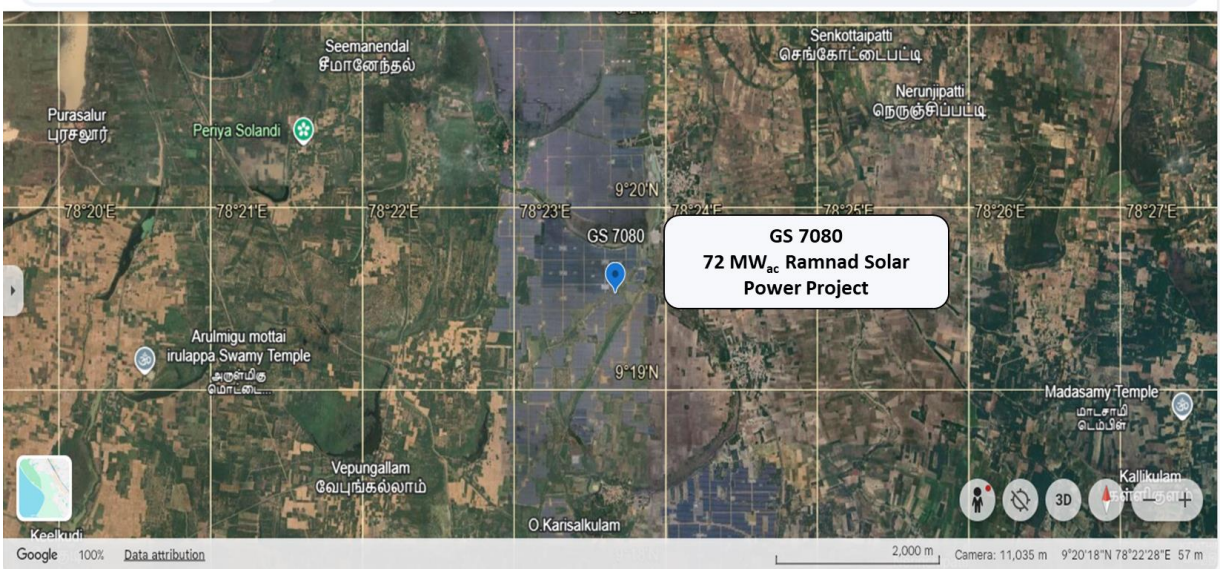
The project activity is step forward in harnessing the untapped solar potential and further diffusion of the solar technology in the region. The project activity leads to the promotion and demonstrates the success of solar projects in the region which further motivate more investors to invest in solar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

A.2. Location of project

Host Party: India
State: Tamil Nadu
District: Ramanthpuram
Tehsil: Kamuthi
Village: O. Karisalkulam
Physical/Geographical location:

Project Developer	Latitude	Longitude	Commissioning date
Ramnad Solar Power Limited (RSPL)	9°19'26.90"N	78°23'40.62"E	08/02/2016


TAMIL NADU
DISTRICT MAP
Tehsil Map of Ramanathapuram
Click here for Customized Maps
RAMANATHAPURAM
TALUKA/TEHSIL MAP
Pudukkottai
Sivaganga
Tiruvadanai
Bay of Bengal
Virudhunagar
Paramakudi
Kamuthi
Mudukulathur
Ramanathapuram
Rameswaram
Kadaladi
Thoothukudi
Legend
District Boundary
Taluk/Tehsil Boundary
Coastline



72 MW_{ac} Ramnad Solar Power Project

A.3. Reference of applied methodology

Title: Grid-connected electricity generation from renewable sources.

References: Approved Large Scale Consolidated Methodology: ACM0002 "Grid-connected electricity generation from renewable sources" (Version 20.0, EB 105 Annex 3) ACM0002 draws upon the following tools which have been used in the PDD:

Tool:

- Tool 1 - Tool for the demonstration and assessment of additionality - Version 07.0.0, EB 70 Annex 8
- Tool 7 - Tool to calculate the emission factor for an electricity system - Version 07.0

A.4. Crediting period of project

Type	Renewable
GS crediting period	26/10/2018 to 25/10/2023
Length of Crediting Period	5 years Which will be renewed twice totaling to 15 years (5+5+5)
Current Monitoring Period	01/01/2021 to 25/10/2023 (Both dates included)

This is to declare that "the project developer will not issue both a CER and a Gold Standard VER for the same vintage from a project that is registered with Gold Standard."

SECTION B. IMPLEMENTATION OF PROJECT

B.1. Description of implemented project

The project activity aims to harness solar energy through installation of PV with total installed capacity of 72 MWac (corresponding to 86.4MWp). The solar PV power plant has solar PV modules, inverters, transformers and other protection system and supporting components. The first Purchase Order is considered as the start date for the Project i.e. 13/06/2015 and the Project is commissioned on 08/02/2016.

Technical Specifications

Solar PV modules:

Module Supplier	Module Model	Capacity (p)	Number	Total Capacity (MWp)
Hanwha	Poly C-Si	310	104740	32.4694
Hanwha	Poly C-Si	315	33120	10.4328
Trina	Poly C-Si	310	56800	17.608
Trina	Poly C-Si	315	23180	7.3017
SunTech	Poly C-Si	310	30080	9.3248
SunTech	Poly C-Si	315	28160	8.8704

Inverters:

S.No.	Make		
1	Manufacturer	ABB	Hitachi
2	Model	PVS800	NPi201
3	Rated Capacity	1000 KW	1250 KW
4	No. of Inverters	12	48
5	Rated Input Voltage (Max. Input Voltage)	380 V	350 V

Transformer:

S.No.	Make			
1	Manufacturer	ABB	Schneider	Schneider
2	Capacity	40/45 MVA	4 MVA	5 MVA
3	No. of Transformers	2	3	12
4	Voltage Ratio	33/110 KV	0.380/33 KV	0.350/33 KV

Metering Equipment Details

S.No.	Make	Solar Plant End
1	Manufacturer	Secure Make
2	Type	ABT meters
3	Accuracy Level	0.2s
4	Total no of meter	3

Meter Details-

Meter & Calibration Details:			
Details	Main Meter	Check Meter	Stand-by Meter
Meter Number	TNW01979	TNW01987	TNE81539
Make	Secure	Secure	Secure
Accuracy	0.2s	0.2s	0.2s
Last Calibration	20/07/2018	27/08/2018	27/08/2018
Due date	19/07/2023	26/08/2023	26/08/2023
Recent calibration	28/12/2022	28/12/2022	28/12/2022
Calibration frequency	Once in 5 years as per CEA guidelines		

Breakdown details for current monitoring period are provided in Appendix 1:

B.1.1 Forward Action Requests

Following FAR was raised during last performance review-

1) Project Design Certification stage or have successfully transitioned to Gold Standard for the Global Goals. An annual report shall be submitted for each monitoring year by end of next calendar year for which verification is not completed. If a verification is in progress but not completed, then an annual report is still required by the end of calendar year

Response- Annual report is submitted for 2022, 2023 & 2024 i.e. for each monitoring year by end of next calendar year for which verification is not completed and same are publicly available on-
https://assurance-platform.goldstandard.org/project-documents/GS7080

B.2. Post-Design Certification changes

Not Applicable

B.2.1. Temporary deviations from the approved Monitoring & Reporting Plan, methodology or standardized baseline

Not Applicable

B.2.2. Corrections

1) In the registered PDD, 6 meters were mentioned, however the Project comprises of 3 meters (main, check and standby) which are used for billing purpose. Hence the number of meters are corrected in the monitoring report.

2) In the registered PDD, for the safeguarding reporting section it was provided that no safeguarding principles were added to the monitoring plan in the registered PDD. But during current monitoring period Principle 9.4 and 9.5: Hazardous and non-hazardous waste) is included in the monitoring plan. Also, there are no any impact (positive/negative/slightly) for any mitigation measures, being applicable to the safeguarding principles. The damaged solar modules, scrap equipment and other waste is disposed to the waste handlers and the firm complies with all the local laws for monitoring and disposal.

B.2.3. Changes to start date of crediting period

Not Applicable

B.2.4. Permanent changes from the Design Certified monitoring plan, applied methodology or applied standardized baseline

Not Applicable

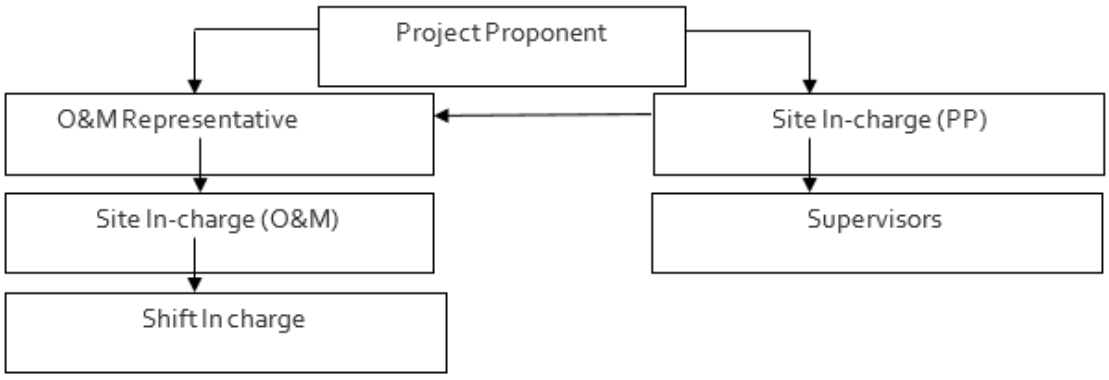
B.2.5. Changes to project design of approved project

Not Applicable

SECTION C. DESCRIPTION OF MONITORING SYSTEM APPLIED BY THE PROJECT

The monitoring plan is developed in accordance with the modalities and procedures for project activities and for grid-connected solar power project/ unit being in Tamil Nadu, India. The monitoring plan, implemented by the project participant describes about the monitoring organisation, parameters to be monitored, monitoring practices, quality assurance, quality control procedures, data storage and archiving. There were no major breakdowns occurred in the current monitoring period. Although, no such events have

happened during the reported monitoring period, which can alter the applicability of the applied methodology. The details for the breakdown is provided in Appendix 1.



Responsibilities of Site In charge (PD):

Overall functioning and maintenance of the project activity, the Site In charge shall coordinate with the O&M operator as well as the site supervisors. The site in-charge is responsible for collecting metering data to maintain electricity generation records, managing employee salaries, and maintaining related records for SDG 8. Additionally, he/she is accountable for addressing any grievances raised by stakeholders or employees and for assigning appropriate personnel to resolve them.

Responsibilities of O&M Representative:

Co-ordination between Site in charge of the O&M operator as well as the project participant and further report to PD head office.

Responsibilities of Site In-charge (O&M Operator):

Responsibility for maintaining the data records, ensures completeness of data, and reliability of data (calibration of equipment) as well as data recording for all the parameters.

Responsibilities of Shift In-charge:

Responsibility for day-to-day data collection and maintains day to day monitored data.

QA/QC procedures:

The energy meters at the feeders are maintained and owned by Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO). Neither the project developer nor the site personnel have any control over it. The records are cross-checked with the records of sold electricity TANGEDCO. The meters are calibrated by TANGEDCO at-least once in five years.

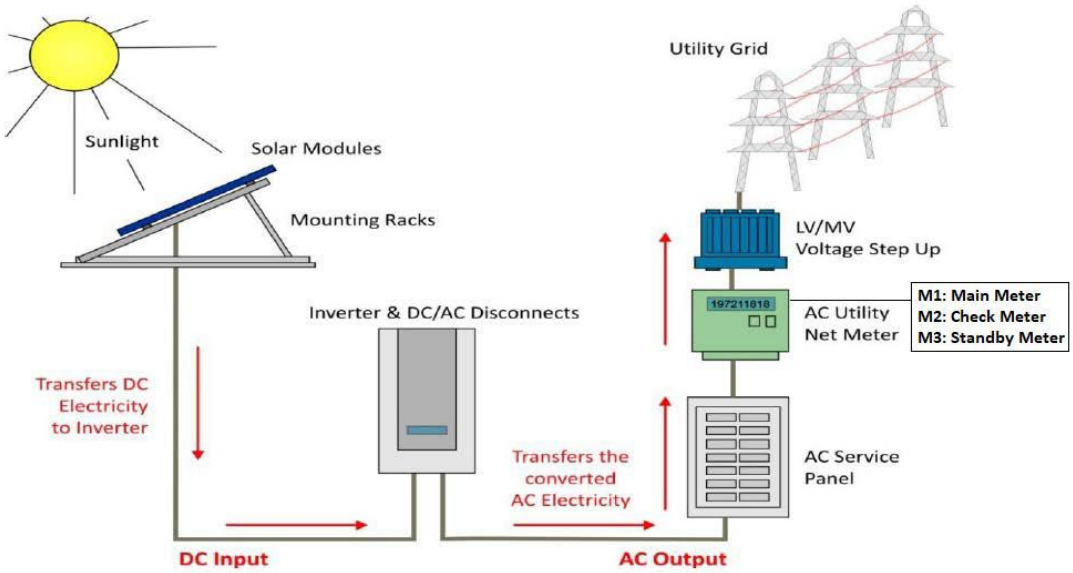
Data Measurement

The 72 MW, 110 kV solar power plant operates through a structured flow of electricity starting from solar power generation to grid transmission. Electricity is first generated in the form of direct current (DC) by photovoltaic (PV) modules, which are arranged in strings and grouped into arrays. This DC power is converted into alternating current (AC) through inverters, typically outputting at 400V to 690V. In systems where string inverters are used, the voltage is further stepped up to 33 kV using Inverter Duty Transformers (IDTs). Once at 33 kV, the AC power is routed to a central switchyard equipped with 33 kV switchgear. From there, the combined 33 kV output is stepped up to 110 kV using two main power transformers, each rated at 40/45 MVA, 110/33 kV, with On-Load Tap Changers (OLTC).

The electricity generated by the project is initially produced at low voltages of 0.380 kV / 0.350 kV. This low-voltage power is first stepped up to 33 kV using an Inverter Duty Transformer (IDT). From there, the voltage is further increased to 33 kV / 110 kV through a power transformer. Upon reaching the 110 kV substation, the voltage is finally stepped up to 110 kV / 230 kV, after which the power is transmitted to the grid at 400 kV.

Projects activity comprises of installation of 3 Energy meters (1 main meter, 1 check meter, 1 standby meter) sealed and under control of TENGEDCO used for joint metering installed at interconnection point of the Grid at project site.

The export and import energy are measured continuously using above mentioned Main & Check meters. Export & Import readings of Main & Check meters installed at the project site shall be taken on monthly basis by authorized officer of TANGEDCO in the presence of PD or representative of PD. The meter reading will be taken jointly and signed by the representatives of the TANGEDCO and project investors. Based on the readings, invoices will be raised by project investors. These invoices can be used for cross checking the meter readings taken for the project activity. It is to be noted though PD or PD representative is available during meter reading; the calculations of net electricity supplied to grid is completely under purview of TANGEDCO officer and PD do not have any control on it. Also, accuracy class of meters and calibration frequency is under purview of TANGEDCO officer and PD do not have any control on it. PD get the monthly generation report from where net electricity supplied to grid is obtained and used for emission reduction calculations.



Data collection and archiving

Export & Import readings from the meters are collected under the supervision of the authorized representatives of PD. The net electricity supplied to grid would be calculated based on export & import readings. Export and Import data would be recorded and stored in electronic &/or Paper format. The records are checked periodically by the Head (Operations) and discussed thoroughly with the O&M Team. The period of storage of the monitored data will be 2 years after the end of crediting period or till the last issuance of GS CERs for the project activity whichever occurs later.

Mismatch in Monitoring Period and the Billing Period

In case the dates of a particular monitoring period do not match with the dates of the billing period, the net electricity exported to the grid would be calculated from:

D = (A/B) * C

Where,

A = Difference of number of days which are not matching of billing period and monitoring period.

B = Number of days of the billing period/ month which was not matched with the monitoring period.

C = Net Electricity supplied to the grid for that given billing period/ month.

The calculated value after apportioning would be used for calculation of emission reductions during that period.

The current monitoring period starts from 01/01/2021 to 25/10/2023 (both dates included) hence apportioning is applied in month of October 2023.

Emergency preparedness

The project activity will not result in any unidentified activity that can result in substantial emissions from the project activity. No need for emergency preparedness in data monitoring is visualized.

In the unlikely event of failure of all Main, Check as well as Standby meter installed at Substation, where all the faulty meters are required to be repaired or replaced simultaneously, the export & import readings from Main, Check & Standby Meters installed at the inter-connection point at the project site will be used for monitoring of net electricity exported to the grid.

Personnel training

In order to ensure a proper functioning of the project activity and a proper monitoring of emission reductions, the staff (GS team) are trained. The plant helpers will be trained in equipment operation, data recording, reports writing, operation and maintenance and emergency procedures in compliance with the monitoring plan.

SECTION D. DATA AND PARAMETERS

D.1. Data and parameters fixed ex ante or at renewal of crediting period

Relevant SDG Indicator 13: Take urgent action to combat climate change and its impacts

Data/parameter	$EF_{OM, y}$
Unit	tCO_2e/MWh
Description	Operating Margin Emission Factor of INDIAN Grid
Source of data	Calculated from CEA database, Version 15, December 2019.
Value(s) applied	0.9622
Choice of data or Measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system," as 3-year generation weighted average using data for the years 2016-17, 2017-18 & 2018-19. The data are obtained from "CO2 Baseline Database for Indian Power Sector" version 15.0, published

	by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	The data is used to calculate baseline emission reductions.
Additional comment	This parameter is fixed ex-ante for the entire crediting period.

Data/parameter	$EF_{BM, y}$
Unit	tCO2e/MWh
Description	Build Margin Emission Factor of INDIAN Grid
Source of data	Calculated from CEA database, Version 15, December 2019.
Value(s) applied	0.8811
Choice of data or Measurement methods and procedures	Calculated as per "Tool to calculate the emission factor for an electricity system,". The data are obtained from "CO2 Baseline Database for Indian Power Sector" version 15.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of data	The data is used to calculate baseline emission reductions.
Additional comment	This parameter is fixed ex-ante for the entire crediting period.

Data/parameter	$EF_{CM, y}$
Unit	tCO2e/MWh
Description	Combined Margin Emission Factor of INDIAN Grid
Source of data	Calculated from CEA database, Version 15, December 2019.
Value(s) applied	0.9419
Choice of data or Measurement methods and procedures	The combined margin emissions factor is calculated as follows: $EF_{grid,CM,y} = EF_{grid,OM,y} * W_{OM} + EF_{grid, BM,y} * W_{BM}$ Where:

	$EF_{grid,BM,y}$ = Build margin CO2 emission factor in year y (tCO_2/MWh) $EF_{grid,OM,y}$ = Operating margin CO2 emission factor in year y (tCO_2/MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 75% W_{BM}= Weighting of build margin emissions factor (%) = 25%
Purpose of data	The data is used to calculate baseline emission reductions.
Additional comment	-

D.2 Data and parameters monitored

Relevant SDG Indicator 7.2: By 2030, increase substantially the share of renewable energy in the global energy mix

Data / Parameter	$EG_{PJ,y}$
Unit	MWh
Description	Quantity of net electricity generation that is produced and fed into the grid
Measured/calculated/ default	Method: The Net electricity supplied to the grid by the project activity is calculated as a difference of electricity exported to the grid, electricity imported from the grid obtained from Monthly Meter reading reports provided by SEB as per below equation: $EG_{facility,y}= EG_{Export} – EG_{Import}$
Source of data	Generation statement provided by TANGEDCO every month.
Value(s) of monitoring parameter	341,429.97 MWh
Monitoring equipment	Projects activity comprises of installation of 3 Energy meters (1 main meter, 1 check meter, 1 standby meter) sealed and under control of TANGEDCO used for joint metering installed at interconnection point of the Grid at project site. Meter & Calibration Details:

	<table><tr><td>Details</td><td>Main Meter</td><td>Check Meter</td><td>Stand-by Meter</td></tr><tr><td>Meter Number</td><td>TNW01979</td><td>TNW01987</td><td>TNE81539</td></tr><tr><td>Make</td><td>Secure</td><td>Secure</td><td>Secure</td></tr><tr><td>Accuracy</td><td>0.2s</td><td>0.2s</td><td>0.2s</td></tr><tr><td>Last Calibration</td><td>20/07/2018</td><td>27/08/2018</td><td>27/08/2018</td></tr><tr><td>Due date</td><td>19/07/2023</td><td>26/08/2023</td><td>26/08/2023</td></tr><tr><td>Recent calibration</td><td>28/12/2022</td><td>28/12/2022</td><td>28/12/2022</td></tr><tr><td>Calibration frequency</td><td colspan="3">Once in 5 years as per CEA guidelines</td></tr></table> Cross Checking: Quantity of net electricity supplied to the grid will be cross-checked from the Invoices/ Monthly Bill raised by the Project Participant to Ramnad Electricity Distribution Circle, TANGEDCO.
Measuring/reading/ recording frequency:	Monthly
Calculation method (if applicable)	Data Type: Measured Monitoring equipment: Energy Meters of accuracy class 0.2s Recording Frequency: Continuous monitoring and Monthly recording from Energy Meters, Summarized Annually. Archiving Policy: Paper &/or Electronic Calibration frequency: Once in 5 years as per CEA guidelines[3] Electricity exported/imported to the grid is in kWh. However, for the calculation purpose electricity exported is converted in MWh. The Net electricity supplied to the

[3] As per CEA data base the frequency of meter calibration is once in five years.
https://cea.nic.in/old/reports/regulation/CEA_metering_regulation_amendment_2019.pdf

	grid by the project activity will be calculated as a difference of electricity exported to the grid and electricity imported from the grid obtained from Monthly Meter reading reports provided by TANGEDCO as per below equation: $EG_{PJ,y} = EG_{Export} - EG_{Import}$ Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO) do the calculation and the PD has no say in the calculation. Based on the Monthly generation Statement issued by TANGEDCO the project shall raise the invoice. The electricity exported to the grid by the project activity connected to the sub- station is measured by electronic tri-vector meters of accuracy class 0.2s. The electricity exported will be measured continuously using Main & Check meters.
QA/QC procedures	Calibration of all the meters will be undertaken once every five years and faulty meters will be duly replaced immediately. The meters will be of accuracy class 0.2s.
Purpose of data	The Data/Parameter is required to calculate the baseline emission.
Additional comment	Data will be archived electronically for a period of 2 years beyond the end of crediting period.

Relevant SDG Indicator 8.5: By 2030, achieve full and productive employment and decent work for all women and men, including for young people and persons with disabilities, and equal pay for work of equal value.

Data / Parameter	• Quantitative employment • Quality of employment Income generation
Unit	• Number (Trainings) • Number (employees) • INR (salary)

Description	• Number of Trainings provided to employees & O&M staff • Number of project employees with Number of male/female, permanent/temporary, age and person with disabilities. • Salary given to the employees of the project. The income to all the unskilled workers are made on day-to-day basis with the minimum being Rs. 350 per day. Annual records of income paid to all the employees would be available. As per minimum wages notification, Department of Labour Tamil Nadu has issued the Notification to increased Minimum Wages in Tamil Nadu. According to this, pay has increased for the employee who is working under the category of Various Scheduled Employment notified under the Minimum Wages Act 1948. The department publishes the minimum daily/monthly data for un-skilled and semi-skilled workers, the monthly income as per the project location for un-skilled and semi-skilled workers are provided below[4][5][6]. For the monthly income of the skilled workers is calculated on the basis of salary slip.
Measured/calculated/	Measured

Year	Un-skilled	Semi-skilled	Skilled
2021	9712	9820	35000
2022	10036	10144	35000
2023	10425	10533	35000

[4] Minimum Wages in Tamil Nadu April 2021 » HR | Compliance | Labour Law
[5] Minimum Wages in Tamil Nadu April 2022 » HR | Compliance | Labour Law
[6] Minimum Wages in Tamil Nadu Revised April 2023 » HR | Compliance | Labour Law

<table>
<tr><td>default</td><td></td></tr>
<tr><td>Source of data</td><td>Training Records (HSE & HR) & Employee feedback forms
Salary Slip of the project employees.</td></tr>
<tr><td>Value(s) of monitoring parameter</td><td>Number of training vintage-wise:
<table><tr><th>Year</th><th>Number of Training</th></tr><tr><td>2021</td><td>5</td></tr><tr><td>2022</td><td>6</td></tr><tr><td>2023</td><td>2</td></tr></table>
The detailed training record for this monitoring period is provided in the Appendix 2.

A total of 13 personnel were employed throughout the monitoring period for the operation and maintenance of the project activity.

<table><tr><th>Year</th><th>Number of employees</th></tr><tr><td>2021</td><td>13</td></tr><tr><td>2022</td><td>13</td></tr><tr><td>2023</td><td>13</td></tr></table>
Number of Skilled, semi-skilled and unskilled bifurcation-

<table><tr><th>Skilled</th><th>Semi-skilled</th><th>Unskilled</th></tr><tr><td>8</td><td>2</td><td>3</td></tr></table>The above number of jobs are permanent and full-time in nature. Additional short-term services create temporary jobs. Females are not employed at the site for this monitoring period as the site is located at a remote location.

As per Minimum Wages Act, 1948, the workers in the project plant are required to be paid minimum wages as</td></tr>
</table>

	per government regulations[7][8][9], on the basis of Zone C which is applicable for the project location.
Monitoring equipment	• Training Attendance sheets and records. • Employment Records • Salary slip of the employees
Measuring/reading/ recording frequency:	Annually
Calculation method (if applicable)	The number of persons employed would be mentioned in the plant register, which can be crossed checked with daily attendance register. Salary slip can be checked for earnings of female and male employees
QA/QC procedures	Continuation of regular trainings/workshops for employees and O&M staffs
Purpose of data	-
Additional comment	The data will be archived for crediting period+2 years

Relevant SDG Indicator 13: Take urgent action to combat climate change and its impacts

Data / Parameter	Air Quality
Unit	tCO_2e
Description	Reduction in CO_2 emission reduction due to implementation of project activity
Measured/calculated/default	Calculated

[7] Minimum Wages in Tamil Nadu April 2021 » HR | Compliance | Labour Law
[8] Minimum Wages in Tamil Nadu April 2022 » HR | Compliance | Labour Law
[9] Minimum Wages in Tamil Nadu Revised April 2023 » HR | Compliance | Labour Law

Source of data	Calculated as per "Tool to calculate the emission factor for an electricity system,". The data are obtained from "CO_2 Baseline Database for Indian Power Sector" version17.0, published by the Central Electricity Authority, Ministry of Power, Government of India.
Value(s) of monitored parameter	321,592 tCO_2e
Monitoring equipment	Not Applicable, as it is a calculated parameter
Measuring/reading / recording frequency:	Calibration and Testing of Meters will be done by the accredited agency as per norms. Once in 5 years as per CEA guidelines.
Calculation method (if applicable)	Calculated from "CO_2 Baseline Database for Indian Power Sector" and Energy Generation
QA/QC procedures	A check meter is also installed near to the export meter to cross check the electricity exported to the grid. The check meter reading would also be used in case of failure of export meter.
Purpose of data	Calculation of baseline emissions
Additional comment	The data will be archived for crediting period+2 years

Safeguarding principle: 4.3.5-Principle 9.5: Hazardous and non-hazardous waste

Data / Parameter	Hazardous Waste and non-hazardous waste
Unit	Kg
Description	The manufacture, trade, release, and use of hazardous chemicals and/or materials
Source of data	Plant records
Value(s) applied	0

Measurement methods and procedures	Manual
Monitoring frequency	Annually
QA/QC procedures	The waste damaged solar modules, scrap equipment and other waste is disposed to the waste handlers and the firm complies with all the local laws for monitoring and disposal.
Purpose of data	Analysis of safeguarding principle
Additional comment	The data is archived for crediting period+2 years

D.3. Comparison of monitored parameters with last monitoring period

Data/Parameter	Value obtained in this monitoring period	Value obtained last monitoring period
NA		
NA		

As per monitoring template guidelines, this section is not applicable for non- Community Service Activities, hence not applicable.

D.4. Implementation of sampling plan

No sampling process is involved, hence not applicable. The details of sampling any of carried out during the course of verification will be included.

SECTION E. CALCULATION OF SDG IMPACTS

E.1. Calculation of baseline value or estimation of baseline situation of each SDG Impact

SDG 7:

The monitoring parameter for the SDG 7 is Quantity of net electricity supplied to the grid during the year y. Since baseline and pre-project scenario are same, in the baseline condition no renewable electricity will be supplied to grid from the project location. Hence, the baseline value is zero.

Vintage	Baseline Value

	Quantity of net electricity supplied to the grid (MWh)
01/01/2021 to 31/12/2021	0
01/01/2022 to 31/12/2022	0
01/01/2023 to 25/10/2023	0

SDG 8:

The monitoring parameter for the SDG 8 are Number of trainings provided to employees & O&M staff, Income generation & Number of O&M staffs involved in the project. Since baseline and pre-project scenario are same, in the baseline condition these values are zero.

Vintage	Baseline Value		
	Number of trainings (Nos)	Income generation (Lakh INR)	Number of employees (Nos)
01/01/2021 to 31/12/2021	0	0	0
01/01/2022 to 31/12/2022	0	0	0
01/01/2023 to 25/10/2023	0	0	0

SDG 13: Climate Action

In the baseline, there were no Social Development activities taking place; whereas baseline Emissions for electricity supplied by project activity, BE_y is calculated as:

$BE_y = EG_{PJ,y} * EF_{grid,CM.y}$

Where,

BE_y	Baseline emissions in year y (tCO_2/yr)
$EG_{PJ,y}$	Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the project activity in year y (MWh/yr).
$EF_{grid,CM.y}$	Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2/MWh).

$EG_{PJ, y}$ = 341,429.97 MWh
$EF_{CO2, grid, y}$ = $EF_{grid, CM, y, y}$ = 0.9419 tCO_2e/MWh
Hence,
BE_y = 341,429.97 MWh * 0.9419 tCO_2e/MWh
= 321,592 tCO_2e (Round down values)

Thus, the estimated baseline situation of each SDG outcome are summarised as follows;

Item	Baseline value
SDG 7: Affordable and Clean Energy	No Activities in the baseline
SDG 8: Decent Work and Economic Growth	No Activities in the baseline
SDG 13: Climate Action	Emission of 321,592 tCO_2e

E.2. Calculation of project value or estimation of project situation of each SDG Impact

SDG 7:

The monitoring parameter for the SDG 7 is Quantity of net electricity supplied to the grid during the year y. In the project situation, the project supplied 341,429.97 MWh electricity during the monitoring period. This can be crosschecked from JMR & Invoices.

During Monitoring period - (01/01/2021 to 25/10/2023) (Both dates included)

Quantity of net electricity supplied to the grid (MWh) = 341,429.97 MWh

Vintage	Project Value
	Quantity of net electricity supplied to the grid (MWh)
01/01/2021 to 31/12/2021	120,385.60 MWh
01/01/2022 to 31/12/2022	114,553.80 MWh
01/01/2023 to 25/10/2023	106,490.57 MWh
Total	**341,429.97 MWh**

SDG 8:

The monitoring parameter for the SDG 8 are Number of trainings provided to employees & O&M staff, income generation & Number of O&M staffs involved in the project. During the project scenario, the following is achieved:

During Monitoring period - (01/01/2021 to 25/10/2023) (Both dates included)

Quantity of Training – 13 Trainings

Quantitative employment and income generation - 13 employees & INR 11,233,474.

These can be crosschecked from the training records, income declaration/sample salary slips & employment records.

Vintage	Project Value		
	Number of trainings (Nos)	Income generation (INR)	Number of employees (Nos)
01/01/2021 to 31/12/2021	5 trainings	INR 3,945,312	13 employees
01/01/2022 to 31/12/2022	6 trainings	INR 3,964,752	13 employees
01/01/2023 to 25/10/2023	2 trainings	INR 3,323,410	13 employees
Total	**13 trainings**	**INR 11,233,474**	**13 employees**

SDG 13:

The monitoring parameter for the SDG 13 is Quantity of emission reduction during the year y. In the project situation, the project reduced 321,592 tCO_2e during the current monitoring period. This parameter is calculated.

During Monitoring period - (01/01/2021 to 25/10/2023) (Both dates included)

Quantity of emission reduction – 321,592 tCO_2e

Vintage	Project Value		
	Net generation (MWh)	Grid Emission Factor (tCO_2/MWh)	Emission Reduction (tCO_2)
01/01/2021 to 31/12/2021	120,385.60 MWh	0.9419	113,391 tCO_2e
01/01/2022 to 31/12/2022	114,553.80 MWh	0.9419	107,898 tCO_2e
01/01/2023 to 25/10/2023	106,490.57 MWh	0.9419	100,303 tCO_2e
Total	**341,429.97 MWh**	**0.9419**	**321, 592 tCO_2e**

As per para 31 of section 5.4 of the approved consolidated Methodology ACM0002 (Version 20.0):

"For most renewable energy power generation project activities, PE_y = 0. However, some project activities may involve project emissions that can be significant. These emissions shall be accounted as project emissions by using the following equation:

$$PE_y = PE_{FF,y} + PE_{GP,y} + PE_{HP,y}$$

Where:

PE_y - Project emissions in year y (tCO_2e/year)

$PE_{FF, y}$ - Project emissions from fossil fuel consumption in year y (tCO_2/ year)

$PE_{GP, y}$ - Project emissions from the operation of dry, flash steam or binary geothermal power plants in year y (t CO_2e/ year)

$PE_{HP, y}$ - Project emissions from water reservoirs of hydro power plants in year y (tCO_2e/ year)

" As the project activity is the installation of a new grid-connected Solar power plant/unit and does not involve any project emissions from fossil fuel, operation of dry, flash steam or binary geothermal power plants, and from water reservoirs of hydro power plants. Therefore $PE_{FF, y}$, $PE_{GP, y}$, $PE_{HP, y}$ is equal to zero and thus, PE_y = 0 tCO_2e.

Vintage	Project Emission (tCO_2e)
01/01/2021 to 25/10/2023 (Inclusive of both the dates)	0

E.3. Calculation of leakage

As per ACM0002 methodology, the leakage emission is considered as zero.

E.4. Calculation of net benefits or direct calculation for each SDG Impact

SDG	SDG Impact	Baseline estimate	Project estimate	Net benefit
7	MWh of renewable energy generated	0	341,429.97 MWh	341, 429.97 MWh
8	Decent Work and Economic Growth	0	13 Trainings 13 employees INR 11,233,474	13 Trainings 13 employees INR 11,233,474
13	Emission Reduction	321,592 tCO_2	0	321,592 tCO_2

E.5. Comparison of actual SDG Impacts with estimates in approved PDD

SDG	Values estimated in ex ante calculation of approved PDD for this monitoring period	Actual values[10] achieved during this monitoring period
7	117,122 MWh/Year (365 days) 329, 867 MWh for the Monitoring period (1028 days)	341,429.97 MWh
8	1 training/year 10 employees Minimum wage Rs 350/Day	13 Trainings 13 Employees INR 11,233,474
13	110,317 tCO_2 /Year (365 days) 310,701 tCO_2 for the monitoring period (1028 days)	321,592 tCO_2

E.5.1. Explanation of calculation of value estimated ex ante calculation of approved PDD for this monitoring period

SDG -13

It is to be noted here that as per the PDD the estimated emission reduction to be achieved from the project activity for the current monitoring period is

= 110,317 * 1028 (days)/365

= 310,701 tCO2e

Whereas actual emission reductions achieved during this monitoring period is 321,592 tCO2e, which is approximately 4% Higher than the estimated emission reductions.

SDG -07

It is to be noted here that as per the PDD the estimated electricity generation to be achieved from the project activity for the current monitoring period is

= 117,122 * 1028 (days)/365

[10] Whenever emission reductions are capped, both the original and capped values used for calculations must be transparently reported. Use brackets to denote original values.

= 329, 867 MWh

The actual electricity generation for the current monitoring period achieved is 341,429.97 MWh which is approximately 4% Higher than the estimated value. This is due to higher PLF achieved due to increased solar radiation and is thus nature dependent and not in control of PD. Other parameters for increase in emission reduction in the current monitoring period are due to efficient equipment and frequent module cleaning. Therefore, as the generation increases so does the emission reduction.

SDG -08

As per the registered PDD 1 training per year and at least 10 employees should be employed. For this monitoring period there were 13 trainings and 13 employees.

The below comparison of SDG 7, SDG 8 and SDG 13 for the monitoring period of 01/01/2021 to 25/10/2023 is as per follows:

SDG	Parameter	Annual Average Estimation as per PDD	Estimation for the monitoring period as per PDD	Actual Achieved during the monitoring period	Difference
7	Renewable electricity generation (MWh)	117,112 MWh	329,867 MWh	341,429.97 MWh	4%
8	Number of Trainings Conducted	1 Training	NA	13 Trainings	NA
	Income generation (INR)	NA	NA	INR 11,233,474	NA
	Number of Employment	10 Employees	10 Employees	13 Employees	30%
13	Emission Reduction (tCO_2e)	110,317 tCO_2e	310,701 tCO_2e	321,592 tCO_2e	4%

E.6. Remarks on increase in achieved SDG Impacts from estimated value in approved PDD

The actual achieved emission reduction for this monitoring period is 4% higher than estimated value in the PDD. This is due to higher PLF achieved due to increased solar

radiation and is thus nature dependent and not in control of PD. Other parameters for increase in emission reduction in the current monitoring period are due to efficient equipment and frequent module cleaning. The value is within the sensitivity range which does not breach even with the increase of 10% in line with the registered PDD.

SECTION F. SAFEGUARDS REPORTING

Principle 9.5: Hazardous and non-hazardous waste) is included in the monitoring plan (Refer section D.2 above). Also, there are no any impact (positive/negative/slightly) for any mitigation measures, being applicable to the safeguarding principles. The damaged solar modules, scrap equipment and other waste is disposed to the waste handlers and the firm complies with all the local laws for monitoring and disposal.

SECTION G. STAKEHOLDER INPUTS AND LEGAL DISPUTES

G.1. List all Inputs and Grievances which have been received via the Continuous Input and Grievance Mechanism together with their respective responses/mitigations.

As a part of continuous feedback from stakeholders, the grievances register is being placed at site and is being continuously monitored and addressed on regular basis and maintained in a registered site office.
During the monitoring period, minor grievances were raised—

1. On 08-06-2021, Mr. Angusamy from O'Karisalkulam raised a complaint requesting the removal of jungle trees in the general pathway and inside the fencing area. The issue was addressed promptly, and the trees were cleared in compliance with local regulations. The matter was resolved within 2 days of the complaint being lodged.
2. On 15-09-2021, Mr. Nalin from Sengapadai reported that the street light at the entrance of the project site was not functioning, causing inconvenience for workers and visitors during evening and night hours. The issue was resolved within 2 days by repairing/replacing the light to ensure proper visibility and safety at the main entrance.
3. On 17-06-2021, Mr. Thangarasu from Chokkalingapuram requested the removal of jungle trees located at the village corner, as they were disturbing agricultural activities. The complaint was resolved within 4 days, with the trees cleared in compliance with local regulations.
4. On 05-12-2021, Mr. Arumugam from Sengapadai raised a grievance regarding jungle trees obstructing the general pathway in the RREL plant. The project team

addressed this by clearing the trees in compliance with local requirements, and the issue was closed within 5 days.

5. On 09-03-2022, a community request was raised by Mr. Rathinamani and Mr. Thavasi from Sengapadai for the installation of two electrical lights in the village temple near Sengapadai pond. The project team responded positively, and the lights were installed the very next day, addressing the community's request in 1 day.
6. On 28-04-2023, Mr. Naganatha Sethupathi from O'Karisalkulam complained about jungle trees obstructing the main road between Thopadaipatti and Pudukottai villages. The trees were removed in compliance with regulations, and the complaint was closed within 2 days.
7. On 04-08-2023, Mr. Karthik from Chokkalingapuram raised a grievance about a non-functioning street light in the residential area leading to the plant, which caused poor visibility during evening and night hours. The light was replaced immediately, and the issue was resolved within 1 day.
8. On 11-10-2023, Mr. Anand from O'Karisalkulam reported that a ceiling fan in the premises was operating at very low capacity, causing discomfort to staff during hot weather. The fan was inspected, repaired, and restored to proper working condition within 1 day, resolving the concern efficiently.

The majority of grievances were resolved swiftly, with most closed within 1–4 days of being raised.

G.2. Report on any stakeholder mitigations that were agreed to be monitored.

No grievances received in the previous monitoring period, thus no follow up required.

G.3. Provide details of any legal contest that has arisen with the project during the monitoring period

Not legal contest or dispute that has arisen with the project during the monitoring period.

APPENDIX 1: Breakdown Details

Date	Error Description	Action Taken	Duration (Hrs.)
April-2021	DC Earth Fault	Fault String Rectified & Started	19:18
May-2021	W2 phase	Reset & started	04:50
June-2021	IGBT SAT trip	Reset & started as per Hitachi engineer instruction	04:55
July-2021	V1 ph	Reset & started	03:01
August-2021	V2 phase	Reset & started	01:18
September-2021	Inverter Fuse Failure, W1 phase, U1 phase, Dc Earth fault & IGBT sat trip	Reset & started	14:07

October-2021	v2ph, IGBT SAT Trip v1 Ph, U1 ph	Gate Driver Card Replacement & Started, IGBT STACK replaced in v2 ph and started, Stack Replaced	22:16
November-2021	W2, U1ph, U2ph	Gate Driver Card Replacement & Started	08:30
December-2021	W2, U1ph, U2ph, Inverter Fuse Failure	Reset & started	09:07
January-2022	DC Earth fault, W2 Phase, IGBT SAT trip V1 phase, Inverter Fuse Failure	Due To Water Logging Issue, Faulty string rectified & Started, Gate Driver Card Replaced & Started	470:42
February-2022	DC Earth Fault, Charging resister fault, LV REF trip, AC Over Current, U2ph	Floating Checked & Started, Charging resister replaced and started, Fault String Rectified & Started	37:01
March-2022	AC Breaker Tripped, Charging Resistor Failure, Tripped in Differential protection, DC CB Off Failure, Grid Fluctuation	Inter change & Started, Testing done and find Fault in Y ph HV side, Gate Driver Card Replaced & Started	42:29
April-2022	Inverter Fuse Failure, DC CB Off Failure, AC Breaker Tripped, IGBT SAT Trip, Charging Fault	W2ph Stack Failure, DC CB Off Failure, U1ph, AC Breaker Tripped, Charging resistor failure	36:08
May-2022	Temperature Abnormal, DC CB Off Failure, AC Breaker Tripped, IGBT SAT Trip	Reset & Started, Charging resistor failure, After cool down INV Started	06:01
June-2022	ISU 02 V,W ph, Charging Resistor Failure, Fuse Failure, ISU-1 Capacitor bank Melted	Charging Resistor Interchanged & Started	11:41
July-2022	Charging Resistor Failure, Inv Drive Power Failure, DC 100 V Failure, Temperature Abnormal, U1,V1 Ph FRC cable failure	Reset and started, Control supply Checked & Inv Started, Fuse, FRC Cable Checked & Started, FRC cable replaced & Started	8:26
August-2022	Charging Resistor Failure, ACCB Off Failure, Temp Failure Of Fin For IGBT, V1ph, DC Earth Fault	Charging Resistor Interchanged & Started, New Fan Replaced & Inv Started, igbt stack (W1) replaced and started	16:42
September-2022	AC Over Current, V1ph, ACCB On Failure, DC CB On Failure, Inv Drive Power Failure, Main auxiliary mcb tripped	Buffer Power Supply Replaced & Inv Started, Inverter reset after getting temperature down, Auxiliary mcb tripped due auxiliary transformer output voltage abnormal.	12:46

		So aux supply fed from CL-12 then inverter reset	
October-2022	U1 Phase, V1 Phase	F1+ IGBT Blasted &Inv Running on 500KW Set point, V1 ph Gate Driver Card Replaced & Started	4:37
Novovember-2022	W2ph, Stack SMPS Card Failure, Inv Drive Power Failure, Current Un Balance-3,	Stack SMPS Card Replaced & Inv Started, W1ph 1000A Fuse Replaced & Inv Started	17:25
December-2022	V2 ph, 2W, Main Contactor Fault, Inv Drive Power Failure	Wiring Tightness checked & Inv Started, Reset & Started	03:48
January-2023	Inv Drive Power Failure, SMPS Card Failure, CT feedback card problem, Over Current 4 OF Inverter, U1 Ph Stack blasted	W2ph Gate Driver Card Replaced & Inv Started, SMPS Card Replaced & Inv Started, UN Availability Stack INV Started with 500 kW load	18:36
February-2023	U2ph Fuse Failure, Inv Drive Power Failure, Charging Fault, DC CB On Failure, W2ph FRC Cable Issue	U2ph Fuse Replaced & Inv Started, Charging Resistor Interchanged & Inv Started, IGBT Stack Replaced & Inv Started, fuse connection checked and started	13:55
March-2023	100V Failure, U2ph IGBT Stack Failure, V2ph Stack Failure, Feedback Circuit Abnormal, Inv Drive Power Failure	SMPS Card Voltage Checked & Inv Started, Unavailability IGBT stack Inv Running @500KW, Checked the connections of CT Feedback card, found ok & then inv started	18:31
April-2023	DC Earth Fault, V2 Phase, Capacitor bank failure, ISU-1 cubical1W, U1 ph stack is defective	Floating voltage checked & inverter started, Floating voltage checked & ISU1 capacitor bank failure & Inverter started at 800KW, RDIO card interchanged and started	35:26
May-2023	DC Earth Fault, V2ph, U1,V1ph Stack Failure, Wrong Operation Fault, Inv Drive Power Failure	Floating Voltage Checked Reset & Inv Started, V1ph 1250amps Fuse Replaced & Inv Started	24:11
June-2023	DC Earth Fault, Current Un Balance-1, Due to grid fluctuation	Floating Voltage checked and found normal, Inv started, ISU-1 AINT card feedback failure. so inverter started with Group-2 set point 800KW. Restoration	26:95

		planned after generation hours	
Total			**888 Hrs**

Appendix 2: Training Records

S. No.	Number of Training	Number of participants	Date of training
1	EHS Induction Training	08	01/02/2021
2	EHS Induction Training	01	08/01/2021
3	Safety Induction Training	05	03/05/2021
4	Permit to work	13	21/05/2021
5	Work at height	14	22/05/2021
6	Animal/Insect bite Safety Awareness	09	12/10/2022
7	Awareness of Incident Reporting & Investigation	07	17/10/2022
8	Electric safety awareness	14	12/10/2022
9	Fire safety Training Awareness	10	10/10/2022
10	Lockout/Target Awareness Training	12	19/06/2022
11	OHS Traffic Awareness Training	06	28/06/2022
12	Hazardous chemical at workplace & safety awareness	11	11/05/2023
13	Safety operating procedure of Gas cylinder	18	19/05/2023