



Verification and certification report form for CDM project activities

(Version 01.0)

Complete this form in accordance with the "Attachment: Instructions for filling out the verification and certification report form for CDM project activities" at the end of this form.

VERIFICATION AND CERTIFICATION REPORT

Title of the project activity	GHG abatement through Solar Power Generation at Jaisalmer, Rajasthan, India
Reference number of the project activity	7461 ¹
Version number of the verification and certification report	01
Completion date of the verification and certification report	30/10/2017
Monitoring period number and duration of this monitoring period	Monitoring period number:01, Monitoring period: 31/10/2013 to 31/08/2017
Version number of monitoring report to which this report applies	02
Crediting period of the project activity corresponding to this monitoring period	31 Oct 13 - 30 Oct 23 (Fixed)
Project participant(s)	Precision Technik Private Limited
Host Party	India
Sectoral scope(s), selected methodology(ies), and where applicable, selected standardized baseline(s)	Sectoral Scope 1: Energy Industries (renewable - /non-renewable sources) Methodology: - AMS I.D – Grid connected renewable electricity generation – version 17
Estimated GHG emission reductions or net anthropogenic GHG removals for this monitoring period in the registered PDD	30,281tCO _{2e}
Certified GHG emission reductions or net anthropogenic GHG removals for this monitoring period	29,885 tCO _{2e}
Name of DOE	 LGAI Technological Center, S.A. (Applus)
Name, position and signature of the approver of the verification and certification report	Juan Sendín Caballero B.U. Systems Certification Area Manager 

¹ <https://cdm.unfccc.int/Projects/DB/RWTUV1348660371.78/view>

SECTION A. Executive summary

M/s Precision Technik Private Limited (PTPL) incorporated on 19th December 1995 under the Companies Act, 1956 is a part of the Sonthalia Group. The Sonthalia Group is a Kolkata based business house with diversified business interests in Polymers, Textiles & Readymade Garments, Jewellery, Steel, Solar Module manufacturing and Infrastructure Development. PTPL has developed a 5 MW grid connected solar Photo voltaic power project in Nokh Village, Pokhran Tehsil in Jaisalmer District in the State of Rajasthan in Western India. The entire power generated from this project is being sold to NTPC Vidyut Vyapar Nigam (NVVN) by connecting it to state grid through a power purchase agreement with NVVN.

The project activity has been commissioned on 8th February 2012 and is continuing operation since then. During the current monitoring period, 29,885 tCO_{2e} is been displaced.

The project location are described below:

Village : Nokh
 Tehsil: Pokhran
 District : Jaisalmer
 State: Rajasthan
 Country: India

The latitude and longitude of the project are as follows:

Latitude: 26° 54'56.69" N
 Longitude: 70° 54' 30.03" E

The above details are checked by the assessment team during the verification site visit and latitude and longitude are also checked via google earth and GPS meters during the site visit. The detail also forms the part of Monitoring report and thus acceptable to the assessment team.

The technology employed by the Proposed Project Activity includes the usage of poly crystalline-based solar PV modules with an aggregate of 5 MW generation capacity to supply the generated electricity to the NEWNE Grid. The generation and consumption of the Project Activity is monitored continuously through the energy meters at project site & substations. The data is used for the calculation of exports to the grid and imports from the grid.

The above mentioned investors employed the Solar PV Modules of poly crystalline technology for the proposed 5 MW project. The Solar power system has been designed with number of sub main plants, solar PV arrays and inverters of suitable capacity. The electricity exported by the proposed project activity would displace an equivalent amount of electricity generated by the power plants already operational and proposed to be added in the North-East-West-North East (NEWNE) Grid which relies predominantly on fossil fuels. Thus, it contributes towards reduction in the demand-supply gap during periods of electricity shortage and increase in the share of renewable energy in the grid mix.

The solar PV power plant has got solar PV modules, inverters, transformers and other protection system and supporting components as well. The various components of the plant include:

- Solar Photovoltaic modules
- Inverters
- Transformers
- Circuit breakers
- Lightning arrester
- Isolator
- Current transformer

- Switchyard
- LT panel
- Earthing system

The Direct Current (DC) from modules is converted into Alternating Current (AC) by inverters. The inverter outputs are fed into a junction box, which in turn is connected to the LV Panel in the control room. The output from LV Panel is stepped up by outdoor type transformers located near the control

room. The HV side of transformer is connected to HT Panel in the control room. The LV and HT Panels have all necessary metering and protection as per Power evacuation schematic.

- 5 MW divided into 5 number of 1 MW
- 1 MW divided in to 2 number of 500 KW inverter
- 500 kw system is connected by 113 strings of solar panel
- Each string consists of 22 solar modules connected in series

Basic System Design:

Parameter	Specifications
Power Generation Units	5 no's each with a proposed capacity of 1MW.
Inverter	Each of the 1 MW units are divided into 2 nos of 500 kW each. Inverter input voltage range 500-820 volt
Modules	230 Wp 30 volts modules have been used. 4348 modules (1 MW) have been used.
Strings	String voltage is 660 volt, 226 strings per MW have been used
Wires	Each inverter has got 5 wires

The plant is connected to RVPN's 132 kV GSS (PS-2) District Jodhpur, the metering equipment installed at delivery points having the main meter and check meter serial number 11071570 and 11071571 respectively.

1. Verification Scope: The verification scope encompasses an independent and objective review and ex-post determination of the monitored reductions in GHG emissions by the DOE. The verification is based on the submitted monitoring report, the validated and registered PDD as well as its validation report, the applied monitoring methodology, relevant decisions, clarifications and guidance from the CMP and the EB and any other information and references relevant to the project activity's resulting emission reductions. These documents are reviewed against the requirements of the Kyoto Protocol, the CDM Modalities and Procedures and related rules and guidance. Based on the requirements in the VVS version 01.0, Applus+ LGAI has applied a rule-based approach for the verification of the project. The principles of accuracy, completeness, relevance, reliability and credibility were combined with a conservative approach to establish a traceable and transparent verification opinion. The verification considers both quantitative and qualitative information on emission reductions. The verification is not meant to provide any consultancy towards the client. However, stated requests for clarifications, corrective and/or forward actions may provide input for improvement of the monitoring activities.

2. Methodology:

Applus+ LGAI's approach to the verification is a two-stage process.

In the 1st stage, Applus+ LGAI completed a strategic review and risk assessment of the projects activities and processes in order to gain a full understanding of:

- Activities associated with all the sources contributing to the project emissions and emission reductions, including leakage if relevant;
- Protocols used to estimate or measure GHG emissions from these sources;
- Collection and handling of data;
- Controls on the collection and handling of data;
- Means of verifying reported data; and
- Compilation of the monitoring report.

Applus+ LGAI used a periodical Verification Checklist which, based on the risk-based assessment of the parameters and data collection and handling processes for each of those parameters, describes the verification approach and the sampling plan.

In the 2nd stage, using the Verification Checklist, Applus+ LGAI verified the implementation of the monitoring plan and the data presented in the Monitoring Report for the period in question. This involved a site visit and a desk review of the Monitoring Report. This Verification Report describes the findings of this assessment.

Assessment team

According to the sectoral scopes / technical area and experiences in the sectoral or national business environment, Applus+ LGAI has composed a project assessment team in accordance with the appointment rules in Applus+ LGAI complying with EB's requirements. The composition of assessment team has to be approved by the Applus+ LGAI ensuring that the required skills are covered by the team. The four qualification levels for team members that are assigned by formal appointment rules as below:

- Leader Auditor (LA)
- Auditor (A)
- Auditor Trainee (T)
- Technical Experts (E)

The detail is mentioned below is section B of this report. The CV of personal are incorporated in Appendix 2 of this report.

3. Review of Documentation:

The Monitoring Report version 01 submitted by the PP was made publicly available on the UNFCCC website before the verification activities started. The published MR was assessed based on all the relevant documents. The aim of the assessment in the desk review was to:

- verify the completeness of the data and the information presented in the MR;
- Check the compliance of the MR with respect to the monitoring plan depicted in the registered PDD and verify that the applied methodology was carried out. Particular attention to the frequency of measurements, the quality of the metering equipment including calibration requirements, and the quality assurance and quality control procedures was paid;
- Evaluate the data management and the quality assurance and quality control system in the context of their influence on the generation and reporting of emission reductions.

A complete list of documents reviewed is available in Appendix 3 of this report.

4. On-site Assessment and follow-up Interviews:

As a part of the verification, the on-site inspection has been performed by the assessment team.

The objective of the on-site assessment is to:

- confirm the implementation and operation of the project;
- review the data flow for generating, aggregating and reporting the monitoring parameters;
- confirm the correct implementation of procedures for operations and data collection;

- cross-check the information provided in the MR documentation with other sources;
- check the monitoring equipment against the requirements of the PDD and the approved methodology, including calibrations, maintenance, etc.;
- review the calculations and assumptions used to obtain the GHG data and ER;
- Identify if the quality control and quality assurance procedures are in place to prevent or correct errors or omissions in the reported parameters.

The details are mentioned in section D.2 of this report.

5. Quality of Evidences

Sufficient evidence covering the full verification period in the required frequency is available to verify the figures stated in the final MR. The source of the evidences will be discussed in Appendix 3 of this report. Specific cross-checks have been done in cases that further sources were available. The monitoring report's figures were checked by the assessment team against the raw data. The data collection system meets the requirements of the monitoring plan as per the methodology.

6. Reporting of Findings

As an outcome of the verification process, the assessment team can raise different types of findings.

Where a non-conformance arises the assessment team shall raise a Corrective Action Request (CAR). A CAR is issued, where:

- a) Non-compliance with the monitoring plan or methodology are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;
- b) Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;
- c) Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions;
- d) Issues identified in a FAR during validation to be verified during verification or previous verification(s) have not been resolved by the project participants.

The assessment team shall raise a Clarification Request (CL) if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met.

All CARs and CLs raised during verification shall be resolved prior to submitting a request for issuance.

Forward Action Requests (FARs) may be raised during verification for actions where the monitoring and reporting require attention and/or adjustment for the next verification period. All the CARs/CLs are being discussed in Appendix 4 of this report

7. Internal Quality Control

As a final step of verification, the final documentation including the verification report has to undergo an internal quality control by the Technical Reviewer. Each report has to be finally approved either by the DOE's Technical Manager or the Deputy. In case one of these two persons is part of the assessment team, the approval can only be given by the person who is not a part of the assessment team. If the documents have been satisfactorily approved, the request of issuance is submitted to CDM EB along with the requisite documents.

SECTION B. Verification team, technical reviewer and approver**B.1. Verification team member**

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)	Involvement in			
						Desk review	On-site inspection	Interview(s)	Verification findings
1.	Team Leader	OR	DAS	SUKANTA	True Quality Certifications private Limited-Outsourced entity	Yes	Yes	Yes	Yes

B.2. Technical reviewer and approver of the verification and certification report

No.	Role	Type of resource	Last name	First name	Affiliation (e.g. name of central or other office of DOE or outsourced entity)
1	Technical reviewer	IR	Shen	Simon	Applus+LGA
2.	Approver	IR	Sendin Caballero	Juan	Applus+LGA

SECTION C. Application of materiality**C.1. Consideration of materiality in planning the verification**

No.	Risk that could lead to material errors, omissions or misstatements	Assessment of the risk		Response to the risk in the verification plan and/or sampling plan
		Risk level	Justification	
1	Human errors: Readings from Meters (if not automatic)	LOW	Human error is likely to occur if the monitoring personnel are not trained well or inexperienced in data recording procedures and monitoring processes.	All the personal are well trained to monitor and collect data and thus risk associated with Human error is minimized. Assessment team checked the training records to confirm that all the personal are well trained to handle the activities related to monitoring. Assessment team checked the training records

				for the complete monitoring period and confirm that the personal are well trained to monitor and collect data for the project activity.
2	Human error: Quantification of emission reduction	LOW	Use of spreadsheets without adequate data control, changes/updates, version tracking, traceability and security	All the JMR sheets and the invoices for the complete monitoring period are checked and thus the assessment team confirms that the ER value is conservative and correct.

C.2. Consideration of materiality in conducting the verification

In line with Guidelines for Application of materiality in verifications, the verification team has conducted a complete verification of all the information presented in the monitoring report and data monitored as presented in the emission reduction calculation spread sheet. It invoices follows the paper trail back to the raw data such as meter reading records and invoices. There are no material errors, omission or misstatement.

SECTION D. Means of verification

D.1. Desk review

The verification was performed primarily based on the review of the monitoring report and the supporting documentation. This process included review of data and information presented to verify their completeness and review of the monitoring plan and monitoring methodology, paying particular attention to the frequency of measurements, the quality of metering equipment used including calibration requirements, and the QA/QC procedures, and an evaluation of data management and the QA/QC system in the context of their influence on the generation and reporting of emission reduction.

The initial MR Version 1.0 submitted by the project participant and additional background documents related to the emission reductions are reviewed as an initial step of the verification process. The subsequent step involved the identification of corrective action requests and clarification requests (CAR and CR) which are presented in Appendix 4 of this report. As a result of these findings, the MR is revised to MR Version 2.0. A complete list of all documents and records reviewed is as attached in Appendix 03 of this report.

D.2. On-site inspection

Duration of on-site inspection: 07/10/2017 to 08/10/2017				
No.	Activity performed on-site	Site location	Date	Team member
1.	The verification team conducted visits to the project site on 07/10/2017 to 08/10/2017 to confirm the information and to resolve issues identified in the document review. An on-site assessment was conducted as a part of verification activity and involved: 1) an assessment of the implementation and operation of the CDM project activity as per the registered PDD 2) a review of information flows for generating, aggregating and reporting of the monitoring parameters 3) interviews with relevant personnel to confirm that the operational and data collection procedures are implemented in accordance with the Monitoring Plan 4) a cross-check between information provided in the MR and data from other sources 5) a check of the monitoring equipment including calibration performance, and observations of monitoring practices against the requirements of the PDD and the applied methodology 6) a review of calculations and assumptions made in determining the GHG data and ERs, and 7) an identification of QA/QC procedures in place to prevent, or identify and correct, any errors or omissions in the reported monitoring parameters	The project location are described below: Village : Nokh Tehsil: Pokhran District : Jaisalmer State: Rajasthan Country: India	07/10/2017 to 08/10/2017	Mr. Sukanta Das

D.3. Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Kumar	Yogesh	Site In-charge- (Rajasthan), PTPL	07/10/2017 to 08/10/2017	As described above in section D.2 of this report	Mr. Sukanta Das

D.4. Sampling approach

No sampling is used as the verification team has visited solar site along with the substations. The verification team has reviewed all the documents like commissioning certificates, Energy injection certificate, invoices etc.

D.5. Clarification requests, corrective action requests and forward action requests raised

Areas of verification findings	No. of CL	No. of CAR	No. of FAR
Compliance of the monitoring report with the monitoring report form	00	00	00
Compliance of the project implementation with the registered PDD	00	01	00
Post-registration changes	00	00	00
Compliance of the monitoring plan with the monitoring methodology including applicable tool and standardized baseline	00	00	00
Compliance of monitoring activities with the registered monitoring plan	00	00	00
Compliance with the calibration frequency requirements for measuring instruments	00	01	00
Assessment of data and calculation of emission reductions or net removals	00	02	00
Others:	00	01	00
1. Matter related to power plant break down.			
Total	00	05	00

SECTION E. Verification findings**E.1. Compliance of the monitoring report with the monitoring report form**

Means of verification	The verification team has determined whether the monitoring report was completed using the valid version of the applicable monitoring report form. The verification team has checked whether all the sections of the monitoring report follows the guidelines provided in the template.
Findings	No finding raised for the present verification.
Conclusion	PP has used the version 06.0 of the MR form which is the current and active version. The monitoring report has been prepared as per the instructions provided in the template. DOE has made the version 1.0 of the monitoring report covering the monitoring period from 31/10/2013 to 31/08/2017 publicly available on 12/09/2017 through its dedicated interface on the UNFCCC CDM website before undertaking the site visit for the verification from 07/10/2017 to 08/10/2017. The verification team has concluded that the monitoring report was completed using the valid version of the applicable monitoring report form and is followed the guidelines contained in the template.

E.2. Remaining forward action requests from validation and/or previous verification

This is 1st verification. No FAR was raised during the validation of the project activity.

E.3. Compliance of the project implementation with the registered project design document

Means of verification	The verification team determined the conformity of the actual implemented project activity and its operation with the registered project design document. DOE has, by means of a desk review and an on-site visit, assessed whether all physical features of the proposed CDM project activity proposed in the registered PDD are in place, and that the project participants have operated the CDM project activity as per the registered PDD
Findings	CAR 1 was raised during the verification process and closed successfully. Please refer below Appendix 4 for the closure of the CAR.
Conclusion	The verification team has reviewed the commissioning certificates to conclude that the capacity of the project is same as mentioned in the registered PDD. The capacity does not change after the registration of the project activity as confirmed by the assessment team during verification site visit. The project is a small scale project activity and the same is confirmed by the DOE during the onsite visit. The above mentioned investors employed the Solar PV Modules of poly crystalline

technology for the proposed 5 MW project. The Solar power system has been designed with number of sub main plants, solar PV arrays and inverters of suitable capacity. The electricity exported by the proposed project activity would displace an equivalent amount of electricity generated by the power plants already operational and proposed to be added in the North-East-West-North East (NEWNE) Grid which relies predominantly on fossil fuels. Thus, it contributes towards reduction in the demand-supply gap during periods of electricity shortage and increase in the share of renewable energy in the grid mix.

The solar PV power plant has got solar PV modules, inverters, transformers and other protection system and supporting components as well. The various components of the plant include:

- Solar Photovoltaic modules
- Inverters
- Transformers
- Circuit breakers
- Lightning arrester
- Isolator
- Current transformer
- Switchyard
- LT panel
- Earthing system

The Direct Current (DC) from modules is converted into Alternating Current (AC) by inverters. The inverter outputs are fed into a junction box, which in turn is connected to the LV Panel in the control room. The output from LV Panel is stepped up by outdoor type transformers located near the control room.

The HV side of transformer is connected to HT Panel in the control room. The LV and HT Panels have all necessary metering and protection as per Power evacuation schematic.

- 5 MW divided into 5 number of 1 MW
- 1 MW divided in to 2 number of 500 KW inverter
- 500 kw system is connected by 113 strings of solar panel
- Each string consists of 22 solar modules connected in series

Basic System Design:

Parameter	Specifications
Power Generation Units	5 no's each with a proposed capacity of 1MW.
Inverter	Each of the 1 MW units are divided into 2 nos of 500 kW each. Inverter input voltage range 500-820 volt
Modules	230 Wp 30 volts modules have been used. 4348 modules (1 MW) have been used.
Strings	String voltage is 660 volt, 226 strings per MW have been used
Wires	Each inverter has got 5 wires

The plant is connected to RVPN's 132 kV GSS (PS-2) District Jodhpur, the metering equipment installed at delivery points having the main meter and check meter serial number 11071570 and 11071571 respectively.

The project location are described below:

Village : Nokh
 Tehsil: Pokhran
 District : Jaisalmer
 State: Rajasthan
 Country: India

	The latitude and longitude of the project are as follows: Latitude: 26° 54'56.69" N Longitude: 70° 54' 30.03" E The above details are checked by the assessment team during the verification site visit and latitude and longitude are also checked via google earth and GPS meters during the site visit. The detail also forms the part of Monitoring report and thus acceptable to the assessment team. Based on the documentary evidence of commissioning certificates and physical verification DOE concludes that the project was implemented as per the registered PDD.
--	--

E.4. Post-registration changes

E.4.1. Temporary deviations from the registered monitoring plan, monitoring methodology or standardized baseline

There are no temporary deviations observed for this monitoring period.

E.4.2. Corrections

No correction approval is required from EB.

E.4.3. Changes to the start date of the crediting period

This is 1st periodic verification. The project activity involves change in start date of crediting period. The start date of crediting period is already changed from 31 Oct 12 - 30 Oct 22 to 31 Oct 13 - 30 Oct 23 (Fixed) and same can be seen from project UN web page.

<https://cdm.unfccc.int/Projects/DB/RWTUV1348660371.78/view>

E.4.4. Inclusion of a monitoring plan to a registered project activity

Not applicable for the project activity.

E.4.5. Permanent changes from registered monitoring plan, monitoring methodology or standardized baseline

Not applicable for this project activity.

E.4.6. Changes to the project design of a registered project activity

No change in project design for the current monitoring period.

E.4.7. Types of changes specific to afforestation and reforestation project activities

Not applicable for this project activity.

E.5. Compliance of monitoring plan with the monitoring methodology including applicable tool and standardized baseline

Means of verification	The verification team determined whether the registered monitoring plan is in accordance with the applied methodology AMS I.D version 17 including applicable tools.
Findings	No finding was raised regarding Compliance of monitoring plan with the monitoring methodology including applicable tool and standardized baseline.
Conclusion	The verification team was able to confirm that the monitoring plan contained in the registered PDD is in accordance with the approved methodology applied by the project activity, i.e. AMS I.D version 17 and its applicable tools.

E.6. Compliance of monitoring activities with the registered monitoring plan

E.6.1. Data and parameters fixed ex ante or at renewal of crediting period

Means of verification	The assessment team checked the registered PDD to confirm the ex-ante fixed
------------------------------	---

	parameter mentioned in the current monitoring report. Assessment team also interviewed the personal onsite to check further regarding the ex-ante values used for emission reduction calculation.
Findings	No findings were raised regarding the same.
Conclusion	EF_{grid, CM, y} / EF_{grid, CO2, y}, EF_{grid, BM, y}, EF_{grid, OM, y} were mentioned as ex-ante fixed parameter. Assessment team checked the values, source of data, choice of data, purpose of the data mentioned in the MR from the registered PDD and confirms that the similar approach was considered for the current monitoring period also. 1. EF_{grid, OM, y}: Operating Margin emissions factor for grid connected power generation in year y calculated using the latest version of "Tool to calculate the emission factor for an electricity system." EF_{grid, OM, y} is computed using the Simple Operating margin CO₂ emission factor. Simple Operating margin CO₂ emission factor is calculated from the weighted average CO₂ emissions per unit net electricity generation of all power plants serving the system, not including low-cost / must-run. This is in agreement with the guidance provided in the Tool to calculate the emission factor for an electricity system. The value is considered from CEA version 06 and registered PDD. Assessment team checked the registered PDD and found that value considered for emission reduction calculation in this present monitoring period is sourced from the registered PDD. Thus assessment team conclude that the emission reduction calculation for the present monitoring period is conservative and correct. 2. EF_{grid, BM, y}: Build Margin emissions factor for grid connected power generation in year y calculated using the latest version of "Tool to calculate the emission factor for an electricity system. Build margin emission factor is the generation-weighted average emission factor of all power plants <i>m</i> during the most recent year <i>y</i> for which generation data is available. Equation 13 of Tool to calculate the emission factor for an electricity system is used to calculate EF_{grid, BM, y}. The value is considered from CEA version 06 and registered PDD. Assessment team checked the registered PDD and found that value considered for emission reduction calculation in this present monitoring period is sourced from the registered PDD. Thus assessment team conclude that the emission reduction calculation for the present monitoring period is conservative and correct. 3. EF_{grid, CM, y} / EF_{grid, CO2, y}: Combined Margin emissions factor for grid connected power generation in year y calculated using the latest version of "Tool to calculate the emission factor for an electricity system." EF_{grid, CM, y} is computed using the official data sources and is in-line with the guidance provided in the tool. The value is considered from CEA version 06 and registered PDD. Assessment team checked the registered PDD and found that value considered for emission reduction calculation in this present monitoring period is sourced from the registered PDD. Thus assessment team conclude that the emission reduction calculation for the present monitoring period is conservative and correct. The value for EF_{grid, CM, y} / EF_{grid, CO2, y}, EF_{grid, BM, y}, EF_{grid, OM, y} were considered from the CO₂ baseline database (Version 06) published by Central Electricity Authority (CEA). The default value as mentioned in the registered PDD and MR are same. The value of combined margin in India is being given by CEA and thus assessment team conclude that the value is correct and appropriate. The default value in turn is used for baseline calculation as per the formula given in the registered PDD for the current monitoring period.

E.6.2. Data and parameters monitored

Means of verification	The assessment team checked the registered PDD to confirm the ex-post parameter mentioned in the current monitoring report. Assessment team also interviewed the personal onsite to check further regarding the ex-post parameter
------------------------------	---

	monitoring and confirms that the same is in line with the registered PDD. AMS.I.D version 17 which was the applied methodology during the registration of the project is also checked to ensure that monitoring parameter as mentioned in the registered PDD and current MR are in compliance with the methodology.
Findings	No findings were raised regarding this issue.
Conclusion	As per the registered monitoring plan and requirement of the registered methodology following parameters needs to be monitored: 1. EG_{BL,y}: Net electricity supplied to the grid by the project activity in year y The parameter is a calculated using the difference of export and import value measured from the electricity meter. The source of data of the parameter is Measured by the meter and as noted in the JMR provided by the agency. Electricity export and import is measured via Bi-directional electricity meter installed on the high tension side of the transformer and the value of export and import forms the part of Meter reading statement issued by State electricity board. The meter reading is taken during a fixed billing cycle of every month and representative of state electricity board and Operation and maintenance personal onsite present during the process. Assessment team checked all the values of the electricity exported and electricity imported from the Meter reading statement issued by State electricity board. The electricity meters are under the custody of the DISCOM and calibrated by DISCOM as per their standard procedures. However, project proponent had ensured that the meters calibrated at least once in three years. The meters are calibrated in line with Indian regulations for such installations. Accuracy of the meters is 0.2S. The accuracy class of active energy measurement is in accordance to Indian national Standards. The meter is of Larson and turbo make which is confirmed by the assessment team during the verification site visit. The net electricity exported to the grid is then calculated from the difference of export and import value. The value of EG_{BL,y} is then cross checked from the invoices raised to state electricity board by the project participant. The invoices also matched with EG_{BL,y} calculated from export and import values which is in accordance with approved methodology and registered PDD. The parameter is a calculated using the difference of export and import value measured from the electricity meter. The parameter also forms the part of JMR as in line with the registered PDD. The value can also be cross check from the invoice details as per the requirement of applied methodology and registered PDD. As the parameter is a calculated value hence calibration is not applicable and the data will be kept for two years after the end of the crediting period or the last issuance of CERs for this project activity, whichever occurs later.

E.6.3. Implementation of sampling plan

Means of verification	The verification assessed whether the compliance of the sampling efforts and surveys with the registered sampling plan in accordance with the "Standard for sampling and surveys for CDM project activities and programme of activities" if PP had applied a sampling approach to determine data and parameters monitored.
Findings	There is no CAR/CL raised in this section.
Conclusion	PP did not apply sampling plan to determine data and parameters monitored during this monitoring period. The verification team has checked all the documents such as JMR report, invoice etc. and hence sampling plan was not required. The verification team hereby confirms that it checked all the documents

E.7. Compliance with the calibration frequency requirements for measuring instruments

Means of verification	The verification team determined whether the calibration of the measuring equipment that has an impact on the claimed emission reductions is conducted by the PP at a frequency specified in the registered monitoring plan.
Findings	CAR 03 was raised during the verification process and closed successfully. Please refer Appendix 4 of this report for the detail closure of the CAR.
Conclusion	Assessment team checked the calibration details of the installed meters and found that meters were calibrated as per the frequency mentioned in the registered PDD. The calibration is conducted by Yadav Measurement private Limited on behalf of

DISCOM. The calibration agency follows the guideline for National Accreditation Board for Testing and Calibration Laboratories (NABL= <http://www.nabl-india.org/>), Govt of India.

The electricity meters are under the custody of the DISCOM and calibrated by DISCOM as per their standard procedures. However, project proponent had ensured that the meters calibrated at least once in three years which is as per the registered PDD. The calibration details of meters involved in the project activity is tabulated below:

Location Type	Serial Number	Make	Accuracy Class	Calibration Date	Calibration Due Date
Main Meter	11071570	Larsen & Turbo Limited	0.2s	26 December 2011	25 December 2014
Check Meter	11071571	Larsen & Turbo Limited	0.2s	26 December 2011	25 December 2014
Main Meter	11071570	Larsen & Turbo Limited	0.2s	30 November 2014	29 November 2017
Check Meter	11071571	Larsen & Turbo Limited	0.2s	30 November 2014	29 November 2017

E.8. Assessment of data and calculation of emission reductions or net removals

E.8.1. Calculation of baseline GHG emissions or baseline net GHG removals by sinks

Means of verification	The verification team assessed whether the data and calculations of GHG emission reductions achieved resulting from the registered CDM project activity. The verification team has checked whether calculations of baseline GHG emissions, project GHG emissions and leakage GHG emissions have been carried out in accordance with the formulae and methods described in the registered monitoring plan
Findings	CAR 04 and CAR 05 was raised during the verification process. The description of the CAR and its closure is described below in Appendix 4 of this report
Conclusion	Baseline emission (BE_y): The baseline emissions is the product of electrical energy baseline $EG_{BL,y}$, expressed in MWh of electricity produced by the renewable generating unit multiplied by the grid emission factor. Baseline emission factor is calculated as combined margin, consisting of a combination of operating margin (OM) and build margin (BM) factors. $BE_y = EG_{BL,y} \times EF_{CO_2,grid,y}$ Where, BE_y is the baseline emissions in year y, tCO₂ $EG_{BL,y}$ is the quantity of net electricity supplied to the grid as a result of the implementation of the CDM project activity in year y (MWh) $EF_{CO_2,grid,y}$ is the CO₂ emission factor of the grid in year y, tCO₂/MWh Therefore,

$$BE_y = 31,524.283 \times 0.9480$$

$$BE_y = 29,885 \text{ tCO}_2\text{e}$$

NOTE: The current monitoring period starts from 31/10/2013 which does not matches with the monthly meter reading date. Therefore, the net electricity exported is calculated from apportioning the net electricity exported to grid, as recorded in the consolidated JMR Report certified by the state DISCOM, based on the number of days in the monitoring period (1 day electricity data for 31/10/2013) and the number of days (31 days data for 01/01/2013 to 31/10/2013) for which JMR Report was prepared.

Apportioning methodology used:

Apportioning of net electricity generation from each WTG connected to NEWNE grid is then determined as follows:

1	Apportioning Ratio	=	Electricity exported from No. of days present in monitoring period during the Oct 2013 to the electricity exported in the month of Oct 2013.
2	Electricity Import (EG import)	=	Total import is been considered during the month of Oct 2013 for the conservative approach.
3	Electricity Export to the grid (EG export)	=	Apportioning Ratio * Total Electricity export as per JMR during the Oct 2013
4	Net electricity generated by WTG	=	(Apportioning Ratio * Total Electricity export as per JMR during Oct 2013) - Total import during Oct 2013

The calculated value after apportioning is used for calculation of baseline emission during that period. Assessment team find the approach to be correct and appropriate and thus the calculation of baseline emission is correct.

E.8.2. Calculation of project GHG emissions or actual net GHG removals by sinks

Means of verification	The verification team assessed whether the data and calculations of GHG emission reductions achieved resulting from the registered CDM project activity. The verification team has checked whether calculations of baseline GHG emissions, project GHG emissions and leakage GHG emissions have been carried out in accordance with the formulae and methods described in the registered monitoring plan.
Findings	No findings raised
Conclusion	Project emission is zero as per the requirement of the methodology and registered PDD

E.8.3. Calculation of leakage GHG emissions

Means of verification	The verification team assessed whether the data and calculations of GHG emission reductions achieved resulting from the registered CDM project activity. The verification team has checked whether calculations of baseline GHG emissions, project GHG emissions and leakage GHG emissions have been carried out in accordance with the formulae and methods described in the registered monitoring plan
Findings	No findings were raised.
Conclusion	The leakage emissions are regarded as zero according to the applied methodology and registered PDD.

E.8.4. Summary of calculation of GHG emission reductions or net anthropogenic GHG removals by sinks

Means of verification	The verification team assessed whether the data and calculations of GHG emission reductions achieved resulting from the registered CDM project activity. The verification team has checked whether calculations of baseline GHG emissions, project GHG emissions and leakage GHG emissions have been carried out in
------------------------------	---

	accordance with the formulae and methods described in the registered monitoring plan.
Findings	There is no CAR/CL raised in this section.
Conclusion	Emission reductions in this monitoring period are: Total Baseline Emissions: 29,885tCO₂e Total Project Emission: 0 Total Leakage: 0 Total Emission Reduction: Emission reduction calculation is done based on following formula, $\text{Emission reduction (ER}_y\text{)} = \text{Baseline Emission (BE}_y\text{)} - \text{Project Emission (PE}_y\text{)} - \text{Leakage Emission (L}_y\text{)}$ $= 29,885\text{tCO}_2\text{e}$

E.8.5. Comparison of actual GHG emission reductions or net anthropogenic GHG removals by sinks with estimates in registered PDD

Means of verification	The verification team has determined the CER achieved during this monitoring period with the estimated value and reason for increase if any.
Findings	No findings raised
Conclusion	The actual CER is 1.31% less than the estimated value. The reduction is CER is due to lower PLF (=Plant Load Factor) in the region.

E.8.6. Remarks on difference from estimated value in registered PDD

Means of verification	The verification team has determined the CER achieved during this monitoring period with the estimated value and reason for increase if any.
Findings	No findings raised
Conclusion	The actual CER is 1.31% less than the estimated value. The reduction is CER is due to lower PLF (=Plant Load Factor) in the region.

E.8.7. Actual GHG emission reductions or net anthropogenic GHG removals by sinks during the first commitment period and the period from 1 January 2013 onwards

Means of verification	The verification team has determined the CER achieved during first commitment period and second commitment period
Findings	There is no CAR/CL raised in this section.
Conclusion	1. GHG emission reductions or net GHG removals by sinks reported up to 31 December 2012: 0 tCO₂e 2. GHG emission reductions or net GHG removals by sinks reported from 1 January 2013 onwards: 29,885 tCO₂e

SECTION F. Internal quality control

As a final step of verification, the final documentation including the verification report has to undergo an internal quality control by the Technical Reviewer. Each report has to be finally approved either by the DOE's Technical Manager or the Deputy. In case one of these two persons is part of the assessment team, the approval can only be given by the person who is not a part of the assessment team. If the documents have been satisfactorily approved, the request of issuance is submitted to CDM EB along with the requisite documents

SECTION G. Verification opinion

Applus+ LGAI has been engaged by M/s Precision Technik Private Limited (PTPL) to perform the 1st periodical verification of the "GHG abatement through Solar Power Generation at Jaisalmer, Rajasthan, India (UNFCCC reference number: 7461)

The management of M/s M/s Precision Technik Private Limited (PTPL) is responsible for the preparation of the GHG emissions data and the reported GHG emissions reductions on the basis set out within the project's Monitoring Plan in the registered PDD version 03 completed on 18/07/2012 and the applied methodology AMS.I.D version 17.

Our verification approach was based on the requirements as defined under the Kyoto Protocol, Marrakesh accord, as well as those defined by the CDM Executive Board. Our approach is risk-

based, drawing on an understanding of the risks associated with reporting GHG emissions data and the controls in place to mitigate these. The verification can confirm that:

- the project is operated as planned and described in the project design document approved by the EB;
- the monitoring plan is as per the applied methodology;
- the monitoring in Monitoring Report is as per the PDD and the monitoring plan approved by the EB;
- the development and maintenance of records and reporting procedures are in accordance with the registered monitoring plan;
- the installed equipment being essential for generating emission reduction runs reliably and is calibrated appropriately;
- the monitoring system is in place and generates GHG emission reductions data;
- the GHG emission reductions are calculated without material misstatements.

In our opinion, the GHG emission reductions for “GHG abatement through Solar Power Generation at Jaisalmer, Rajasthan, India “ for the monitoring period 31/10/2013 to 31/08/2017 as reported in Monitoring Report, prepared on the basis of the project’s Monitoring Plan are fairly stated.

Based on the information we have seen and evaluated, we confirm the following statement:

Reporting period: From 31/10/2013 to 31/08/2017

Verified emissions in the above reporting period:

Leakage emissions	0 tCO ₂ equivalents
Project emissions	0 tCO ₂ equivalents
Baseline emissions	29,885 tCO ₂ equivalents
Emission reductions	29,885 tCO₂equivalents

SECTION H. Certification statement

Same as above

Appendix 1. Abbreviations

Abbreviations	Full texts
BM	Build Margin
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CER	Certified Emission Reduction(s)
CEA	Central Electricity Authority
CL	Clarification request
CM	Combined Margin
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNA	Designated National Authority
DOE	Designated Operational Entity
DISCOM	Distribution Company (<i>India</i>)
DR	Document Review
EF	Emission Factor
EIA	Environmental Impact Assessment
ER	Emission Reductions sheet
FAR	Forward Action Request
JMR	Joint Meter reading
GHG	Greenhouse gas(es)
GWP	Global Warming potential
RBI	Reserve Bank Of India
PP	Project Participant
PPA	Power purchase agreement

PTPL	Precision Technik Private Limited
------	-----------------------------------

Appendix 2. Competence of team members and technical reviewers

1. Mr. Sukanta DAS, has done M. SC in (Electronics and Photonics) and M. Tech in (Energy technology) from Tezpur Central University/ Indian Institute of technology Bombay in India. He is a certified lead auditor for ISO 14001 EMS LA and ISO 9001 QMS LA from International registry for Certified Auditors (IRCA) and Certified Lean Management practitioner from Quality Council of India (QCI). He has more than eight years of working experience at TUV NoRD/ Re-consult/CRA/APPLUS certifications under various categories of projects stating from Renewable to waste to supercritical projects. He was JI/ CDM Lead Assessor in TUV NoRD and was involved in more than 100 CDM validation and verifications activities in Gold Standard, VCS, CDM projects as a team leader/technical reviewer / validator / verifier covering the sectoral scope 1, 13 technical areas 1.2/1.1/13.1. Currently he is associated with True Quality Certifications Private Limited and is empanelled with APPLUS certification to carry out GHG audit.
2. Meng (Simon) Shen (Master Degree in Thermal Energy Engineering, Bachelor Degree in Environmental Engineering) is a Lead Auditor appointed by Applus+ LGAI for the GHG project assessment. He is based in Shanghai. He has several years of work experience in environmental protection field. Before he joined Applus+ LGAI, he had been worked for TÜV SÜD as a GHG Validator/Assessment team and ISO 9001/14001 Lead Auditor for 3.5 years

Appendix 3. Documents reviewed or referenced

N o.	Auth or	Title	References to the document	Provide r
1	NA	Commissioning certificates of the solar power plant	The commissioning certificate is dated 8th February 2012	Project participant
2	NA	Contract of the project participant with the DOE	Contract document signed between PP and DOE	Project participant
3	NA	VVS standard-version 01	UNFCCC web site	UNFCCC
4	NA	Joint Meter reading and Invoices for the complete monitoring period	Joint Meter reading and Invoices for the complete monitoring period	Project participant
5	NA	MR version 01 MR version 02	MR version 01 dated 12/09/2017 MR version 02 dated 11/10/2017	Project participant
6	NA	ER sheet version 01 ER sheet version 02	ER sheet version 01 dated 12/09/2017 ER sheet version 02 dated 11/10/2017	Project participant
7	NA	Actual geo-coordinates by GE	Actual coordinates for the project activity via GPS meters	Project participant
8	NA	Break Down details of both the Units	Log book records onsite	Project participant
9	NA	Guidelines for Application of materiality in verifications version 2.0	UNFCCC web site	UNFCCC

10	NA	Calibration details for the complete monitoring period	Calibration certificates for the installed meters	Project participant																														
			<table><tr><th>Location Type</th><th>Serial Number</th><th>Make</th><th>Accuracy Class</th><th>Calibration Date</th><th>Calibration Due Date</th></tr><tr><td>Main Meter</td><td>11071570</td><td>Larsen & Turbo Limited</td><td>0.2s</td><td>26 December 2011</td><td>25 December 2014</td></tr><tr><td>Check Meter</td><td>11071571</td><td>Larsen & Turbo Limited</td><td>0.2s</td><td>26 December 2011</td><td>25 December 2014</td></tr><tr><td>Main Meter</td><td>11071570</td><td>Larsen & Turbo Limited</td><td>0.2s</td><td>30 November 2014</td><td>29 November 2017</td></tr><tr><td>Check Meter</td><td>11071571</td><td>Larsen & Turbo Limited</td><td>0.2s</td><td>30 November 2014</td><td>29 November 2017</td></tr></table>	Location Type	Serial Number	Make	Accuracy Class	Calibration Date	Calibration Due Date	Main Meter	11071570	Larsen & Turbo Limited	0.2s	26 December 2011	25 December 2014	Check Meter	11071571	Larsen & Turbo Limited	0.2s	26 December 2011	25 December 2014	Main Meter	11071570	Larsen & Turbo Limited	0.2s	30 November 2014	29 November 2017	Check Meter	11071571	Larsen & Turbo Limited	0.2s	30 November 2014	29 November 2017	
Location Type	Serial Number	Make	Accuracy Class	Calibration Date	Calibration Due Date																													
Main Meter	11071570	Larsen & Turbo Limited	0.2s	26 December 2011	25 December 2014																													
Check Meter	11071571	Larsen & Turbo Limited	0.2s	26 December 2011	25 December 2014																													
Main Meter	11071570	Larsen & Turbo Limited	0.2s	30 November 2014	29 November 2017																													
Check Meter	11071571	Larsen & Turbo Limited	0.2s	30 November 2014	29 November 2017																													

Appendix 4. Clarification requests, corrective action requests and forward action requests

Table 1 Remaining FAR from validation and/or previous verification

FAR ID	xx	Section no.	E.2	Date: DD/MM/YYYY
Description of FAR				
<i>Not applicable</i>				
Project participant response				Date: DD/MM/YYYY
<i>Not applicable</i>				
Documentation provided by project participant				
<i>Not applicable</i>				
DOE assessment				Date: DD/MM/YYYY
<i>Not applicable</i>				

Table 2 CL from this verification

CL ID	xx	Section no.		Date: DD/MM/YYYY
Description of CL				
<i>Not applicable</i>				
Project participant response				Date: DD/MM/YYYY
<i>Not applicable</i>				
Documentation provided by project participant				
<i>Not applicable</i>				
DOE assessment				Date: DD/MM/YYYY
<i>Not applicable</i>				

Table 3 CAR from this verification

CAR ID	01	Section no.	B of the MR	Date: 12/10/2017
Description of CAR				
The technical details are not provided in the MR and the documents are also not submitted to assessment team. Corrective action is sought for the same.				
Project participant response				Date: 16/10/2017
<i>The technical plant specification along with documentary support has been provided to the DOE and the same has been updated to the MR version 2.</i>				
Documentation provided by project participant				
<i>MR V2, Technical Purchase Invoice and Calibration Certificates.</i>				
DOE assessment				Date: 30/10/2017
The technical details are checked and found correct by the assessment team during verification site visit and cross check of manufacturer's specification. The details as mentioned in the MR is thus correct and CAR is closed.				

CAR ID	02	Section no.	B of the MR	Date: 12/10/2017
Description of CAR				
The breakdown details of the Power plant (scheduled/forced) are provided in the as supporting, however the description of the same is missing in the MR. Corrective action is sought for further analysis. The commissioning certificate is missing.				
Project participant response				Date: 16/10/2017
<i>The breakdown details along with feeder details of power plant has been updated in the Monitoring Report V2.</i>				
Documentation provided by project participant				
<i>MR V2, Commissioning certificate</i>				
DOE assessment				Date: 30/10/2017
The plant undergone scheduled maintenance as per the manufacturer's specification and no unforeseen breakdown observed during the monitoring period. The breakdown details are now updated in the MR version 02. Based on the revision of MR and check of log details for breakdown for the power plant, CAR is thus closed.				
Commission certificate is submitted and found correct by the assessment team. CAR is thus closed.				

CAR ID	03	Section no.	C	Date: 12/10/2017
Description of CAR				
The due date of calibration is missing in the MR, Corrective action is sought for the same				
Project participant response				Date: 16/10/2017
<i>The due date column has been updated in the table and calibration report has been submitted to the DOE.</i>				
Documentation provided by project participant				
<i>Calibration Report</i>				
DOE assessment				Date: 30/10/2017
The due date of calibration is now updated in the revised MR version 02. The details are also checked from the calibration certificates and assessment team confirms that the calibration details are correct as mentioned in the MR version 02. CAR is thus closed.				

CAR ID	04	Section no.	E of the MR	Date: 12/10/2017
Description of CAR				
The monitoring period starts from 31/10/2017, however assessment team noted that the billing period for the JMR is from 1 st /2 nd to 1 st /2 nd every month and hence the apportioning details needs to be explained in the MR.				
ER calculation is thus reserved based on the above observation.				
Project participant response				Date: 16/10/2017

The Apportioning details for day 31/10/2013 has been mentioned in the MR version 2. The JMR is from 0.00 hours of first day to 24.00 hours of last day of each month. Thus for 31/10/2013, the whole month export is apportioned based on daily generation data.	
Documentation provided by project participant	
MR V2	
DOE assessment	Date: 30/10/2017
The apportioning calculation is deemed correct and thus the CAR is closed.	

CAR ID	05	Section no.	E of the MR	Date: 12/10/2017
Description of CAR				
During the document review it was observed that the comparison of actual CERs w.r.t estimated CERs in section E.6 of the MR is provided, however since the ER sheet is reserved the section also need revision.				
Project participant response				Date: 16/10/2017
Revised ER sheet has been provided with the updated Value				
Documentation provided by project participant				
ER V2 and MR V2.				
DOE assessment				Date: 30/10/2017
The comparison of actual CER and estimated CER is now updated in the revised MR version 02. It is observed that actual emission reduction for the monitoring is lower than estimated emission reductions by - 1.31%.				
CAR is thus closed.				

Table 4 FAR from this verification

FAR ID	xx	Section No.		Date: DD/MM/YYYY
Description of FAR				
Not applicable				
Project participant response				Date: DD/MM/YYYY
Not applicable				
Documentation provided by project participant				
Not applicable				
DOE assessment				Date: DD/MM/YYYY
Not applicable				

Document information

Version	Date	Description
01.0	23March 2015	Initial publication.
Decision Class: Regulatory		
Document Type: Form		
Business Function: Issuance		
Keywords: project activities, verifying and certifying		