



**Verified Carbon
Standard**

RENEWABLE POWER PROJECT BY SEI KATHIRAVAN POWER PRIVATE LIMITED



INFINITE
SOLUTIONS

Document Prepared by Infinite Solutions

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1 PROJECT DETAILS

1.1 Summary Description of the Implementation Status of the Project

The main purpose of this project activity is to generate clean form of electricity through renewable solar energy sources. The project activity involves installation of a 50 MW_(AC) solar power project in Tamil Nadu state of India.

The Project activity is a new facility (Greenfield) and the electricity generated by the project is exported to the Indian electricity grid. The project therefore displaces an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant electricity grid.

Over the 10 years of first crediting period, the project will replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 77,356 tCO₂e per year, thereon displacing 81,643 MWh/year amount of electricity from the generation-mix of power plants connected to the Indian grid, which is mainly dominated by thermal/fossil fuel-based power plant.

The details of the project and their location of installation are mentioned in the table below:

Name of Investor	Capacity in MW	COD	Connection with Grid	State	Usage
SEI Kathiravan Power Private Limited	50 MW	09-March-2017	Indian Grid	Tamil Nadu	Sale to Tamil Nadu Generation and Distribution Corporation Limited (TANGEDCO)

The project is commissioned on 09-March-2017 and operating smoothly with schedule maintenance at regular intervals. The solar plant is under operation including scheduled shutdowns during the current monitoring period but has no impact in the GHG emissions and also does not alter the design of project and for more information regarding project implementation and process refer to section 3.1.

Total emission reductions achieved in this monitoring period:

During the Current Monitoring Period from 01-January-2021 to 31-December-2022 (Inclusive of both days), the project activity has supplied 193,222.76 MWh of electricity, and thus contributing to the GHG reductions 183,078 tCO₂e.

Audit Type	Period	Program	VVB Name	Number of years
Validation+ Verification	(09-March-2017 to 25-July-2018) (First and last days included)	VCS	LGAI Technological Center S.A. (Applus+ Certification)	01 year 04 months 17 days
Verification	(26-July-2018 to 30-September-2019) (First and last days included)	VCS	Earthood Services Private Limited	01 year 02 months 05 days
Verification	(1-October-2019 to 31-December-2020) (First and last days included)	VCS	TUV SUD South Asia Pvt. Ltd.	01 year 03 months 00 days
Verification	(01-January-2021 to 31-December-2022) (Current monitoring period) (First and last days included)	VCS	VKU Certification Private Limited	02 years 00 month 00 days
Total	(09-March-2017 to 31-December-2020) (Inclusive of both the days)	VCS		05 years 09 months 22 days

1.2 Sectoral Scope and Project Type

The project activity falls under the following Sectoral scope and Project Type:

Sectoral Scope: 01 - Energy industries (renewable / non-renewable sources)

Project Type: I - Renewable Energy Projects

The project is not a grouped project nor an AFOLU (Agriculture, Forestry and Other Land Use) project activity.

1.3 Project Proponent

Organization name	SEI Kathiravan Power Private Limited
Contact person	Murali Krishnam Raju M
Title	Sr Manager - CDM & GIMS
Address	Veerakudi Village, Thiruchuli Taluk, Virudhunagar Dist, Tamil Nadu 626129, India
Telephone	+91 40 40300100

Email	info@greenkogroup.com
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1.4 Other Entities Involved in the Project

Organization name	Infinite Solutions
Role in the Project	Project Consultant
Contact person	Mr. Jimmy Sah
Title	Head – Sustainability
Address	214-215 Milinda Manor, Opp. Next Treasure Island, 2 RNT Marg, Indore – 452001, India
Telephone	+91-9644130430
Email	jimmy@infisolutions.org

1.5 Project Start Date

Start date of the project activity is the earliest date of interconnection with the grid i.e. 09-March-2017. This is the date of commissioning of 50 MW solar Project activity by SEI Kathiravan Power Private Limited.

1.6 Project Crediting Period

Crediting Period Start date: 09-March-2017

Crediting Period End date: 08-March-2027

The project activity adopts renewable crediting period of 10 years period which can be renewed for maximum 2 times.

1.7 Project Location

The details of the project locations are mentioned in the table below

Name of Investor	Capacity (MW)	Village(s)	Tehsil / Mandal	District	State	Latitude (N)	Longitude (E)
SEI Kathiravan Power Private Limited	50 MW	Kootheranarkottai, Kamalipuliankulam & Veerakudi	Thiruchuli	Virudhnagar	Tamil Nadu	9° 34' 39.9"	78° 18' 34.3"

The project locations have been shown¹ in the map below:



1

<https://earth.google.com/web/search/9%2c2%b0+34%27+39.9%22%0978%2c2%b0+18%27+34.3%22/@9.57784023,78.308425,81.87.61016937a,2386.78597902d,35y,150.95563742h,45.00856285t,359.99999914r/data=Cl8aNRlvGSuHFtnOJyNAIfuMsE3Pk1NAKhs5wrAgMzQnIDM5LjkiCTc4wrAgMTgnIDM0LjMYAiABliYKJAK4Zm8KsCUzQBE4Zm8KsCUzwBIKF3Tsc-diQCEWS1nmNhxJwA>



Figure 1 Satellite Project location covers the whole plant

1.8 Title and Reference of Methodology

Title : Grid-connected electricity generation from renewable sources

Reference : The project activity meets the eligibility criteria of large-scale project as it is more than 15 MW

Methodology : ACM0002: Grid-connected electricity generation from renewable sources - Version 18.1²

Type I : Energy industries (renewable / non-renewable sources)

Category: Approved Consolidated Methodology (ACM0002)

Tools referred with above methodology and applicable for project activity are:

- Tool 07: Tool to calculate the emission factor for an electricity system³ - Version 06.0 (EB 97, Annex 07)

² <https://cdm.unfccc.int/methodologies/DB/5725LCHYPYM4I1V8OD9SFYVAMFFWNP>

³ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v6.pdf>

- Tool 01: Tool for the demonstration and assessment of additionality⁴- Version 07.0.0 (EB 70, Annex 08)

1.9 Participation under other GHG Programs

As the project activity is not registered with any other program. Further, an undertaking from PP has been submitted for avoiding double accounting via any means for current monitoring period. Also, the project is only registered in VCS mechanisms.

1.10 Other Forms of Credit and Supply Chain (Scope 3) Emissions

Emission Trading Programs and Other Binding Limits: The project is not a part of any emission trading program as confirmed by the project proponent through the declaration of no double counting certificate.

Other Forms of Environmental Credit: The project activity has not availed any other form of environmental credit as confirmed by the project proponent through the declaration of no double counting. Furthermore, the project activity is not availing any benefits from CDM (Clean Development Mechanism)/GS (Gold Standard)/GCC (Global Carbon Council)/UCR (Universal Carbon Registry)/RECs (Renewable Energy Certificates) mechanism which can be confirmed from the link below:

https://www.recregistryindia.nic.in/index.php/publics/accredited_regens

CDM: CDM-Home (unfccc.int)

<https://www.goldstandard.org/>

<https://projects.globalcarboncouncil.com/>

<https://www.ucarbonregistry.io/>

<https://www.irecstandard.org/registries/>

The project activity is a solar power project and does not involve any supply chain in the project such as manufacturers, wholesalers, distributors and retailers. So, indirect upstream and downstream GHG emissions are involved in the project activity. Thus, the Scope 3 emissions are not applicable in this project activity.

1.11 Sustainable Development Contributions

Contribution to sustainable development covered by the project in the current monitoring period has been described below:

⁴ <http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf>

Ministry of Environment, Forests and Climate Change, GoI, has stipulated economic, social, environment and technological well-being as the four indicators of sustainable development.

The project contributes to sustainable development using the following ways.

- **Social well-being:** The project helps in generating employment opportunities during the construction and operation phases. The project activity leads to development in infrastructure in the region like development of roads and may promote business with improved power generation.
- **Economic well-being:** The project is a clean technology investment in the region, which would not have been taken place in the absence of the VCS benefits. The project activity also helps to reduce the demand supply gap in the state.
- **Technological well-being:** The successful operation of project activity leads to promotion of solar power generation and would encourage other entrepreneurs to participate in similar projects.
- **Environmental well-being:** Wind being a renewable source of energy, it reduces the dependence on fossil fuels and conserves natural resources which are on the verge of depletion.

The project is contributing in sustainable development by generating electricity and reduction of CO₂ emissions due to implementation of project activity and generates employment to the local stakeholders. Through Project activity economic development has been achieved in the project location by creating opportunities of employment during the project lifetime. Project owner monitors the carbon emission with help of the record of electricity generated.

The project is solar power project, it has generated 193,222.76 MWh electricity and avoided 183,078 tons of greenhouse gas emissions in the atmosphere during the current monitoring period. So, the project contributes to the sustainable development and it is fulfilling SDG 07 and SDG 13.

Table 1: Sustainable Development Contributions

Row number	SDG Target	SDG Indicator	Net Impact on SDG Indicator	Current Project Contributions	Contributions Over Project Lifetime
1)	7.2	7.2.1: Renewable energy share in the total final energy consumption	Implemented activities to increase	About 193,222.76 MWh, in the current monitoring period renewable electricity has supplied to INDIAN Grid during the reported period that helps to increase the renewable energy share in the energy mix	Since Commissioning, about 554,428.76 MWh (129,231+117,924+114,051+193,222.76) ⁵ renewable electricity has supplied to INDIAN Grid that helps to increase the renewable energy share in the energy mix.
2)	8.5	8.5.1 Average hourly earnings of employees, by sex, age, occupation and persons with disabilities	The project activity will result in temporary and primary employment opportunity during the construction and operation phase.	Project has contributed directly to achieve the SDG target, because the project activity has created 53 jobs (29 skilled and 24 unskilled)	53 people were employed since start date of the project activity. Which will also upgrade employee's knowledge and capacity over and above the commonly used technology in the energy sector of India.

⁵ <https://registry.verra.org/app/projectDetail/VCS/1789>

3)	13.0	13.2.2 Tonnes of greenhouse gas emissions avoided or removed	Implemented activities to increase reduction of GHG	By installation of 50 MW solar Energy Power Plant, project has prevented the release of 183,078 tons of carbon into the atmosphere during the current monitoring period	Prevented the release of 525,319 tons of carbon (122,446+111,732+108,063+183,078) ⁶ into the atmosphere till the end of current monitoring period.
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⁶ <https://registry.verra.org/app/projectDetail/VCS/1789>

2 SAFEGUARDS

2.1 No Net Harm

The project activity does not involve any major construction activity. It primarily requires the installation of the solar PV panels, interfacing the generators with the State Electricity Board by setting up HT transmission lines and installation of other accessories.

The report on “Developmental Impacts and Sustainable Governance Aspects of Renewable Energy Projects” prepared by MNRE dated September 2013. As per section 3.4.3 ENVIRONMENTAL IMPACTS FROM SOLAR FARMS, the report clearly mentioned that solar PV project activity operations do not result in direct air pollution, noise pollution. Please refer below web link for the same⁷.

There are no negative environmental and/or social- economic impacts due to the project. Thus, there are no any significant impacts due to implementation of project activity on air, water, soil quality and ambience are envisaged due to the project activity.

2.2 Local Stakeholder Consultation

The project has already been registered under VCS mechanism. The Local stakeholder consultation process was conducted during the validation stage⁸.

The details of the Stakeholder Meetings are:

Date of Invitation – 09-November-2015

Date of Meeting – 16-November-2015

Location of Meeting – Project site, Tamil Nadu

In the introductory speech, the representative of SEI Kathiravan Power Private Limited (Project Investor), welcomed the gathering and given a brief about the climate mitigation project activity. Subsequent to the introductory speech, stakeholders were explained about the electricity generation from solar project is an environmentally friendly power generation technology contributing to reduction in GHG emissions. They were also explained about the benefits of the solar power projects like, increasing energy availability and improving quality of power and its

⁷ <http://164.100.94.214/sites/default/files/uploads/report-on-developmental-impacts-of-RE.pdf>

⁸ <https://registry.terra.org/app/projectDetail/VCS/1789>

assistance to the local population by providing employment opportunities to both skilled & unskilled labors.

As a part of continual improvement process, feedback from the associated stakeholders is vital; therefore, a dedicated Visitor register cum grievance register has been placed at the project site which is accessible to stakeholders to provide their feedback on the project. It is appropriate publicly accessible location at which local stakeholders can provide their feedback on the project. This location is also conducive to continuous and regular checks for stakeholder comments.

For ongoing Stakeholder communication, the PP has also placed a grievance register onsite where in the stakeholder can put down his/her complain and the same if found genuine is being addressed immediately. Furthermore, the project team maintains regular communication with stakeholders by participating in community meetings and other relevant events in nearby village Temple where all the panchayat meetings/social events/ festivals are organized. During these interactions, they facilitate a feedback exchange and assess any stakeholder requirements to ensure project alignment and address community needs. Thus, maintaining the on-going communication with the stakeholders.

However, no grievances received during the current monitoring period, therefore no mitigation measures are required.

2.3 AFOLU-Specific Safeguards

Not applicable to this as this is not an AFOLU project activity.

3 IMPLEMENTATION STATUS

3.1 Implementation Status of the Project Activity

The project activity involves the installation of solar project. The total installed capacity of the project is 50 MW_(AC) Solar project located at Tamil Nadu state in India. The project is promoted by SEI Kathiravan Power Private Limited.

The Project activity is a new facility (Greenfield) and the electricity generated by the project is been exported to the Indian electricity grid. The project therefore displaces an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant electricity grid. The Project Proponent plans to avail the VCS benefits for the project. In the Pre- project scenario

the entire electricity, delivered to the grid would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources.

The project shall result in replacing anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 77,356 tCO₂e per year, thereon displacing 81,643 MWh/year amount of electricity from the grid over the 10 years crediting period. The project activity aims to harness solar energy through installation of Solar PV project with total installed capacity of 50 MW solar power project. The commissioning date of the project activity is 09-March-2017. The project is running smoothly since commissioning with regular planned maintenance. No any changes occurred during the current monitoring activity which can alter the design of the project activity. No change in project proponent or other entity. The details are same as the registered PDD.

The solar plant is under operation including scheduled shutdowns during the current monitoring period. The breakdown occurred is for a total of 2.35% of total hours of all solar panels and is beyond the control of PP. Therefore, due to this percentage variations of breakdown identified in the current monitoring period also it has no impact in the GHG emissions reductions. The summary of breakdown details in the current monitoring period has been described in the below table and a detailed analysis of the same has been provided in APPENDIX 3.

S.No.	Plant Site	Total Hours	Net operational Hours	Breakdown Hours
1	SEI Kathiravan Power Private Limited	17,520 hours ⁹	17,108 hours/ 97.64% of total hours	412 ¹⁰ hours/ 2.35% of total hours

The technical specification for 50 MW solar is tabulated below.

Sl. No.	Technical details of the equipment	Description
1	Technology Used	Solar PV technology (Poly-Crystalline)
2	Number of modules and their model capacity	Make: Astron energy Solar India Pvt. Ltd. No. of Modules- 95,696 for 310 Wp, 93,286 for 315 Wp Model capacity- 310 Wp & 315 Wp Make: Risen Energy Co. Ltd. No. of Modules- 627

⁹ Total hours = 17520 (i.e., 730*24)

¹⁰ Strings and stackers maintenance are minor and not included in the above

		Module capacity- 320 Wp Make- Renesola No. of modules- 2,415 Module capacity- 320 Wp Total no. of modules: 192,024
3	Number of Inverters, Inverter Make & Model	67 Inverters Make:TMEIC Model no: PVL0750 E (750 KW) – 65 nos Make: TMIEC Model no: PVL0500 E (625 KW) – 2 nos
4	Modules per String	42/2
5	Tilt	Tracking
6	Tracker	Single Axis tracker

3.2 Deviations

3.2.1 Methodology Deviations

No methodology deviation is applied during the previous and current monitoring period.

3.2.2 Project Description Deviations

No deviation has taken place in project description during previous and current monitoring period.

3.3 Grouped Projects

The project is not a grouped project thus this is not applicable.

4 DATA AND PARAMETERS

4.1 Data and Parameters Available at Validation

Data / Parameter	EF _{grid, OM, y}
Data unit	tCO ₂ /MWh
Description	Operating margin CO _{2e} emission factor for the project electricity system in year y
Source of data	Calculated from CEA database, Version 13, June 2018 ¹¹
Value applied	0.9726

¹¹ https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver13.pdf

Justification of choice of data or description of measurement methods and procedures applied	Calculated as per “Tool to calculate the emission factor for an electricity system, version 06” ¹² as 3-year generation weighted average using data for the years 2014-15, 2015-16 & 2016-17. The data are obtained from “CO ₂ Baseline Database for Indian Power Sector” version 13, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of Data	For the calculation of the Baseline Emission
Comments	This parameter is fixed ex-ante for the entire crediting period.

Data / Parameter	EF _{grid, BM, y}
Data unit	tCO ₂ /MWh
Description	Build margin CO ₂ emission factor for the project electricity system in year y
Source of data	Central Electricity Authority (CEA) of India Database Version 13 ¹³
Value applied	0.8723
Justification of choice of data or description of measurement methods and procedures applied	Calculated as per “Tool to calculate the emission factor for an electricity system, version 06” ¹⁴ as per the latest data available for the most recent year 2016-17. The data is obtained from “CO ₂ Baseline Database for Indian Power Sector “version 13, published by the Central Electricity Authority, Ministry of Power, Government of India.
Purpose of Data	Calculation of baseline emissions
Comments	The above value is fixed and it is same for the entire crediting period

Data / Parameter	EF _{grid, CM, y}
Data unit	tCO ₂ /MWh
Description	Combined margin CO ₂ emission factor in year y
Source of data	Calculated from CEA database, Version 13, June 2018 ¹⁵
Value applied	0.9475
Justification of choice of data or description of	The combined margin emissions factor is calculated as follows: $EF_{grid, CM, y} = EF_{grid, OM, y} * W_{OM} + EF_{grid, BM, y} * W_{BM}$

¹² <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v6.pdf>

¹³ https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver13.pdf

¹⁴ <https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-07-v6.pdf>

¹⁵ https://cea.nic.in/wp-content/uploads/baseline/2020/07/user_guide_ver13.pdf

measurement methods and procedures applied	Where: $EF_{grid, BM, y}$ = Build margin CO₂ emission factor in year y (tCO₂e/MWh) $EF_{grid, OM, y}$ = Operating margin CO₂ emission factor in year y (tCO₂e/MWh) W_{OM} = Weighting of operating margin emissions factor (%) = 75% W_{BM} = Weighting of build margin emissions factor (%) = 25%
Purpose of Data	Calculation of baseline emissions
Comments	The above value is fixed and it is same for the entire crediting period

4.2 Data and Parameters Monitored

Data / Parameter	$EG_{PJ, y}$						
Data unit	MWh/y						
Description	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y (MWh)						
Source of data	Monthly joint meter reading reports						
Description of measurement methods and procedures to be applied	Export and import are measured by energy meter of accuracy class 0.2s and the difference of export and import values are used for monthly values of net electricity supplied to the grid by the project activity and same value are be considered for ER calculations. Monthly records are recorded in the presence of site personnel and DISCOM representative. The meters are approved, tested & sealed by the State Utility. The meters are in the custody of State Utility. The frequency of calibration is once in 5 years¹⁶						
Frequency of monitoring/recording	Continuous measurement & monthly recording						
Value monitored	193,222.76 MWh <table border="1"> <thead> <tr> <th>Vintage-wise calculation</th><th>SEI Kathiravan Power Private Limited (MWh)</th></tr> </thead> <tbody> <tr> <td>2021</td><td>93,984.00</td></tr> <tr> <td>2022</td><td>99,238.76</td></tr> </tbody> </table>	Vintage-wise calculation	SEI Kathiravan Power Private Limited (MWh)	2021	93,984.00	2022	99,238.76
Vintage-wise calculation	SEI Kathiravan Power Private Limited (MWh)						
2021	93,984.00						
2022	99,238.76						

¹⁶ https://cea.nic.in/wp-content/uploads/2020/04/review_regulation.pdf

	Total	193,222.76
Monitoring equipment	Equipment: Electronic Meter (3 sets – Main, check and standby) Type: 3 – phase, 4 – wire Accuracy Class: 0.2s The solar plant has their metering arrangement at the 110kV (PSS) located at Veerakudi village. There are three meters main, check and standby meters of 3 phase 4 wire, ER 300P type. The output 60 MW_{DC} from solar panels gets converted to 50 MW_{AC} at 380V from Inverter and it is connected to inverter duty transformer step up to 33KV. And connected to MCR HT panels and again step up with Power transformer 33KV/110KV and then further step up to 230kV at TANGEDCO Tiruchuli substation (GSS).The meter details are provided in appendix 1 of the MR.	
QA/QC procedures to be applied	The meters are approved, tested & sealed by the State Utility. The meters are in the custody of State Utility. The frequency of calibration is once in 5 years¹⁷. The monthly electricity supplied/exported by the project activity in the JMR report is cross checked with the monthly invoices of sale. In the absence or delay in the meter calibration appropriate Guidelines are been applied appropriately to confirm the conservativeness of metering. The metering arrangement, accuracy class of meters, calibration frequency is under control of state electricity board and PP does not have any control on it. The billing is raised based on substation meters i.e., 110 kV Tiruchuli at PSS end	
Purpose of the data	Calculation of baseline emissions	
Calculation method	Thus, Net electricity supplied to the grid by the project plant in a given month = Export, kWh – Import, kWh is then converted to MWh units to obtain the EG _{PJ,y} value.	
Comments	Data will be archived in paper & electronic form for two years after the end of crediting period or of the last issuance of VCUs for this project activity, whichever occurs later.	

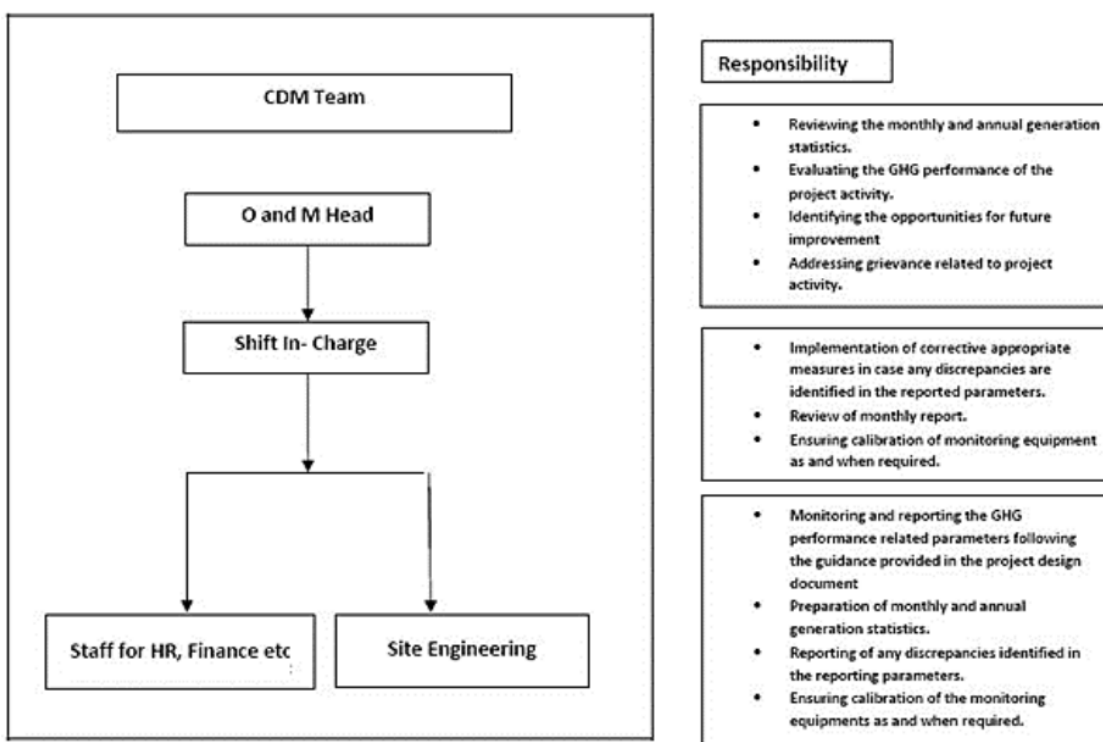
¹⁷ https://cea.nic.in/wp-content/uploads/2020/04/review_regulation.pdf

4.3 Monitoring Plan

The project activity harness solar energy through installed capacity of 50 MW_{AC} solar power project. The electricity generated by the project is exported to the Indian electricity grid.

The monitoring plan is developed in accordance with the modalities and procedures for VCS project activities and is proposed for grid-connected solar power project being implemented. The monitoring plan, which is implemented by the project participant describes about the monitoring organization, parameters to be monitored, monitoring practices, quality assurance, quality control procedures, data storage and archiving.

The authority and responsibility for registration, monitoring, measurement, reporting and reviewing of the data rests with the project participant. The module cleaning mechanism of the solar panels is also available at the project site and the NMR only doing the module cleaning. PP proposed the following structure for data monitoring, collection, data archiving and calibration of equipment's for this project activity. The team comprises of the following members:



Data Measurement

The export and import energy are been measured continuously using above mentioned Main and Check meters located at the pooling substation 33/110KV SS Tiruchuli. Readings of meters are taken on monthly basis by authorized officer of SEB (State Electricity Board i.e, TANGEDCO; Tamil

Nadu Generation and Distribution Corporation) in the presence of PP or representative of PP. Based on the Meter Reading Statement to PP, invoices are raised. These invoices can be used for cross checking the meter readings taken for the respective project activity. Both the meters are approved, tested & sealed by the State Utility. The meters are in the custody of State Utility and the calibration of the meters are done by the state utility and not under the control of PP. The frequency of calibration is once in 5 years¹⁸ by Measurematic India approved laboratory.

Data collection and archiving

Readings from meters are been collected in the presence of the plant in-charge. Export and import data are recorded and stored in logs as well as in electronic form (soft/scan copies) on a daily basis. The records are checked periodically by the Plant Manager and discussed thoroughly with the plant supervisor. The period of storage of the monitored data is 2 years after the end of crediting period or till the last issuance of VCUs for the project activity whichever occurs later.

Emergency preparedness

The project activity does 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 current monitoring period.

In case Main meter or Check meter is found to be outside the acceptable limits of accuracy or faulty or not functioning properly, it is been repaired, recalibrated or replaced as soon as possible. In the event that the Main meter is not in service as a result of maintenance, repairs or testing, the Check meter are been used for readings and in the event that the Main meter and check meter both are not in service as a result of maintenance, repairs or testing, the Standby meter are used for readings. During the monitoring period the main meter and check meter were operating in the acceptable limits of accuracy.

Personnel training

In order to ensure a proper functioning of the project activity and a properly monitoring of emission reductions, the staff are trained. The plant helpers are been trained in equipment operation, data recording, reports writing, operation and maintenance and emergency procedures like declare emergency, sound alert, evacuate danger zone, Close main shutoffs, call for external aid, internal inspection, etc. in compliance with the monitoring plan. The following trainings were conducted

¹⁸ https://cea.nic.in/wp-content/uploads/2020/04/review_regulation.pdf

during this current monitoring period like road safety awareness, firefighting and fire safety, electrical and operational safety, PPE, hazard identification and risk assessment.

QA/QC procedures

The meters are approved, tested & sealed by the State Utility. The meters are in the custody of State Utility. Calibration of all the meters is undertaken at required intervals and faulty meters are duly replaced immediately based on CEA guidelines which specifies calibration and the frequency of calibration is once in 5 years.¹⁹ The monthly electricity supplied/exported by the project activity in the JMR report is cross checked with the monthly invoices of sale. In the absence or delay in the meter calibration appropriate Guidelines are been applied appropriately to confirm the conservativeness of metering.

The metering arrangement, accuracy class of meters, calibration frequency is under control of state electricity board and PP does not have any control on it. PP is getting value of net electricity supplied to grid and the same is considered in the monitoring parameter. The billing is raised based on substation meters.

All the data items monitored under the monitoring plan are kept for 2 years after the end of crediting period or till the last issuance of VCU for this project activity, whichever occurs later. The data are archived both electronically and manually, and kept in safe storage by PP.

Data Adjustment in case of monitoring period different from billing period:

The net electricity supplied to the grid would be reported as the difference between the net export and import from the solar plant. The electricity export and import data are monitored via main, check and standby meters connected to the sub-station.

Data Adjustment in case of monitoring period different from 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 as follows:

$$D = (A/B) * C$$

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.

¹⁹ https://cea.nic.in/wp-content/uploads/2020/04/review_regulation.pdf

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.

Metering Arrangement

The solar plant has their metering arrangement at the 110kV (PSS) located at Veerakudi village. There are three meters main, check and standby meters of 3 phase 4 wire, ER 300P type. The output 60 MW_{DC} from solar panels gets converted to 50 MW_{AC} at 380V from Inverter and it is connected to inverter duty transformer step up to 33KV. And connected to MCR HT panels and again step up with Power transformer 33KV/110KV and then further step up to 230kV at TANGEDCO Tiruchuli substation (GSS). A detailed line diagram with metering arrangement for the solar project activity is shown in [APPENDIX 2: Plant metering arrangement](#).

5 QUANTIFICATION OF GHG EMISSION REDUCTIONS AND REMOVALS

5.1 Baseline Emissions

As per the approved consolidated Methodology ACM0002 (Version 18.1) para 42:

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

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

Where:

BE_y = Baseline emissions in year y (tCO₂/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 VCS project activity in year y (MWh/yr)

EF_{grid, CM,y} = Combined margin CO₂ 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” (t CO₂/MWh)

Vintage-wise calculation	SEI Kathiravan Power Private Limited (MWh)
Year	
2021	93,984.00
2022	99,238.76
Total	193,222.76

Thus, $EG_{PJ,y} = 193,222.76$ MWh

Grid Emission Factor

The GEF is fixed ex-ante in the PD as given below:

Parameter	Value
OM	0.9726
BM	0.8723
CM	0.9475

Vintage-wise calculation	SEI Kathiravan Power Private Limited (ERs)
Year	
2021	89,049
2022	94,029
Total	183,078

Therefore,

$$\begin{aligned}
 BE_y &= 93,984.00 \times 0.9475 \text{ (For vintage 2021)} \\
 &= 89,049 \text{ tCO}_2\text{e (Round down values)}
 \end{aligned}$$

$$\begin{aligned}
 BE_y &= 99,238.76 \times 0.9475 \text{ (For vintage 2022)} \\
 &= 94,029 \text{ tCO}_2\text{e (Round values)}
 \end{aligned}$$

$$\begin{aligned}
 \text{Total } BE_y &= 193,222.76 \times 0.9475 \\
 &= 183,078 \text{ tCO}_2\text{e (Round down values)}
 \end{aligned}$$

5.2 Project Emissions

As per Applied Methodology: ACM0002, v18.1 para 34 For most renewable energy power generation project activities, $PE_y = 0$ and the project activity is solar power project which comes under renewable energy power generation project thus, $PE_y = 0$.

5.3 Leakage

Leakage emissions from the project activity is considered zero as per clause 5.6 ACM0002 (Version 18.1) methodology. 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 and thus, $LE_y = 0 \text{ tCO}_2\text{e}$.

5.4 Net GHG Emission Reductions and Removals

The Formula used to calculate the net emission reduction for the project activity

$$ER_y = BE_y - PE_y$$

Where,

ER_y = Emission Reduction in tCO_2/year

BE_y = Baseline emission in tCO_2/year

PE_y = Project emissions in tCO_2/year

For the project activity during the current monitoring period, as per section 5.1

$BE_y = 183,078 \text{ tCO}_2\text{e}$

$PE_y = 0 \text{ tCO}_2\text{e}$

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)
01-January-2021 to 31-December-2021	89,049	0	0	89,049
01-January-2022 to 31-December-2022	94,029	0	0	94,029
Total	183,078	0	0	183,078

The achieved GHG emission is 18.33 % is higher than the estimated value. This is due to the longer sunshine hours during the monitoring period. The generation of electricity depends upon many other climatic conditions, and not within the control of the project participant.

<u>Ex-ante emissions reductions/removals</u>	<u>Achieved emissions reductions/removals</u>	<u>Percent difference</u>	<u>Justification for the difference</u>
154,712	183,078	+18.33%	It is to be noted here that as per the estimated emission reduction to be achieved from the project activity for the current monitoring period is 154,712 tCO ₂ e, whereas actual emission reductions achieved are 183,078 tCO ₂ e which is 18.33% is higher than the estimated value. This is due to the Higher of sunshine hours during the monitoring period. The generation of electricity depends upon many other climatic conditions, and not within the control of the project participant. The actual PLF for the generated energy in this monitoring period is 22.06% whereas as per the PDMR with breaching value of PLF would be 24.61% which is still higher than actual PLF hence project is additional. Refer tab PLF analysis in ER sheet

APPENDIX 1: CALIBRATION DETAILS

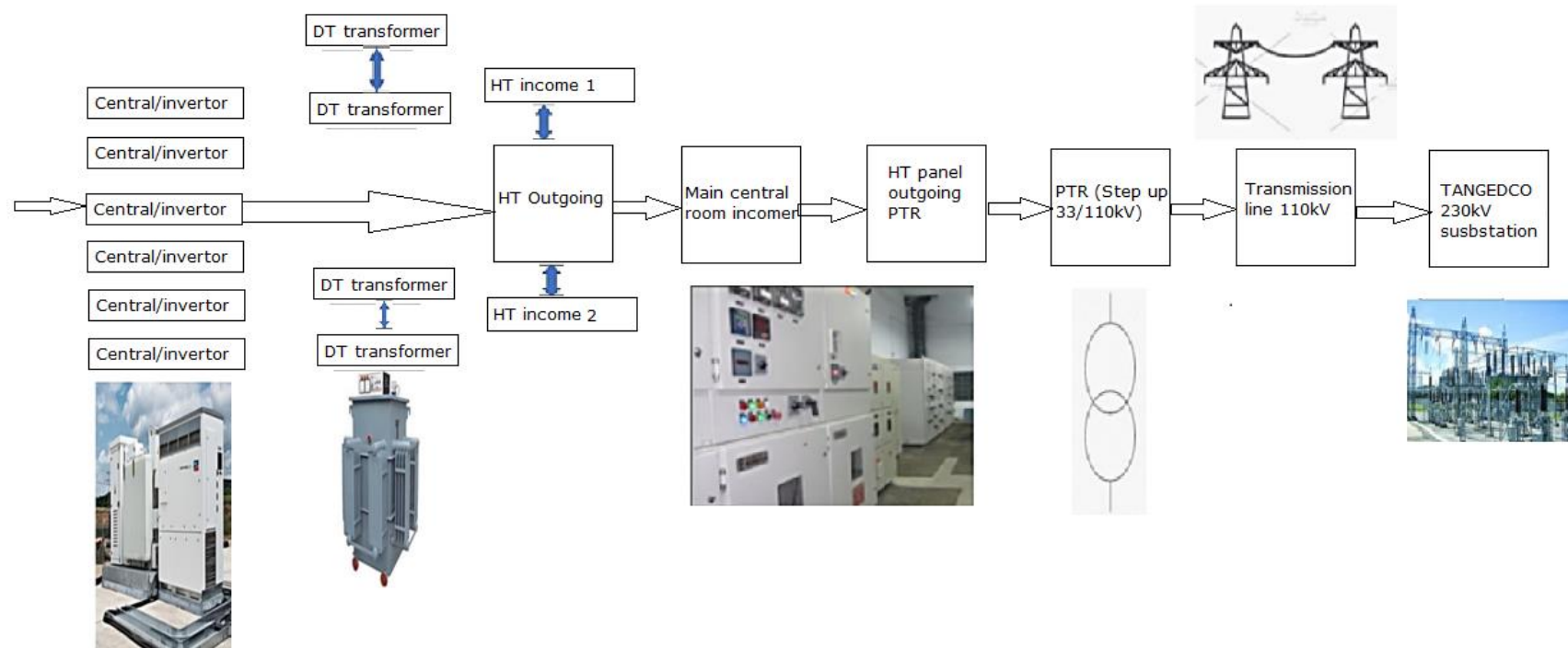
Meter and Calibration details of 50 MW Solar power project by SEI Kathiravan Power Private Limited²⁰

Meter Details	Main Meter	Check Meter	Standby Meter
Meter Serial No	16194542	16194544	16194553
Name of Entity	Measurement India	Measurement India	Measurement India
Meter Make	L & T	L & T	L & T
Type of meter	ER300P	ER300P	ER300P
Calibration done by	Measurematic India	Measurematic India	Measurematic India
Accuracy Class	0.2s	0.2s	0.2s
Date of Subsequent Calibration	24-May-2019	24-May-2019	24-May-2019
Due date of Calibration	23-May-2024	23-May-2024	23-May-2024

* As per registered PDMR & CEA guideline the calibration frequency is once in 5 years however State Utility is carrying out calibration once in a year which is not under the control of PP.

²⁰ As per registered PDMR & CEA guideline the calibration frequency is once in 5 years however State Utility is carrying out calibration once in a year which is not under the control of PP.

APPENDIX 2: PLANT METERING ARRANGEMENT



APPENDIX 3: BREAKDOWN DETAILS

Breakdown details of 50 MW Solar power project by SEI Kathiravan Power Private Limited

S. No.	Reason	2021	2022
1	Power transformer & HT panels	55.04	36.39
2	Manual shutdown for line repairs	-	7.25
3	TNEB grid failure	124.45	47.17
4	110kV line maintenance	51	5.30
5	IDT	58	5.43
6	SCB	22.29	
Total	January-21 to December-22	310.78	101.54

Therefore, the total breakdown in the current monitoring period is approx. 412.32 hrs.

APPENDIX 4: SDG CONTRIBUTION

SDG Contribution of 50 MW Solar power project by SEI Kathiravan Power Private Limited

Months	Total Net Generation (MWh)	Emission Factor(tCO ₂ /MWh)	Emission Reductions(tCO ₂)
	SGD 7		SGD 13
January-21	5,907.00	0.9475	3941.63
February-21	8,409.00	0.9475	4554.52
March-21	9,480.00	0.9475	5589.70
April-21	8,775.00	0.9475	4918.54
May-21	8,214.00	0.9475	4921.72
June-21	8,475.00	0.9475	4282.84
July-21	8,319.00	0.9475	3562.67
August-21	8,121.00	0.9475	3702.38
September-21	8,649.00	0.9475	4135.46
October-21	6,465.00	0.9475	3708.92
November-21	5,157.00	0.9475	2347.56
December-21	8,013.00	0.9475	3631.64
Vintage 2021	93,984.00	0.9475	89,049
January-22	7,926.00	0.9475	7,509.89
February-22	7,827.00	0.9475	7,416.08
March-22	9,726.00	0.9475	9,215.39
April-22	8,547.00	0.9475	8,098.28
May-22	9,066.00	0.9475	8,590.04
June-22	8,958.00	0.9475	8,487.71
July-22	8,433.00	0.9475	7,990.27
August-22	8,372.81	0.9475	7,933.24
September-22	9,286.75	0.9475	8,799.19
October-22	7,365.39	0.9475	6,978.71
November-22	6,723.81	0.9475	6,370.81
December-22	7,007.00	0.9475	6,639.13
Vintage 2022	99,238.76	0.9475	94,029
Total	193,222.76		183,078 (Vintage wise round down)