

SOLAR PV POWER PROJECT BY ROHA DYECHM PVT. LTD. (EKIESL.CDM.AUG-11-02)



Document Prepared By **LGAI Technological Center S.A.** (Applus+ Certification)

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**Work Carried
Out By**

Dr. Atul Takarkhede-Lead Auditor/Technical expert

Summary:

Verification purpose: The main purpose of this project activity is to generate clean form of electricity through renewable energy sources i.e. Solar energy. The project activity helps to reduce the supply demand gap in the state and also helps in contributing to the sustainable development by using solar energy as the source of power generation and reduction of GHG Emissions. Roha Dyechem Pvt. Ltd. (RDPL) has installed a Greenfield 25 MW solar photovoltaic (PV) power plant in the solar park at Patan District, Gujarat.

The PV system will mainly consist of PV modules, module mounting structures, inverters, regulators, monitoring devices etc. The project activity uses 172,728 nos. of 145 W Nexpower (NT/ AX series) solar thin film modules which are installed in array configuration.

This is the 3rd monitoring under VCS and covers the activity from 29/12/2013 to 30/06/2018 (inclusive of both dates). The project activity adopts renewable crediting period of 10 years period which can be renewed for maximum 2 times.

The first VCS crediting period is 04/03/2012 to 03/03/2022.

Start date of crediting period for VCS verification: 04/03/2012 (Date of commissioning of project)

The GHG credits from 29/12/2013 to 30/06/2018 will be claimed under VCS only. An undertaking dated 09/11/2019 from the both project participants confirms that project will not claim any other scheme benefits for the concerned monitoring period.

A risk-based approach has been followed to perform this verification activity. In the course of verification, 06 Corrective Action requests (CAR), 00 Clarification Requests (CLs) and 00 Forward action requests (FARs) were raised and successfully closed. The review of the Monitoring report and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and PP have provided DOE with sufficient evidence to verify the fulfilment of the stated criteria of VCS.

LGA Technological Center S.A. (Applus+ Certification) (Hereafter referred as Applus+ Certification) has been appointed by "Roha Dyechem Pvt. Ltd." to perform the 3rd periodic verification of the "Solar PV power project by Roha Dyechem Pvt. Ltd. (EKIESL.CDM.Aug-11-02)" under VCS standard and guideline version 3.7. The objective of this verification activity is to have an independent third party for the assessment of the project design, monitoring report and Final Verification report and to ensure a thorough assessment of the proposed project activity against the applicable CDM and VCS requirements. In particular;

- the project's baseline is assessed against "ACM0002, Version 13.0.0"

- the project's monitoring plan is assessed against "ACM0002, Version 13.0.0"
- the projects compliance with, the requirements of Article 12 of the Kyoto Protocol, the CDM Modalities and Procedures as agreed in the Marrakech Accords under decision 3/CMP.1, the annexes to this decision, subsequent decisions and guidance made by COP/MOP & CDM Executive Board and other relevant rules, including the Host Country legislation and sustainability criteria along with VCS guideline and standard version 3.7
- CDM validation and verification standard for project activities, version 02
- CDM project standard for project activities, version 02.0
- CDM project cycle procedure for project activities, version 02.0
- VCS standard v3.7
- VCS program guideline v3.7

Verification is a requirement for all VCS projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of verified emission reductions (VERs).

The scope of the verification is the independent and objective review of the Monitoring report (MR). The MR is reviewed against the relevant criteria (see above) and decisions by the CDM Executive Board and VCS executive board, including the approved baseline and monitoring methodology. The verification was based on the guidance given in the CDM validation and verification standard for project activities, version 02, review against registered PD and Final Validation report, CDM project standard for project activities, version 02.0, CDM project cycle procedure for project activities, version 02.0 for the project activities and VCS program guideline and standard version 3.7.

The assessment team has employed a risk based approach to assess the completeness and accuracy of the claims and conservativeness of the assumptions in the MR. The main focus of the assessment team is to identify the significant risks for the project implementation and the generation of VERs. The verification is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the monitoring report combined.

The only purpose of the verification is its usage during the issuance process as part of the VCS project cycle. Therefore, LGAI Technological Center S.A. (Applus+ Certification) can't be held liable by any party for decisions made or not made based on the verification opinion, which will go beyond that purpose.

The verification has been planned and organized to achieve a Reasonable Level of assurance as per the requirement of VCS. No sampling procedure applied for site visit or document verifications. The entire documents checked/Solar panel verification conducted to arrive at positive verification conclusions.

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1 INTRODUCTION

1.1 Objective

LGAI Technological Center S.A. (Applus+ Certification) (Hereafter referred as Applus+ Certification) has been appointed by “Roha Dyechem Pvt. Ltd.” to perform the 3rd periodic verification of the “Solar PV power project by Roha Dyechem Pvt. Ltd. (EKIESL.CDM.Aug-11-02)” under VCS standard and guideline version 3.7. The objective of this verification activity is to have an independent third party for the assessment of the project design, Monitoring report and Final Verification report and to ensure a thorough assessment of the proposed project activity against the applicable CDM and VCS requirements. In particular;

- the project's baseline is assessed against “ACM0002, Version 13.0.0”
- the project's monitoring plan is assessed against “ACM0002, Version 13.0.0”
- the projects compliance with, the requirements of Article 12 of the Kyoto Protocol, the CDM Modalities and Procedures as agreed in the Marrakech Accords under decision 3/CMP.1, the annexes to this decision, subsequent decisions and guidance made by COP/MOP & CDM Executive Board and other relevant rules, including the Host Country legislation and sustainability criteria along with VCS guideline and standard version 3.7.
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- VCS standard v3.7
- VCS program guideline v3.7

Verification is a requirement for all VCS projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of verified emission reductions (VERs).

1.2 Scope and Criteria

The scope of the verification is the independent and objective review of the Monitoring report (MR). The MR is reviewed against the relevant criteria (see 1.1) and decisions by the CDM Executive Board and VCS executive board, including the approved baseline and monitoring methodology. The verification was based on the guidance given in the CDM validation and verification standard for project activities, version 02, review against registered PD and Final Validation report, CDM project standard for project activities, version 02.0, CDM project cycle procedure for project activities, version 02.0 for the project activities and VCS program guideline and standard version 3.7.

The assessment team has employed a risk-based approach to assess the completeness and accuracy of the claims and conservativeness of the assumptions in the MR. The main focus of the assessment team is to identify the significant risks for the project implementation and the generation of VERs. The verification is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the monitoring report combined.

The only purpose of the verification is its usage during the issuance process as part of the VCS project cycle. Therefore, LGAI Technological Center S.A. (Applus+ Certification) can't be held liable by any party for decisions made or not made based on the verification opinion, which will go beyond that purpose.

1.3 Level of Assurance

The verification has been planned and organized to achieve a Reasonable Level of assurance as per the requirement of VCS. No sampling procedure applied for site visit or document verifications. The entire documents checked/solar panel verification conducted to arrive at positive verification conclusions.

1.4 Summary Description of the Project

The project activity involves installation of a Greenfield 25 MW solar photovoltaic (PV) power plant in the solar park at Patan district in Gujarat. The PV system will mainly consist of PV modules, module mounting structures, inverters, regulators, monitoring devices etc.

The project activity uses 172,728 nos. of 145 W Nexpower (NT/ AX series) solar thin film modules which are installed in array configuration.

The project activity was commissioned on 04/03/2012.

The timeline for Commission of the project activity is also checked by the assessment team. Assessment team checked the Commission of solar plant via the commissioning Certificates and found correct. The project is implemented as per the description in the registered PD. No event observed during the current monitoring period which can alter or deviate from the methodology requirement. The details are as below:

PP	Capacity (MW)	Purpose	Location	Latitude	Latitude
Roha Dyechem Pvt. Ltd.	25	Sale to EB	Patan, Gujarat	23° 53" 59" N	71° 12" 01" E

There was no activity at the site prior to implementation of the project activity (Greenfield). The electricity generated by the project is exported to the Indian grid. The project activity will therefore displace an equivalent amount of electricity which would have otherwise been generated by fossil fuel dominant electricity grid. Since solar power is Greenhouse Gas (GHG) emissions free, the power generated will prevent the anthropogenic gas emissions generated by fossil fuel based thermal power stations comprising coal, diesel, furnace oil and gas.

Assessment team confirms following during the verification site visit:

1. Start date of the project activity is 04/03/2012 as mentioned in the registered VCS PD.
2. An undertaking letter dated 09/11/2019 has been submitted by PP for double counting with any other GHG program. PP also has given a written declaration that project has not claimed other form of GHG credit for the concerned monitoring period. Assessment team also checked that the projects are not registered under the REC mechanism of India and the same can be cross-checked at <https://recregistryindia.nic.in>. PP has given a written declaration that the credit claimed under VCS for the current monitoring period is not claimed under any other GHG mechanism.

3. Assessment team confirms that this is the 3rd monitoring under VCS and covers the activity from 29/12/2013 to 30/06/2018 (inclusive of both dates). The Crediting Period of the project activity is from 04/03/2012-03/03/2022 which will be renewed twice.

Start date of crediting period for VCS verification: 04/03/2012 (Date of commissioning of plant)

The GHG credits from 29/12/2013 to 30/06/2018 will be claimed under VCS only. At any point of time during the crediting period, the project proponent will abide by the "Double Counting".

4. Assessment team checked and found that the Project proponent of the project activity is as below for the current monitoring period:

Organization name	Roha Dyechem Pvt. Ltd.
Contact person	Sachin Chavan
Title	Authorized Signatory
Address	Road No.2 Andheri East, A-44 and 45, MIDC, Mumbai, Maharashtra – 400093
Telephone	+91 (22) 4933 1386
Email	sachin.chavan@rohagroup.com

Organization name	First Climate (India) Private Limited
Contact person	Mr. Subhendu Biswas
Title	Director
Address	3C, Camac Street, Camac Towers, 4 th Floor, Kolkata, West Bengal- 700016
Telephone	+91 (33) 4022 3456
Email	subhendu.biswas@firstclimate.co.in

5. Assessment team also checked the details of other entity and found correct. The details are as below:

Organization name	Infinite Solutions
Role in the project	Carbon Consultant
Contact person	Richa Thakur Sah
Title	Project Manager
Address	611, Chetak Centre Main, 12/2, Rabindranath Tagore Marg, South Tukoganj, Tukoganj, Indore, Madhya Pradesh 452001
Telephone	+91-731-4050174
Email	richa@infisolutions.org

6. The quantified emission reduction calculation for the monitoring period is correct and conservative. Assessment team also compared actual VER with the estimated VER and found that the actual VER (180,835 tCO₂e) is 10.33% higher than the estimated emission reduction¹ (163,901 tCO₂e). The generation of electricity depends upon the solar availability which affects PLF, and not within the control of the project participant. It is to be noted that there is no change in design of project activity as checked by the assessment team during the onsite visit and all the parameters has been monitored as per the Monitoring Plan mentioned in the Registered PD, hence there is no any post registration changes applicable. Further, there is no impact of increased generation on the additionality of the project activity as the increased PLF is not crossing the IRR benchmark.

¹ Calculated for 1645 monitoring days involved.

2 VERIFICATION PROCESS

2.1 Method and Criteria

Verification Scope: The scope is defined as an independent and objective review of the Monitoring report (MR) prepared as per the registered PD and registered approved methodology ACM0002, Version 13.0.0. The MR is reviewed against the criteria stated in Article 12 of the Kyoto Protocol, the CDM modalities and procedures as agreed in the Marrakech Accords and the relevant decisions by the CDM Executive Board and VCS standard and guideline version 3.7, including the approved baseline and monitoring methodology ACM0002, Version 13.0.0. The verification was based on the requirements in the CDM Validation and Verification Standard (VVS version 02 for the project activities), CDM project standard for project activities, version 02.0, CDM project cycle procedure for project activities, version 02.0 for the project activities and VCS program guideline and standard version 3.7

The verification is not meant to provide any consulting towards the project participants. However, stated requests for clarifications and/or corrective actions may have provided input for improvement of the Monitoring report.

Verification Process: The project assessment is based on the “Clean Development Mechanism Validation and Verification Standard” version 02 for the project activities and “VCS standard and program guideline version 3.7” and is conducted using standard auditing techniques to assess the correctness of the information provided by the project participants. Before the assessment begins, members of the team covering the technical scope(s), sectoral scope(s), and relevant host country experience for evaluating the VCS project activity are appointed.

Once the project is received by the assessment team, the members of the assessment team carried out:

1. A desk review of the Monitoring report against the registered PD and final validation report;
2. Follow-up interviews with project participant;
3. The resolution of outstanding issues and the issuance of the final verification report and opinion.

The prepared verification report and other supporting documents then undergo an internal quality control at the HQ (Accredited office) before being submitted to the VCS executive board.

In order to ensure transparency, assumptions must be clear and stated explicitly and background material must also be referenced. Applus+ Certification has developed a specific checklist customized for the project. The checklist demonstrates, in a transparent manner, the project criteria (requirements), discussion on each criterion by the assessment team, and the results from validating the identified criteria.

Appointment of the assessment team

According to the sectoral scope / technical area and experience in the sectoral or national business environment, Applus+ Certification has composed a project assessment team in accordance with the appointment rules in the internal Quality Management System of Applus+ Certification.

The composition of audit team shall be approved by the Applus+ Certification ensuring that the required skills are covered by the team.

The four qualification levels for team members that are assigned by formal appointment rules are as presented below:

- Lead Auditor (LA).
- Auditor (A) / Auditor in Training (AiT).
- Technical Expert (TE).
- Technical Reviewer (TR).

The sectoral scope / technical area knowledge linked to the applied methodology/ies shall be

Covered by the assessment team.

Name	Role	SS Coverage	TA Coverage	Financial aspect	Host country experience
Dr. Atul Takarkhede	LA/TE	YES	YES	NA	YES
Mr. Denny Xue	TR	YES	YES	NA	NA

The detail regarding the assessment team is provided below in this report as Appendix 3

Document review

The Monitoring report version 1 submitted by the PP was reviewed against the approved methodology, registered PD, final validation report and other relevant criteria to verify the correctness, credibility, and interpretation of the presented information. Furthermore, a cross-check between information provided and information from other sources has been done. A complete list of all documents and evidence material reviewed is included in this report below in appendix 1

Follow-up interviews

A site visit is conducted by Applus+ Certification. Applus+ Certification performed interviews, telephone conferences, and physical site inspection with project stakeholders to confirm selected information and to resolve issues identified in the document review. The detail is provided in this report.

Resolution of Clarification and Corrective Action Request

The objective of this phase of the Verification was to resolve the requests for corrective actions and clarification and any other outstanding issues which need to be clarified for Applus+ Certification's positive conclusion on the Monitoring report. The Corrective Action Requests and Clarification Requests raised by Applus+ Certification were resolved during communications between the Client and Applus+ Certification to guarantee the transparency of the verification process, the concerns raised and responses given are summarized below in the appendix 2.

The final MR Version 02 submitted by PP on 18/11/2019 serves as the basis for the final assessment presented. Additional changes to the project during the verification process are not considered to be significant with respect to the main CDM/VCS objectives. The two CDM/VCS main objectives are the

reduction of anthropogenic GHG emissions and the contribution of sustainable development to the host country.

Internal quality control

As final step of a verification of the final documentation including the verification report and the checklist have to undergo an internal quality control by the technical review committee, i.e. each report has to be finally approved either by the head of the technical review committee or the deputy. In case one of these two persons is part of the assessment team approval can only be given by the other one to avoid any conflict of Interest.

After confirmation of the PP the positive verification opinion and relevant documents are submitted to the VCS board through the VCS web-platform

2.2 Document Review

The details of the document observed during the verification process are listed below in Appendix 1 of this report

2.3 Interviews

No.	Interviewee			Date	Subject	Team member
	Last name	First name	Affiliation			
1.	Bhargava	Ayush	PP Representative	05/10/2019	Implementation of the project and monitoring. Baseline emission calculation, achieved emission reduction for the monitoring period, monitoring process followed onsite	Dr. Atul Takarkhede
2	Patel	Roshan	Villager	05/10/2019	Local Stakeholder Consultations	Dr. Atul Takarkhede
3	Modi	Jignesh	Villager	05/10/2019	Local Stakeholder Consultations	Dr. Atul Takarkhede

2.4 Site Inspections

Duration of on-site inspection: 05/10/2019				
No.	Activity performed on-site	Site location	Date	Team member
1.	Assessment team checked the implementation of the project, Baseline emission, Emission reduction calculation, technical description of the project and Monitoring. Assessment team also checked that whether the monitoring plan as described in the VCS PD is actually practised onsite. Also assessment team checked any change in host country criteria which may affect the baseline of the project activity. Assessment team also had a discussion with Local stakeholders and checked grievance register placed onsite as per the continuous improvement measure of PP for the Local villagers.	Charanka, Santalpur, Patan District, Gujarat, India	05/10/2019	Dr. Atul Takarkhede

2.5 Resolution of Findings

The objective of this phase of the Verification was to resolve the requests for corrective actions and clarification and any other outstanding issues from validation which need to be clarified for Applus+ Certification's positive conclusion on the Monitoring report. The Corrective Action Requests and Clarification Requests raised by Applus+ Certification were resolved during communications between the Client and Applus+ Certification to guarantee the transparency of the verification process, the concerns raised and responses given are summarized below in the appendix 2.

The final MR Version 2 submitted by PP on 18/11/2019 serves as the basis for the final assessment presented. Additional changes to the project during the verification process are not considered to be significant with respect to the main CDM/VCS objectives. The two CDM/VCS main objectives are the reduction of anthropogenic GHG emissions and the contribution of sustainable development to the host country.

Areas of validation and verification findings	No. of CL	No. of CAR	No. of FAR
Project design document and Monitoring report	00	02	00
Description of project activity	00	00	00
Application of selected baseline and monitoring methodology and selected standardized baseline			
Applicability of methodology and standardized baseline	00	00	00
Deviation from methodology	00	00	00
Clarification on applicability of methodology, tool and/or	00	00	00

Areas of validation and verification findings	No. of CL	No. of CAR	No. of FAR
standardized baseline			
Project boundary	00	00	00
Establishment and description of baseline scenario	00	00	00
Demonstration of additionality	00	00	00
Emission reductions	00	03	00
Calibration details	00	01	
Monitoring plan	00	00	00
No Net harm assessment	00	00	
Local stakeholder consultation	00	00	
Others (please specify)	00	00	00
Total	00	06	00

The list of findings and there resolution is presented in Appendix 2 of this report.

2.5.1 Forward Action Requests

This is 3rd periodic verification of the project activity and no FAR raised from validation & previous verifications.

2.6 Eligibility for Validation Activities

This section is not applicable for present verification.

3 VALIDATION FINDINGS

3.1 Participation under Other GHG Programs

The project activity is a VCS registered project as per report ID VCS.13.VER.005 version 2 dated 05/06/2013. Further, PP has also registered this project under Clean Development Mechanism scheme of UNFCCC (ref no. 7442). The project has been registered on 26/12/2012 and the crediting period date is from 29/12/2013 to 28/12/2020. PP have already issued VCUs for the period from 04/03/2012 to 28/12/2013. From the UN webpage it is confirmed that PP have not claimed any CDM benefits till date. Further, PP have also submitted undertaking in effect of avoiding double counting of the emission reductions.

3.2 Methodology Deviations

This section is not applicable for present verification.

3.3 Project Description Deviations

This section is not applicable for present verification.

3.4 Grouped Project

This is not a grouped project.

4 VERIFICATION FINDINGS

4.1 Project Implementation Status

During the verification site visit it was concluded that the project is implemented as per the requirement of the registered PD and Final Validation report. During the current monitoring period it was observed that no unforeseen incident/event evolved which can impact the operation of the project activity. The project

undergone continuous operation and only scheduled maintenance is observed as per the manufactures specification which is acceptable to the assessment team.

MR checked for the project implementation and found in line with the registered VCS PD & actual project implementation.

Project location is confirmed by the assessment team during the site visit. Assessment team also checked with the GPS meter regarding the latitude and longitude of the project site and confirm that the details as mentioned in the registered PD are correct. The detail is as below:

Location	Latitude	Longitude
Village - Charanka, Tehsil - Santalpur, Patan District, Gujarat, India	23° 53' 59" N	71° 12' 01" E

The project activity aims to harness solar energy through installation of PV with total installed capacity of 25 MW.

Assessment team also checked the Technical details of the Solar Panels installed onsite. The same is checked during the onsite visit from the number plates, module capacity etc. also cross checked from the technical manual of the Manufactures.

The project activity uses 172,728 nos. of 145 W1 Nexpower (NT/ AX series) solar thin film modules which are installed in array configuration. The detail is as below:

Solar PV modules: 172728 solar modules of nominal power capacity of 145 W ($\pm 5\%$) has been installed in array configuration. Nine solar modules have been connected in series to form one string. 19158 such strings are in parallel, connected to 450 Array Junction Boxes (AJBs). Therefore, the total power generation capacity of the modules installed at site translates to 25.04 MW (i.e. 25 MW).

Module mounting structure: There are 6400 mounting structures designed for each having a maximum of 27 modules. Some of the mounting structures are having less than 27 modules.

Inverters: 50 Nos. of 500 kW Satcon make inverters have been utilized in the project activity.

Data logging systems: There are total of 4789.5 arrays, which are being monitored by the WEM (Wipro Energy Manager) sub systems in cluster rooms and main master in the MRSS (Main Receiving Substation)

Transformers and Distribution Control Panels: Transformers: 25 Nos. of 1.25MVA Transformer, 1 No of 160KVA Auxiliary Transformer & 1 No of 27.5MVA Main transformer are being utilized in the project.

Assessment team checked the commissioning certificate and confirmed that the dates of Commission for the plants are correct.

The assessment team confirmed that there is no proposed or actual change to the project design during this monitoring period. The project design as mentioned in the registered PD is implemented and thus the same is acceptable to the assessment team. All required monitoring equipment's and procedures as mentioned in the registered PD are available and implemented in an appropriate manner.

The organisational role and responsibility as mentioned in the registered PD is followed onsite. All the monitoring equipment was calibrated once in three year and thus complied with registered monitoring plan. All the emergency preparedness as mentioned in the registered PD is followed onsite and no discrepancies were found regarding the same.

The project activity fulfilled the contribution of sustainable development to the host country by implementing environmental friendly technology and creating employment opportunities to the local community. Same is confirmed during site visit.

It was also observed during the verification process that project is not rejected by any other GHG program around the world. Declarations dated 09/11/2019 in that effect is also provided by PP.

It was also observed during the verification process is that project is not rejected by any other GHG program around the world. The project is registered by VCS board and the registered PD and registered FVR is used to assess the present 3rd periodic verification. The following web sites were checked to confirm the same:

1. www.v-c-s.org

Assessment team hereby also confirms from the declaration made by PP the projects are not registered under the REC mechanism of India and the same is cross-checked at <https://recregistryindia.nic.in>. Moreover, as per state tariff policy the project is not eligible to receive REC benefits as it is selling power to State electricity grid.

The assessment team observed that the project is in line with the registered PD, FVR and approved methodology and thus no clarification/deviation is sought.

Sustainable development indicators

The National CDM Authority (NCDMA), which is the Designated National Authority (DNA) for the Government of India (GOI) under the Ministry of Environment, Forests & Climate Change (MoEFCC), has mentioned four indicators for the sustainable development in the interim approval guidelines for Clean Development Mechanism (CDM/VCS) projects from India. Thus the project's contribution towards sustainable development has been addressed based on the following sustainable development aspects:

Social well-being

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

Environmental well-being

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

Economic well-being

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

Technological well-being

The project activity is step forward in harnessing the untapped solar energy and further diffusion of the solar technology in the region. The project activity leads to the promotion and demonstrates the success

of solar projects in the region which further motivate more investors to invest in solar power projects. Hence, the project activity leads to technological well-being.

4.2 Accuracy of GHG Emission Reduction and Removal Calculations

Means of verification	The verification team assessed whether the data and calculations of GHG emission reductions achieved resulting from the VCS PD. 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 monitoring plan of the VCS PD
Findings	CAR 03, CAR 04 & CAR 05 was raised during the verification process and closed successfully. Please refer Appendix 2 of this report for the detail closure of the CAR
Conclusion	The baseline Emissions for a given year is calculated by multiplying the energy baseline (EB) with the regional grid emission factor. Formula used:- $BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$ 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 CDM 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" (tCO₂/MWh) $EF_{grid,CM,y} = 0.953$ tCO₂/MWh. (it has been fixed ex-ante) This is a greenfield project, hence $EG_{PJ,y} = EG_{facility,y}$ Thus, $BE_y = EG_{facility,y} * EF_{grid,CM,y}$ <u>Ex ante Parameters:</u> $EF_{grid,CM,y}$, $EF_{grid,BM,y}$, $EF_{grid,OM,y}$ 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 PD and confirms that the similar approach was considered for the current monitoring period also. The values for $EF_{grid,CM,y} = 0.953$ tCO₂/MWh- Assessment team Confirmed that the value is as per the registered PD $EF_{grid,BM,y} = 0.859$ tCO₂/MWh- Assessment team Confirmed that the value is as

	per the registered PD $EF_{grid,OM,y} = 0.984 \text{ tCO}_2/\text{MWh}$- Assessment team Confirmed that the value is as per the registered PD 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 CO_2 emission factor. Simple Operating margin CO_2 emission factor is calculated from the weighted average CO_2 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 CO_2 baseline database version 07 and registered PD. Assessment team checked the registered PD and found that value considered for emission reduction calculation in this present monitoring period is sourced from the registered PD. 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". Build margin emission factor is the generation-weighted average emission factor of all power plants m during the most recent year y for which generation data is available. The value is considered from CEA CO_2 baseline database version 07 and registered PD. Assessment team checked the registered PD and found that value considered for emission reduction calculation in this present monitoring period is sourced from the registered PD. Thus, assessment team conclude that the emission reduction calculation for the present monitoring period is conservative and correct. 3. $EF_{grid,CM,y}$: 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". Combined Margin is computed using the official data sources and is in-line with the guidance provided in the tool. The value is considered from CEA CO_2 baseline database version 07 and registered PD. Assessment team checked the registered PD and found that value considered for emission reduction calculation in this present monitoring period is sourced from the registered PD. Thus assessment team conclude that the emission reduction calculation for the present monitoring period is conservative and correct. The value for $EF_{grid,CM,y}$, $EF_{grid,BM,y}$, $EF_{grid,OM,y}$ were considered from the CO_2 baseline database (Version 07) published by Central Electricity Authority (CEA). The default value as mentioned in the registered PD 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 PD for the current monitoring period. <u>Ex-post parameter:</u> As per the registered monitoring plan and requirement of the registered methodology following parameters needs to be monitored:
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	EG_{facility, y} : Quantity of net electricity generation supplied by the project plant/unit to the grid in year y – This parameter is a calculated parameter, and is deduced as the difference between Electricity exported and electricity imported by the project activity. The verification team verified the net electricity supplied by the project activity to the grid from the monthly JMR issued by the State utility (GUVNL) on a monthly basis. Based on this JMR, the Project Participant raises an invoice on GUVNL for payment, subsequent to which payments are made. The verification team cross-checked the values of the net electricity supplied values indicated in the JMR with the invoices raised by the Project Participant. The verification team confirms that all the values of net electricity supplied to the grid are sourced from the monthly JMR and are correct. Baseline emission factor is calculated as combined margin, consisting of a combination of operating margin (OM) and build margin (BM) factors. BE_y baseline emissions, tCO₂e $BE_y = 189,796.01 * 0.953 = 180,835 \text{ tCO}_2\text{e}$ (Rounded down) The project activity involves in harnessing solar power. So the emissions from the project are zero. Leakage emission is not applicable as per the registered PD. As per the applied methodology, emission reductions are calculated as follows: $ER_y = BE_y - PE_y$ $= 180,835 \text{ tCO}_2\text{e} - 0 = 180,835 \text{ tCO}_2\text{e}$ (rounded down) Where: ER_y = Emission reductions in year y (tCO₂e/yr) BE_y = Baseline emissions in year y (tCO₂e/yr) PE_y = Project emissions in year y (tCO₂e/yr) Hence, ER_y = BE_y
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4.3 Quality of Evidence to Determine GHG Emission Reductions and Removals

Means of verification	The verification team checked the Calibration details of the monitoring meters with the calibration certificates.
Findings	CAR 06 was raised during the verification process. The description of the CAR and its closure is described below in Appendix 2 of this report

Conclusion	The metering arrangement is bi-directional energy meters (main and check) at the State Electricity Board (SEB) substation. These meters record several parameters including electricity exported & imported. These electricity meters are being used by state electricity board for Share certificate statements. Assessment team found that Since metering arrangement, monitoring practice, accuracy class, calibration interval is under control of state electricity board, the PP does not have all calibration certificates available with them. As per the registered monitoring plan, the energy meters have to be calibrated once in three years and no delay observed. The details of the Calibration is presented in Appendix 5 Assessment team confirms that all the energy meters (both main and check meter) installed at the substation are of accuracy class of 0.2s and are calibrated as per the national standards followed by the electricity board. There was no delay in calibration. The calibration of the energy meters installed at HT side of the transformer were carried out by State Utility and the same is acceptable to the assessment team and thus traceability of the Calibration is also confirmed by the assessment team.
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4.4 Non-Permanence Risk Analysis

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	
NA	NA	NA	NA	NA

5 SAFEGUARDS

5.1 No Net Harm

No potential environment or socio-economic matter was found during the site visit. The project is renewable energy project and thus no negative impact observed onsite.

The project activity promotes environmental and socio-economic well-being as it results in zero GHG emissions due to installation and operation of clean, renewable energy technology for electricity generation. The report on “Developmental Impacts and Sustainable Governance Aspects of Renewable Energy Projects” prepared by MNRE dated September 2013. This report clearly mentioned that solar/Wind power project activity operations do not result in direct air pollution, noise pollution. Moreover, also as per the Central Pollution Control Board of India notification² solar/wind project falls under White Category and are practically non-polluting.

However, assessment team still conducted the No net harm assessment for some of the parameters and the result is described below.

² http://envfor.nic.in/sites/default/files/Latest_118_Final_Directions.pdf

SL.NO	Indicator	Assessment team opinion
1	Air quality	The project generates clean energy which replaces the fossil fuel intensive electricity generation. Also report on “Developmental Impacts and Sustainable Governance Aspects of Renewable Energy Projects” prepared by MNRE dated September 2013. This report clearly mentioned that solar power plant operations do not result in direct air pollution. Adequate measures were taken to mitigate the envisaged impacts like spraying water on the road side to reduce dust level, etc. This was confirmed by the local stakeholders. Therefore, it is validated that mitigation measures were robustly implemented on ground for air quality issues project will have a positive impact on air quality.
3	Soil condition	There are negligible impacts envisaged during operation of the project activity. For mitigating the impacts during construction, various mitigation measures were taken which is validated from the plant records of PP and the interview with local villagers. The top soil excavated during construction, was stockpiled and used for compaction. The roads were not paved and soling was done with excavated earth & rock material, so land disturbance could be minimized. It was also confirmed that, the vegetation done at site helps for soil erosion. The same is confirmed during the stakeholder meetings during onsite visit. Therefore, it can be concluded that the project has no effect on soil conditions during its operation because it has no waste coming out.
4	Biodiversity	During the validation site visit it was observed that the condition of ground vegetation will be gradually improved; No rare species has been found in the around area. The project site is not on the migration route of migratory bird. As Such solar power plant does not have any obstruction in the path of migratory birds. With the implementation of Project, the greening water will be increased significantly; the biodiversity in the vicinity will be improved with the vegetation improvement. No negative impact envisaged.
5	Employment Generation	The project activity employed local population as skilled workers as well as security guards which were envisaged during the validation site visit. The personnel employed by the project activity are also provided trainings and exposed to various awareness programs therefore a positive indicator has been accepted.
6	Livelihood of the poor	The project is associated with infrastructure development like roads in the nearby areas and promoting economic activities like grants to local school and communities temples etc. Also, project employed local villagers as guards for the security of power project. Positive impact envisaged. .

5.2 Local Stakeholder Consultation

All the stakeholders are happy with the implementation and operation of the project activity and no negative comments envisaged for the project activity. There was no change in technical project description from the registered VCS PD. Assessment team confirmed the same during the verification site visit. Also, as best practice method PP also placed a grievance register onsite to record any grievance from the stakeholders during and after the implementation of the project activity. Assessment team checked the grievance register maintained onsite and no negative comments were observed for the project activity. Local people are happy as the project generated employment opportunities and thus the living standards in and around the vicinity of the project is increased and thus assessment team confirms that local stakeholders have no issue with this project activity after implementation and continuous operation.

The interaction with some of the stakeholders during the site visit is presented below:

Name of the stakeholder	Mr. Roshan Patel (villager)
Occupation	Villager
DOE QUESTION: Did due to installations of solar power plant employment opportunity increased? Answer: Yes, due to project activity local employment opportunities increased. DOE also like to conclude that during the site visit it was observed that local people were employed for security and operation related work and other unskilled work. DOE also found that skilled local persons were also employed by the organization for the operation and maintenance of the solar power plant.	

Name of the stakeholder	Mr. Jignesh Modi (villager)
Occupation	Villager
DOE questions: Did the solar power plant have any harmful impacts on nearby area? Answer: NO the plant does not have any harmful impact on the area. DOE questions: Did the solar panels have any adverse impact on crop fields? Answer: The plant is implemented in barren land and there were no any fertile land or crop which is damaged. Further, solar panels does not emits any pollutants.	

6 VERIFICATION CONCLUSION

Applus+ Certification has been engaged by Roha Dyechem Pvt. Ltd. to perform the 3rd periodical verification of the “Solar PV power project by Roha Dyechem Pvt. Ltd. (EKIESL.CDM.Aug-11-02)”

The management of Roha Dyechem Pvt. Ltd. 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 VCS PD and the applied methodology ACM0002, Version 13.0.0

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 team can confirm that:

- the project is operated as planned and described in the project document;
- the monitoring plan is as per the applied methodology;
- the monitoring process in Monitoring Report is as per the PD
- the development and maintenance of records and reporting procedures are in accordance with the 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.

Verification period: 29/12/2013 to 30/06/2018 (inclusive of both days)

Verified GHG emission reductions and removals in the above verification period:

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
29/12/2013 – 31/12/2013	341	-	-	341
01/01/2014- 31/12/2014	40,241	-	-	40,241
01/01/2015 - 31/12/2015	40,205	-	-	40,205
01/01/2016 - 31/12/2016	40,448	-	-	40,448
01/01/2017 - 31/12/2017	38,471	-	-	38,471

Year	Baseline emissions or removals (tCO ₂ e)	Project emissions or removals (tCO ₂ e)	Leakage emissions (tCO ₂ e)	Net GHG emission reductions or removals (tCO ₂ e)
01/01/2018 - 30/06/2018	21,129	-	-	21,129
Total	180,835	0	0	180,835

APPENDIX 1: DOCUMENTS REVIEWED OR REFERENCED (VERIFICATION)

No.	Author	Title	References to the document	Provider
1	NA	Commissioning certificates of the Solar power plant implemented in the project site.	NA	Project participant
2	NA	Contract of the project participant with the DOE	Contract document signed between PP and DOE	Project participant
3	NA	Technical specifications of Solar power plant from manufacturers	Manufacturer technical specifications	Project participant
4	NA	Registered PDD dated 20/05/2013 version 2.	NA	Project participant
5	NA	Registered Final Validation report 24/12/2012	NA	Project participant
6	NA	Emission Calculation sheet version 01 Emission Calculation sheet version 02	ER sheet Dated 14/09/2019 ER sheet Dated 18/11/2019	Project participant
7	NA	The operational lifetime of the project activity from the manufacturer=(Technical specifications)	Manufacturer technical specifications	Project participant
8	NA	RBI: Reserve Bank of India www.rbi.org.in Ministry of Environment and forest: www.envfor.nic.in UNFCCC www.cdm.unfccc.int CEA: Central electricity authority www.cea.nic.in Income tax act 1961 http://law.incometaxindia.gov.in/DIT/ VCS: Verified Carbon Standard www.v-c-s.org	Reference link is provided.	Independent Search
09	NA	Tools/ guidelines used in the project activity • Tool to determine the remaining lifetime of the project activity in line with Annex 15 EB 50 • Tool to calculate the emission factor for an electricity system (Version 02.2.1) • Tool for the demonstration and assessment of additionality (Version 06.0.0) • Glossary of CDM terms version 07 • VCS verification report template version 03	UNFCCC CDM/VCS web site	UNFCCC
10	NA	Share reports/Monthly statement for the complete monitoring period	Share reports/Monthly statement for the complete monitoring period	PP

11	NA	MR version 01 MR version 02	14/09/2019 18/11/2019	PP
12	NA	Invoices for the complete monitoring period	Invoice	PP
13	NA	Break down details of the complete monitoring period	Log sheet	PP
14	NA	Declaration regarding no participation in other GHG program for the concerned monitoring period from both PPs	Declaration dated 09/11/2019	PP

APPENDIX 2: CORRECTIVE ACTION REQUESTS, CLARIFICATION REQUESTS AND FORWARD ACTION REQUESTS (CAR/CL/FAR)

Project Implementation Status

CAR ID	01	Section no.	4.1	Date: 07/11/2019
Description of CAR				
<i>Following inconsistencies observed during review of the MR:</i>				
1. Emission reduction value is not consistent throughout the MR. 2. Version number of the methodology applied is not consistent throughout MR. 3. Editorial correction requested in font used inline with guideline to complete MR.				
Project participant response				Date: 11/11/2019
1. Previously in the ER sheet, VERs were not rounded down vintage wise, instead the total was done for the same. Now it has been revised by rounding down the values vintage wise; hence making the VERs 180,835 tCO₂. Emission reduction value is now consistent throughout the MR. 2. Version number of the methodology applied is now made consistent throughout the revised MR. 3. Editorial correction in font used are now in line with guideline to complete MR.				
Documentation provided by project participant				
Revised MR				
DOE assessment				Date: 25/11/2019
1. Emission Reductions values are now consistent in revised MR. 2. Version number of applied meth made consiste in revised documents. 3. Editorial corrections are done.				
CAR closed.				

CAR ID	02	Section no.	4.1	Date: 07/11/2019
Description of CL				
<i>Declaration for avoidance of double counting of ER & involvement in other GHG programs is missing in the documents submitted by PP.</i>				
Project participant response				Date: 11/11/2019
<i>Declaration for avoidance of double counting of ER & involvement in other GHG programs is submitted with this submission.</i>				
Documentation provided by project participant				
Declaration Letter for no double counting				
DOE assessment				Date: 25/11/2019
Declaration submitted by PP have been checked and found correct. CAR closed.				

Accuracy of GHG Emission Reduction and Removal Calculations

CAR ID	03	Section no.	4.2	Date: 07/11/2019
Description of CAR				
<i>Tables for Parameters Fixed ex-ante are not consistent with registered CDM PDD. Corrections requested.</i>				
Project participant response				Date: 11/11/2019
<i>Tables for Parameters Fixed ex-ante in the revised MR are now made consistent with registered CDM PDD.</i>				
Documentation provided by project participant				
Revised MR				

DOE assessment	Date: 25/11/2019
Tables for ex ante parameters are now corrected inline with CDM registered PDD. CAR closed.	

CAR ID	04	Section no.	4.2	Date: 07/11/2019
Description of CAR				
<i>PP requested to submit JMRs for the month of December 2013 to March 2015.</i>				
Project participant response				Date: 11/11/2019
<i>JMRs for the month of December 2013 to March 2015 are now submitted with this submission.</i>				
Documentation provided by project participant				
<i>JMRs for the month of December 2013 to March 2015</i>				
DOE assessment				Date: 25/11/2019
Missing JMRs for the month of December 2013 to March 2015 have been submitted by PP. Assessment team checked export and import values for all the month and found correct. CAR closed				

CAR ID	05	Section no.	4.2	Date: 07/11/2019
Description of CAR				
<i>PP requested to review justification for the higher emissions achieved during this monitoring period.</i>				
Project participant response				Date: 11/11/2019
<i>Section 4.4 is now corrected mentioning the justification of higher emissions achieved during this monitoring period.</i>				
Documentation provided by project participant				
<i>Revised MR</i>				
DOE assessment				Date: 25/11/2019
The monitoring period covers approximate 4.5 years and during this period generation is increased due to maximum sun availability. Further, increased PLF is not breaching the additionality benchmark hence accepted by assessment team. CAR closed.				

Quality of Evidence to Determine GHG Emission Reductions and Removals

CAR ID	06	Section no.	4.3	Date: 07/11/2019
Description of CAR				
<i>PP requested to submit all calibration certificates for the complete monitoring report to justify calibration frequency compliance.</i>				
Project participant response				Date: 11/11/2019
<i>All the calibration certificates for the complete monitoring report are now submitted to the DOE for the assessment.</i>				
Documentation provided by project participant				
<i>Calibration Certificates</i>				
DOE assessment				Date: 25/11/2019
PP have submitted all the calibration certificates covering complete monitoring period. No delay observed. CAR closed.				

APPENDIX 3: COMPETENCE OF TEAM MEMBERS AND TECHNICAL REVIEWERS

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.	Lead Auditor/Technical Expert	OR	Takarkhede	Atul	TQC-Outsourced entity	Yes	Yes	Yes	Yes

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 (TR)	EI	Xue	Denny	Applus+ Certification
2.	Approver	IR	Sendin	Juan	Applus+ Certification B.U. Managing Director

Short CVs of the Team:

- Dr. Atul Takarkhede counts with 9 years of experience in field of Environmental Auditing, consulting and accreditation. He is an Expert in ISO 9001-14001, CO2/GHG Reporting, Carbon Foot Print, Energy, Water and Waste Management Reporting for organizations environmental performance. His professional portfolio is mainly related with carrying out EIA, conducting QA/QC of EIA Reports; Conducting Environmental/water Audits; NABET requirements appliance. Furthermore, he counts with solid experience on CDM-VCS-GS consultancy and auditing. He has Ph.D. (Environmental Science) from Institute of Science, RTM Nagpur University, Nagpur, and he has already published different technical reports related to environmental science. Currently he is associated with True Quality Certifications Private Limited and is empanelled with Applus+ Certification to carry out GHG audit.
- Denny Xue (Master Degree in Environmental Engineering, Bachelor Degree in Thermal Engineering) is an Auditor appointed by Applus+ LGAI for the GHG project assessment. He is based on Shanghai. He has more than 1.5 years of work experiences in CDM project development. Before he joined Applus+ LGAI, he has been worked for Shanghai Chuanji Investment and Management which is a CDM consultancy company as a project manager for CDM project development.

APPENDIX 4: 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
CMS	Central Monitoring system
CO ₂	Carbon dioxide
CO ₂ e	Carbon dioxide equivalent
DNA	Designated National Authority
DOE	Designated Operational Entity
DR	Document Review
EF	Emission Factor
EIA	Environmental Impact Assessment
ER	Emission Reductions
FAR	Forward Action Request
GHG	Greenhouse gas(es)
GWP	Global Warming potential
RBI	Reserve Bank Of India
PP	Project Participant

APPENDIX 5: CALIBRATION DETAILS OF THE METERS

Meter No	GJ1211A (Main)	GJ1210A (Check)
Test Date	28/12/2011	31/12/2011
Due Date	27/12/2014	30/12/2014
Test Date	01/09/2013	01/09/2013
Due Date	31/08/2016	31/08/2016
Test Date	04/09/2015	04/09/2015
Due Date	03/09/2018	03/09/2018
Test Date	19/07/2018	19/07/2018
Due Date	18/07/2021	18/07/2021

The frequency of the calibration of monitoring meters is once in 3 years hence no delay observed.