SOLAR PHOTOVOLTAIC PROJECT BY GIRIRAJ RENEWABLES PRIVATE LIMITED

LGAI Technological Center S.A. (Applus+ Certification)

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Summary:

Validation purpose: The main purpose of this project activity is to generate clean form of electricity through renewable energy sources. The project activity involves installation of combined capacity of 225 MW Solar power projects in the states of Karnataka, Uttar Pradesh & Maharashtra, India. The project aims at providing electricity to the state grid by effective utilization of renewable resources. The electricity generated from the project activity would be supplied to the national grid of India.

During the 10 years of first crediting period, the project will replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 329,720 tCO_2e per year, thereon displacing 351,965 MWh/year amount of electricity from the generation-mix of power plants connected to the Indian grid, which is mainly dominated by thermal/fossil fuel based power plant.

The objective of this validation activity is to have an independent third party for the assessment of the project design, estimated ER sheet 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 19.0"
- the project's monitoring plan is assessed against "ACM0002- Version 19.0"
- 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 4.0
- CDM Validation and Verification Standard for project activities version 02
- CDM Project Standard for project activities version 02
- CDM project cycle procedure for project activities version 02
- VCS standard v4.0[1]
- VCS guideline v4.0

Validation 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 estimated verified emission reductions (VERs).

A risk-based approach has been followed to perform this validation and verification activity. In the course of

[1] http://www.v-c-s.org/project/vcs-program/rules-and-requirements/

Validation, 07 Corrective Action requests (CARs) and 00 Clarification Requests (CLs),00 Forward action request (FARs) were raised and successfully closed. The review of the project description and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and project owners have provided LGAI Technological Center S.A. (Applus+ Certification) with sufficient evidence to verify the fulfilment of the stated criteria of VCS.

Verification purpose:

The proposed project activity will assist development of renewable energy generation plants based on Solar energy technology in India and delivering electricity to the grid.

The proposed project is a voluntary action being undertaken by the project owner of the project activity. EKI Energy Services Limited (hereafter referred as "EKIESL") is acting as the other party for this project activity.

The main purpose of this project activity is to generate clean form of electricity through renewable energy sources. The project activity involves installation of combined capacity of 225 MW Solar power projects in the states of Karnataka, Uttar Pradesh & Maharashtra, India. The project aims at providing electricity to the state grid by effective utilization of renewable resources. The electricity generated from the project activity would be supplied to the national grid of India. The Project activity is a new facility (Greenfield) and the electricity generated by the project will be exported to the Indian electricity grid.

During the Current Monitoring Period from 02/03/2018 to 31/03/2019 (First and last date included) the project activity contributed to the GHG reductions 248,528 tCO_2e.

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

During the current monitoring period, project activity undergoes continued operation since their commissioning and no major breakdown had taken place

The objective of this verification activity is to have an independent third party for the assessment of the project design, Actual ER sheet 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 19.0"
- the project's monitoring plan is assessed against "ACM0002- Version 19.0"
- 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 4.0
- CDM Validation and Verification Standard for project activities version 02

- CDM Project Standard for project activities version 02
- CDM project cycle procedure for project activities version 02
- VCS standard v4.0[2]
- VCS guideline v4.0

A risk-based approach has been followed to perform this verification activity. In the course of verification, 01 Corrective Action requests (CARs) and 00 Clarification Requests (CLs), 00 Forward action request (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 project owners have provided LGAI Technological Center S.A. (Applus+ Certification) with sufficient evidence to verify the fulfillment of the stated criteria of VCS.

[2] http://www.v-c-s.org/project/vcs-program/rules-and-requirements/

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1 INTRODUCTION

1.1 Objective

Explain the purpose of the validation and verification.

LGAI Technological Center S.A. (Hereinafter referred as Applus+ Certification) has been appointed by "**Giriraj Renewables Private Limited**" to perform the validation and verification of the project entitled "Solar Photovoltaic Project by Giriraj Renewables Private Limited" under VCS standard and guideline version 4.0. The objective of this joint validation& verification activity is to have an independent third party for the assessment of the project design, ER sheet 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 19.0"
- the project's monitoring plan is assessed against "ACM0002- Version 19.0"
- 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 4.0
- CDM Validation and Verification Standard for project activities version 02
- CDM Project Standard for project activities version 02
- CDM project cycle procedure for project activities version 02
- VCS standard v4.0[3]
- VCS guideline v4.0

Validation & 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 estimated verified emission reductions (VERs).

1.2 Scope and Criteria

The scope of the Joint validation and verification is the independent and objective review of the Joint Project Description & Monitoring Report. The Joint VCS PD & MR are reviewed against the

[3] http://www.v-c-s.org/project/vcs-program/rules-and-requirements/

relevant criteria (see 1.1) and decisions by the CDM Executive Board and VCS executive board, including the approved baseline and monitoring methodology. The validation and verification were based on the guidance given in the CDM Project Standard for project activities version 02, CDM Project Cycle Procedure for project activities version 02, VCS guideline and standard version 4.0

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 Joint VCS PD & MR. The main focus of the assessment team is to identify the significant risks for the project implementation and the generation of VCUs. The validation and 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 project design and monitoring report combined.

The only purpose of the validation and verification is its usage during the registration /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 validation/verification opinion, which will go beyond that purpose.

1.3 Level of Assurance

The verification and validation have been planned and organized to achieve a Reasonable Level of assurance as per the requirement of VCS.

1.4 Summary Description of the Project

The main purpose of this project activity is to generate clean form of electricity through renewable energy sources. The project activity involves installation of combined capacity of 225 MW Solar power projects in the states of Karnataka, Uttar Pradesh & Maharashtra, India. The project aims at providing electricity to the state grid by effective utilization of renewable resources. The electricity generated from the project activity would be supplied to the national grid of India. Thus, energy supplied to the Indian grid is sold to the respective state utility.

During the 10 years of first crediting period, the project will replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 329,720 tCO_2e per year, thereon displacing 351,965 MWh/year amount of electricity from the generation-mix of power plants connected to the Indian grid, which is mainly dominated by thermal/fossil fuel based power plant.

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

Name of SPVs	Capacity	Capacity Commissioned	Commissioning Date	State	Usage
Avaada Sustainable Energy Pvt Ltd	30 MW	30 MW	02/03/2018	Karnataka	Sale to 3rd Party
Avaada Clean Energy Power Limited	5 MW	5 MW	14/09/2018	Uttar Pradesh	Sale to Ordnance Factory, Kanpur

Giriraj Renewables Pvt Ltd	100 MW	28 MW	16/04/2018	Maharashtra	Sale to SECI
Solarsys Non-Conventional Energy Pvt Ltd	30 MW	30 MW	30/03/2018	Karnataka	Sale to 3rd Party
	60 MW	60 MW	31/03/2018	Karnataka	Sale to 3rd Party

During the Current Monitoring Period from 02/03/2018 to 31/03/2019 (First and last date included) the project activity contributed to the GHG reductions 248,528 tCO_2e.

Project Technology Details –

The project activity involves the installation of Solar projects. The project activity involves installation of combined capacity of 225 MW Solar power projects in the states of Karnataka, Uttar Pradesh & Maharashtra, India.

1. Avaada Sustainable Energy Pvt Ltd. (30 MW)

Sl. No.	Technical details of the equipment	Description
1	Technology Used	Solar PV technology (Poly-Crystaline)
2	Number of modules and their model capacity	No. of Modules- 192024 Model capacity- 310 Wp, 315 Wp & 320 Wp
3	Number of Inverters, Inverter Make & Model	67 Inverters TMEIC-PVL0750 E(750 KW) – 65 nos TMIEC-PVL0500 E(625 KW) – 2 nos
4	Modules per String	42/2
5	Tilt	Tracking
6	Tracker	Single Axis tracker

2. Avaada Clean Energy Power Limited (5 MW)

Sl. No.	Technical details of the equipment	Description
1	Technology Used	Solar PV technology (Poly-Crystaline)
2	Number of modules and their model capacity	No. of Modules- 192024 Model capacity- 310 Wp, 315 Wp & 320 Wp
3	Number of Inverters, Inverter Make & Model	67 Inverters TMEIC-PVL0750 E(750 KW) – 65 nos. TMIEC-PVL0500 E(625 KW) – 2 nos.
4	Modules per String	42/2
5	Tilt	Tracking
6	Tracker	Single Axis tracker

3. Giriraj Renewables Pvt Ltd. (100 MW)

Sl. No.	Technical details of the equipment	Description
1	Technology Used	Solar PV technology (Poly-Crystaline)

Sl. No.	Technical details of the equipment	Description
2	Number of modules and their model capacity	No. of Modules- 192024 Model capacity- 310 Wp, 315 Wp & 320 Wp
3	Number of Inverters, Inverter Make & Model	67 Inverters TMEIC-PVLO750 E(750 KW) – 65 nos TMIEC-PVLO500 E(625 KW) – 2 nos
4	Modules per String	42/2
5	Tilt	Tracking
6	Tracker	Single Axis tracker

4. Solarsys Non-Conventional Energy Pvt Ltd. (30 MW)

Sl. No.	Technical details of the equipment	Description
1	Technology Used	Solar PV technology (Poly-Crystaline)
2	Number of modules and their model capacity	No. of Modules- 192024 Model capacity- 310 Wp, 315 Wp & 320 Wp
3	Number of Inverters, Inverter Make & Model	67 Inverters TMEIC-PVLO750 E(750 KW) – 65 nos TMIEC-PVLO500 E(625 KW) – 2 nos
4	Modules per String	42/2
5	Tilt	Tracking
6	Tracker	Single Axis tracker

5. Solarsys Non-Conventional Energy Pvt Ltd. (60 MW)

Sl. No.	Technical details of the equipment	Description
1	Technology Used	Solar PV technology (Poly-Crystaline)
2	Number of modules and their model capacity	No. of Modules- 192024 Model capacity- 310 Wp, 315 Wp & 320 Wp
3	Number of Inverters, Inverter Make & Model	67 Inverters TMEIC-PVLO750 E(750 KW) – 65 nos TMIEC-PVLO500 E(625 KW) – 2 nos
4	Modules per String	42/2
5	Tilt	Tracking
6	Tracker	Single Axis tracker

It is to be noted that in future there is possibility of change in module configuration of projects implemented; however total project capacity of each project will remain same as above. The timeline for Commission of the project activity is also checked by the assessment team. Assessment team checked the Commission of all the solar power plants via the commissioning Certificates and found correct.

2 VALIDATION AND VERIFICATION PROCESS

2.1 Method and Criteria

Validation and Verification Scope: The scope is defined as an independent and objective review of the Joint project design document and Monitoring report. The Joint VCS PD and 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 4.0, including the approved baseline and monitoring methodology ACM0002- Version 19.0 (for the present scenario in the project). The validation and verification were based on the requirements in the Validation and Verification Standardfor project activities version 02, project standard for project activities version 02, project cycle procedure for project activities version 02 and VCS guideline and standard version 4.0.

The validation and verification are 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 combined project document and the Monitoring report.

Validation and Verification Process: The project assessment is based on the Clean Development Mechanism Validation and Verification Standard for project activities version 02 and VCS standard and guideline version 4.0 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:

I. A desk review of the Joint project design documentation and monitoring report;

II. Follow-up interviews with project stakeholders;

III. The resolution of outstanding issues and the issuance of the final Joint –VAL & VER report and opinion.

In order to ensure transparency, assumptions must be clear and stated explicitly and background material must also be referenced. LGAI TECHNOLOGICAL CENTER S.A. (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/verifying the identified criteria.

Appointment of the assessment team

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

The composition of audit team shall be approved by the LGAI Technological Center S.A. (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 a re 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 c overed by the assessment team.

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

The complete list of CVs is included as Appendix 3 of this report.

Document review

The Joint VCS PD & MR submitted by the Client was reviewed against the approved methodology 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 LGAI Technological Center S.A. (Applus+ Certification) who 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 in the below sections.

Resolution of Clarification and Corrective Action Request

The objective of this phase of the joint validation and verification was to resolve the requests for corrective actions and clarification and any other outstanding issues which need to be

clarified for LGAI Technological Center S.A. (Applus+ Certification) positive conclusion on the project design and Monitoring report. The Corrective Action Requests and Clarification Requests raised by LGAI Technological Center S.A. (Applus+ Certification) were resolved during communications between the Client and Applus+ Certifications to guarantee the transparency of the validation process, the concerns raised and responses given are summarized below in the appendix 2.

The Joint VCS PD & MR Version 03 submitted by project owners on 15/05/2020 serves as the basis for the final assessment presented. Additional changes to the project during the joint validation and 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 joint validation and verification of the final documentation including the final Joint validation and 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 project owners the positive validation/verification opinion and relevant documents are submitted to the VCS secretariat through the VCS web-platform.

2.2 Document Review

The details of the document observed during the joint validation and verification process are listed below in appendix 1 of this report.

2.3 Interviews

The site visit for the project activity was carried out from 28/09/2018 to 30/09/2018 & 02/10/2018 & 04/10/2018 to 05/10/2018. No sampling procedures were adopted either in document verification and all the document were cross checked to ensure conservative estimation of emission reduction. Kindly find below names of the persons interviewed (during onsite and telephonic interview later) for the site.

Sr. No.	Name of Persons	*Role*/Designation
1)	Mr. Raji George	PP Representative
2)	Mr. Ram Nimbalkar	Farmer
3)	Mr. Gagan Yadav	Villager
4)	Mr. Kingshuk Das	Consultants

2.4 Site Inspections

Duration of on-site inspection: 28/09/2018 to 30/09/2018 & 02/10/2018 & 04/10/2018 to 05/10/2018				
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.	Rajasthan, Uttar Pradesh, Maharashtra, Karnataka, Telangana, Odisha States, India	28/09/2018 to 30/09/2018 & 02/10/2018 & 04/10/2018 to 05/10/2018	Dr. Atul Takarkhede

The monitoring period covers the period 02/03/2018 to 31/03/2019. Thus, to verify the data & information post site visit period like implementation of project activity, onsite operation & maintenance, monitoring & management practices; assessment team has reviewed third party statutory documents i.e. Commissioning certificates, Power Purchase Agreement, Complete set of JMRs covering monitoring period, Invoice (for cross check of Net electricity supplied to the grid), , breakdown log, O&M schedule, and other relevant records along with telephonic discussions with PP.

After document reviews & discussions with PP; assessment team concluded that the project activity is still implemented and operated in-line with the Joint VCS PD & MR. There is no change in the project design or operation and monitoring practices at site which can alter the applicability of methodology, scale, additionality of the project activity or onsite monitoring practices. In addition, assessment team have checked the commissioning certificate, PPA and JMRs and found that the project activity is implemented as per the Joint VCS PD & MR submitted by the PP. Assessment team therefore of the opinion that project is implemented as described in the Joint VCS PD & MR and there is no change in monitoring practices as well as all monitoring parameters as envisaged in the Joint VCS PD & MR. All the monitored values are supported by the evidences i.e. JMRs and found that information provided in the Joint VCS PD & MR is inline with the submitted evidences.

2.5 Resolution of Findings

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

The final Joint VCS PD & MR Version 03 submitted by project owners on 15/05/2020 serves as the basis for the final assessment presented. Additional changes to the project during the validation and 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	01	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	01	00
- Deviation from methodology	00	00	00
- Clarification on applicability of methodology, tool and/or standardized baseline	00	00	00
- Demonstration of additionality	00	01	00
- Emission reductions	00	01	00
- Monitoring plan	00	01	00
-Stakeholders consultation process	00	01	00
- Public comments	00	01	00
Others (please specify)-Matter related to double counting- **for validation**	00	00	00
Others (please specify)-Matter related to Emission reduction calculation- **for verification**	00	01	00
Total	**00**	**Validation+ Verification: 08**	**00**

The list of findings and their resolution is presented in appendix 2 of this report.

2.5.1 Forward Action Requests

No FAR was raised during this joint validation and verification process. Please refer Appendix 2 for details.

3 VALIDATION FINDINGS

3.1 Project Details

The main purpose of this project activity is to generate clean form of electricity through renewable energy sources. The project activity involves installation of combined capacity of 225 MW Solar power projects in the three states i.e. Karnataka, Uttar Pradesh & Maharashtra, India. The project aims at providing electricity to the state grid by effective utilization of renewable resources. The electricity generated from the project activity would be supplied to the national grid of India.

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

During the 10 years of first crediting period, the project will replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 329,720 tCO_2e per year, thereon displacing 351,965 MWh/year amount of electricity from the generation-mix of power plants connected to the Indian grid, which is mainly dominated by thermal/fossil fuel based power plant.

Details of the capacity & installation dates are mentioned in Section 1.4 above.

Project location

Assessment team during the validation site visit confirms via google map that the Solar power plant is located at a single region and the details are as follows[4]:

Name of SPVs	*Capacity*	*Village*	*State*	*Latitude (N)*	*Longitude (E)*
Avaada Sustainable Energy Pvt Ltd	30 MW	Donetemenahalli village, Molakalmuaru, Chitradurga District	Karnataka	14° 40' 38.2728"	76° 40' 34.0644"
Avaada Clean Energy Power Limited	5 MW	Ordnance Factory, Kanpur	Uttar Pradesh	26° 28' 34.7124"	80° 16' 10.4340"
Giriraj Renewables Pvt Ltd	100 MW	Varkute and Malavadi, Man, Satara Dist.	Maharashtra	17° 33' 28.8"	74° 48' 36.7"
Solarsys Non-Conventional Energy Pvt Ltd	30 MW	Banavikalu, Kudligi, Ballary Dist.	Karnataka	14.767592°	76.519933°
	60 MW	Balakundi, Ilkal, Balkot Dist.	Karnataka	15° 55' 41.63"	76° 5'2.89"

During the Current Monitoring Period from 02/03/2018 to 31/03/2019 (First and last date included) the project activity contributed to the GHG reductions 248,528 tCO_2e.

Project Technology Details –

The project activity involves the installation of Solar projects. The project activity involves installation of combined capacity of 225 MW Solar power projects in the states of Karnataka, Uttar Pradesh & Maharashtra, India.

The technical specifications are mentioned in section 1.4 of this report and same was checked during site visit.

Assessment team checked onsite and confirms that the details of the project proponent areas below:

Organization name	**Giriraj Renewables Private Limited**

[4] Sourced from Detail Project Report of the project activity. The same is checked during the validation site visit via GPS meters.

Contact person	Praveen Golash
Title	Senior General Manager
Address	304, Shoppers Plaza, Opp. Municipal Market, CG Road, Navrangpura. Ahmedabad-380009
Telephone	+91- 9711302259
Email	praveen.golash@avaada.com

Assessment team checked onsite and confirms that the details of the other entity involved is as below:

Organization name	**EKI Energy Services Limited**
Role in the project	Project Consultant
Contact person	Manish Dabkara
Title	CEO & MD
Address	EnKing Embassy, Office No 201, Plot 48, Scheme 78, Part 2, Vijay Nagar, Indore- 452010, Madhya Pradesh, India.
Telephone	+91-731-4289086
Email	manish@enkingint.org

Project Start Date

Start date of the project activity is the earliest date of interconnection with the grid i.e. 02/03/2018. This is the date of commissioning of 30 MW solar PV project activity by Avaada Sustainable Energy Pvt Ltd. Assessment team checked the commission details from the commissioning certificate provided by the Government agencies.

Project crediting period Date

Assessment team confirms that the crediting period dates for the project is as below:

Crediting Period Start date: 02/03/2018

Crediting Period End date: 01/03/2028

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

Project Scale and Estimated GHG Emission Reductions or Removals

Assessment team confirms that the project is a Project that involves setting up of 225 MW Solar Project activity project.

Project Scale	
Project	
Large project	✓

As the estimated annual average GHG emission reductions or removal per year is 329,720 tCO_2e which is less than 300,000 tonnes of CO_2e per year, thus the project falls in the category of Large Project.

Year	Estimated GHG emission reductions or removals (tCO_2e)
Year 1	340,444
Year 2	338,061
Year 3	335,678
Year 4	333,295
Year 5	330,911
Year 6	328,528
Year 7	326,145
Year 8	323,762
Year 9	321,379
Year 10	318,996
Total estimated ERs	**3,297,199**
Total number of crediting years	10
Average annual ERs	**329,720**

The above estimated emission reduction is confirmed by assessment team via emission reduction calculation spreadsheet. The calculation is conservative and this acceptable to the assessment team. Also, the estimated emission reductions have been calculated by taking into account the degradation factor of 0.7% from 2nd year onwards and this is evident from the emission reduction calculation spreadsheet.

Conditions prior to project initiation

Assessment team during the desk review and onsite visit confirms that the project is a Solar power project and does not involve generation of GHG emissions for the purpose of their subsequent reduction, removal or destruction. The baseline as described in section 3.3.4 of this report will continue to be the baseline in the absence of project activity.

Project compliance with applicable laws, statutes and other regulatory frameworks

Assessment team confirms that the Project has received necessary approvals for development and commissioning for the proposed Solar project from the state Nodal agencies and is in compliance to the local laws and regulations. Assessment team checked the Commissioning certificates, wheeling agreement with state board, Installation report for Solar power plant in the name of PP issued by state nodal agency of the respective state to confirm the project capacity and its relevant statutory requirements as per the host country regulations.

Assessment team noted that the project fulfils the norms put down by Central Pollution Control Board norms. As per Central Pollution Control Board (Ministry of Environment & Forests, Govt. of India), final document on revised classification of Industrial Sectors under Red, Orange, Green and White Categories (29/02/2016).

Being a renewable power project, it falls under the category of White and thus these projects do not need clearance vide MoEFCC Office Memorandum J-11013/41/2006-IA.II(I) dated 07/07/2017 and only needs to inform the relative State Pollution Control Board for Consent to operate. The same is done for the project and thus it can be confirmed that it follows the local laws of the host country.

The relevant national laws and regulations pertaining to generation of energy in India are:

- Electricity Act 2003
- National Electricity Policy 2005
- Tariff Policy 2006

The Project activity conforms to all the applicable laws and regulations in India:

- Power generation using renewable energy is not a legal requirement or a mandatory option.
- There are state and sectoral policies, framed primarily to encourage Solar power projects. These policies have also been drafted realizing the extent of risks involved in the projects and to attract private investments.
- The Indian Electricity Act, 2003 (May 2007 Amendment) does not influence the choice of fuel used for power generation.
- There is no legal requirement on the choice of a particular technology for power generation.

Thus, assessment team confirms that the project activity follows the National and local law and regulation of the host country.

Project Ownership

Giriraj Renewables Private Limited is the parent company and also **project proponent (PP)** of project activity and they have the legal right to control and operate the project activities.

The project ownership has been checked by the Assessment Team and demonstrated through below supporting documents:

1. Commissioning certificates – The letter from respective State Nodal Agency to the respective SPV of PP for registration of commissioning of generation facility indicates that PP have the legal right to control and operate the project activities.

2. Contract with EPC contractor – The purchase order on the name of respective SPV of PP indicates that PP has the legal right to control and operate the project activities.

*Assessment team confirms that, the project ownership relies on **Giriraj Renewables Private Limited** as per the internal agreement between Giriraj Renewables Private Limited & each SPV companies.*

Emissions trading programs and other binding limits

Assessment team confirms that the Net GHG emission reductions or removals generated by the Project will not be used for compliance with an emissions trading program or to meet binding limits on GHG emissions in any Emission Trading program or other binding limits. Audit team checked the REC

Mechanism database of India and found that the project activity is not accredited[5] / registered[6] under REC mechanism. Further, Declaration in effect of the same has been submitted by project proponent to audit team and found to be correct. Thus, it is concluded that the project activity not involved on other Emissions trading programs and other binding limits.

Additional Information Relevant to the Project

Eligibility Criteria for grouped projects

This is not a grouped project activity. Thus, this section is not applicable for this project.

Leakage Management for AFOLU projects

Not applicable to the project activity.

Commercially Sensitive Information

No commercially sensitive information has been excluded from the public version of the project description. The details are presented transparently to the assessment team for analysis which lead to positive conclusion for this validation and verification.

Sustainable Development

Contribution to sustainable development:

Ministry of Environment and Forests, has stipulated economic, social, environment and technological well-being as the four indicators of sustainable development. Assessment team found that the project contributes to sustainable development using the following ways.

Social well-being: The project would help in generating employment opportunities during the construction and operation phases. The project activity will lead to development in infrastructure in the region like development of roads and also may promote business with improved power generation.

Economic well-being: The project is a clean technology investment in the region, which would not have been taken place in the absence of the VCS benefits the project activity will also help to reduce the demand supply gap in the state.

[5] https://recregistryindia.nic.in/index.php/publics/accredited_regens

[6] https://recregistryindia.nic.in/index.php/publics/registered_regens

Technological well-being: The successful operation of project activity would lead to promotion of Solar based power generation and would encourage other entrepreneurs to participate in similar projects.

Environmental well-being: Solar being a renewable source of energy, it reduces the dependence on fossil fuels and conserves natural resources which are on the verge of depletion. Due to its zero emission the Project activity also helps in avoiding significant amount of GHG emissions and specific pollutants like SO_x, NO_x, and SPM associated with the conventional thermal power generation facilities.

Project undergone continuous operation and only scheduled maintenance as per the manufacturer specification is considered. No unforeseen incident observed for the present monitoring period.

Conclusion: In view of the assessment of JOINT VCS PD & MR and supporting documents as listed in Appendix 1 of this report, the validation team is able to confirm that the description contained in the JOINT VCS PD & MR of the project activity provides the reader with a clear understanding of the precise nature of the project activity and the technical aspects of its implementation. Consequently, assessment team confirms that the project description of the project contained in the JOINT VCS PD & MR to be complete and accurate. The JOINT VCS PD & MR complies with the relevant forms and guidance for completing the JOINT VCS PD & MR.

3.2 Participation under Other GHG Programs

The project has neither been registered nor seeking registration under any other GHG programs. The project is seeking registration only in VCS program. Audit team checked the REC Mechanism database of India and found that the project activity is not accredited / registered under REC mechanism. Further, declaration for the same is checked and found correct by the assessment team. Also assessment team checked the following registries to confirm the same. The details of the registries checked are as follows:

1. https://www.recregistryindia.nic.in/
2. http://cdm.unfccc.int/
3. http://www.goldstandard.org/

Rejection by other GHG programs

The Project is not rejected by other GHG programs. A declaration for the same is checked and found correct by the assessment team. Also assessment team checked the following registries to confirm the same. The details of the registries checked are as follows:

1. https://www.recregistryindia.nic.in/
2. http://cdm.unfccc.int/
3. http://www.goldstandard.org/
4. www.v-c-s.org

The Project has no intend to generate any other form of GHG-related environmental credit for GHG emission reductions or removals claimed under the VCS Program.

Renewable energy certificates are available for trading in the host country However, the same is not availed by the project participant. The undertaking regarding the same is submitted by PP which is acceptable to the assessment team and assessment team also checked the REC web site (*https://recregistryindia.nic.in/*) and found the declaration to be correct.

3.3 Safeguards

3.3.1 No Net Harm

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.

As project is a renewable energy project hence there is no negative environmental and socio impact effect and the same can be summarized in the below table:

S.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 farms 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.
2	Water quality and quantity	The project has no effect on water quality and quantity because it neither generates any waste not consume any water. It was validated during on-site assessment that there was no requirement of water for operations of Solar plant and the only usage of water was for drinking and sanitation purpose. The consumption of freshwater during construction was also pretty much limited as confirmed by the local stakeholders. Hence the parameter is indicated as neutral and the same is acceptable to the DOE
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

S.No.	Indicator	Assessment team opinion
		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. Positive impact envisaged.

3.3.2 Local Stakeholder Consultation

As per the VCS requirements, it is necessary to invite the relevant stakeholders, prior of the validation process. Moreover, the stakeholder meeting took place prior to the start date of the project activity which fulfil the requirement of project standard for project activities version 02. The DOE checked the relevance of the dates during the validation site visit. The detail of the invitation date and stakeholder meeting date is as below:

The stake holder meeting was conducted at the project site itself as below:

Name of Investor	Capacity (MW)	Project Location			Date of Invitation	Date of Meeting
		Village	District	State		
Avaada Sustainable Energy Pvt Ltd	30	Donetemenahalli	Chitradurga	Karnataka	10/06/2017	17/06/2017
Avaada Clean Energy Power Limited	5	Ordnance Factory Kanpur	Kanpur	Uttar Pradesh	08/07/2017	15/07/2017
Giriraj Renewables Pvt Ltd	100	Varkute and Malavadi	Satara	Maharashtra	09/06/2017	16/06/2017
Solarsys Non-Conventional Energy Pvt Ltd	30	Banavikalu	Ballary	Karnataka	07/07/2017	14/07/2017
	60	Balakundi	Balkot	Karnataka	06/07/2017	13/07/2017

The local stakeholders' consultation meeting was attended by local persons including local villagers, local vendors and technology suppliers.

The stakeholders identified by the project participant were local villagers who are the major population of the particular area, local communities and gram panchayat (Village head), panel supplier, project proponent representatives, O&M Team and other people involved in the project. Validation team verified the list of participants who attended the stakeholder meeting and feedback questionnaire and confirms

the stakeholders identified are relevant. Validation team verified the list of participants who attended the stakeholder meeting and feedback questionnaire and confirms the stakeholders identified are relevant. The validation team also verified the minutes of meeting to note that no negative comments were received and the same was cross checked with the information obtained during follow up interviews with the stakeholder's. Moreover, assessment team during the validation site visit also noted that a grievance register is also put onsite for the stakeholder to comment on any grievances during the operation lifetime of the project activity, the grievances from the stakeholder if found suitable will be addressed immediately by the top management and thus the approach is found appropriate for the project activity.

1)	Mr. Ram Nimbalkar	Farmer
2)	Mr. Gagan Yadav	Villager

The interactions with some of the stakeholders during the site visit are presented below:

Name of the stakeholder	Mr. Ram Nimbalkar (Farmer)
DOE questions: Did the power project generated employment opportunities for locals youths, skilled or unskilled persons? **Answer:** Yes. Employment given to locals in O&M activities for technically educated youths and unskilled men & womens as labours in construction activity as well as vegetation removal etc. work.	

Name of the stakeholder	Mr. Gagan Yadav (Villager)
DOE questions: Did the Solar power project have any adverse impact on the nearby areas? **Answer:** No. Solar power plants do have no adverse impact on surrounding area.	

Thus, Validation team is of the opinion that the stakeholder meeting was adequate and appropriate. There were no other major comments raised by the stakeholders and they were totally in support for setting up of these kinds of projects in the region.

For the ongoing stakeholder's communication, PP has placed a grievance register onsite, where stakeholder can register their grievance or feedback and the same is reviewed by site manager/site in-charge and if found genuine addressed immediately. Also, a need based survey is carried out annually to check the requirements of any developmental activities in the villages and accordingly the CSR fund is allotted.

3.3.3 Environmental Impact

The project activity is expected to have positive impacts and no significant adverse environmental impacts are foreseen. Since, the project activity is an electricity generation from renewable source (i.e. Solar energy) therefore no negative impact are envisaged. There is no mandatory legal requirement for carrying out an environmental impact assessment in the host country. The Ministry of Environment, Forests & Climate change (MoEFCC), Government of India (GoI) notification[7] dated 14/09/2006 regarding the requirement of Environment Impact Assessment (EIA) studies states that any project developer in India needs to file an application to the Ministry of Environment and Forests (including a public hearing and an EIA) in case the proposed industry or project is listed in a predefined list. The list includes thirty nine project

[7] http://envfor.nic.in/legis/eia/so1533.pdf

activities that require EIA studies. The Solar power projects are not included in this list and thus an EIA study is not required. Further, solar parks are exempted from environmental clearance requirements as per MoEFCC Office Memorandum J-11013/41/2006-IA.II(I) dated 07/07/2017.

3.3.4 Public Comments

Assessment team noted that this project was open for public comment from 17/08/2018 to 16/09/2018. No comments were received.

The detail were checked by the assessment team in the following web platform

https://www.vcsprojectdatabase.org/#/pipeline_details/PL1786.

3.3.5 AFOLU-Specific Safeguards

This section is not applicable as this project activity is a non-AFOLU project activity.

3.4 Application of Methodology

3.4.1 Title and Reference

Assessment team checked that following methodology and tools are applicable for the project activity. The details are as below:

Title: Grid-connected electricity generation from renewable sources - ACM0002- Version 19.0

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

Methodology: Grid-connected electricity generation from renewable sources

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

Category: Approved Consolidated Methodology

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

- Tool to calculate the emission factor for an electricity system[8] - Version 07.0 (EB 100, Annex 04)
- Methodological Tool- Tool for the demonstration and assessment of additionality[9] - Version 07.0.0 (EB 70, Annex 08).

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

3.4.2 Applicability

The applied baseline methodology is justified as it has been demonstrated that the proposed project activity is:

Applicability 1: The project activity is installation of a new grid connected solar power plant (Option 1 (A)) at a site where no renewable power plant was operated prior to the implementation of the project activity (Greenfield plant) and hence this criterion is applicable.

Applicability 2: The proposed project activity is an installation of a new grid connected solar power plant and hence this condition is met. The option (a) of applicability criteria 2 is applicable as project is renewable energy power plant/unit.

Applicability 3: The project is installation of new solar energy-based electricity generation plants (not a hydro power plant). Hence this criterion is not applicable.

Applicability 4: The project is solar power project and thus the criterion is not applicable to this project activity.

Applicability 5: The project is solar power project and thus the criterion is not applicable to this project activity.

Applicability 6: The project is solar power project and thus the criterion is not applicable to this project activity.

Applicability 7: The project activity is installation of a new grid connected solar power project and does not involve switching from fossil fuel to renewable energy and hence this criterion is not relevant to the project activity.

&

This is a solar power plant and not a biomass fired plant and hence this applicability criterion is not applicable to the project activity.

Applicability 8: The project activity is a new grid connected solar power plant and not a retrofits, replacement or capacity additions and therefore this criterion is not applicable to the project activity.

Applicability 9: Please refer below

<u>Applicability conditions of "Tool to calculate the emission factor for an electricity system"</u>

- OM, BM and CM are estimated using the tool for calculating baseline emissions.
- The project activity is grid connected and thus emission factor is calculated and thus OM, BM and CM are estimated using the tool for calculating baseline emissions.

[9] http://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-01-v7.0.0.pdf

- The project activity is located in India, a non-Annex I country. Therefore, tool is applicable for the project activity.

- The project is a solar power project and there is no involvement of biofuels. Therefore, this criterion is not applicable for the project activity.

LGAI Technological Center S.A. (Applus+ Certification) confirms that the application of the baseline methodology is transparent and conservative and confirms that the chosen baseline and monitoring methodology i.e. ACM0002- Version 19.0 is applicable to the project activity.

The project activity qualifies as Type I during every year of the crediting period in accordance with applicable provisions for project activity eligibility as discussed above. Also, the total installed capacity of project activity is more than 15 MW which is applicable as per large scale project activities methodology ACM0002- Version 19.0. The project capacity will be always remain the same and hence the project activity will always be large scale project activities throughout the crediting period and thereafter.

3.4.3 Project Boundary

Project boundary has been ascertained and confirmed during the site visit using ACM0002- Version 19.0 – "The spatial extent of the project boundary includes the project power plant and all power plants connected physically to the electricity system that the CDM project power plant is connected to".

Hence the project boundary includes the renewable energy power generation, sub-stations, grid and all power plants connected to grid. The proposed project activity will evacuate power to the grid. The boundary also extends to the project power plant and all power plants connected physically to the electricity system that the VCS project power plant is connected to".

The calculation of net electricity supplied to grid is under purview of state electricity board and project activity Owner or project activity Implementer does not have any control on it. Thus, for project activity, net electricity supplied to grid is the monitoring parameter which is used for ER calculations.

It is to be noted that metering arrangement is under control of state electricity board and PP does not have any control on it.

The sources and GHG gases involved for proposed Project activity are as below

Source		Gas	Included?	Justification/Explanation
Baseline	Grid connected electricity generation.	CO_2	Yes	Main emission source
		CH_4	No	Minor emission source
		N_2O	No	Minor emission source
		Other	No	No other emissions are emitted from the project
Project Activity	Greenfield Solar Power Project Activity.	CO_2	No	No CO_2 emissions are emitted from the project
		CH_4	No	Project activity does not emit CH_4
		N_2O	No	Project activity does not emit N_2O
		Other	No	Project activity does not emit other forms of GHG emissions

3.4.4 Baseline Scenario

Assessment team confirms that being a grid connected Solar energy generation project, PP developed the project based on the Methodology ACM0002- Version 19.0. As per methodology *if the project activity is the installation of a new grid-connected renewable power plant/unit, the baseline scenario is the following:*

Electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system".

As per CDM Validation and Verification Standard for project activities version 02, "where the baseline scenario is not prescribed in the approved methodology, the DOE shall assess the list of identified credible alternatives to the project activity in the JOINT VCS PD & MR selected to determine the most realistic baseline scenario." Thus, JOINT VCS PD & MR should mention the credible alternatives to the project activity in order to determine the most realistic baseline scenario. As the selected large-scale methodology clearly mention the baseline scenario and the same has been opted in this project, therefore, no further analysis on baseline is required.

Validation Team, therefore, concludes that the JOINT VCS PD & MR conforms to the guidance given by EB via CDM Validation and Verification Standard for project activities version 02 and VCS via VCS standard version 4.0.

The project activity involves setting up solar projects to harness the power of sun and solar to produce electricity and supply to the grid. In the absence of the project activity, the equivalent amount of power would have been supplied by the Indian grid, which is fed mainly by fossil fuel fired plants.

In the absence of the project activity, the equivalent amount of power would have been drawn from the Indian grid. Hence, the baseline for the project activity is the equivalent amount of power from the Indian grid.

The combined margin ($EF_{grid, CM, y}$) is the result of a weighted average of two emission factor pertaining to the electricity system: the operating margin (OM) and build margin (BM). Calculations for this combined margin must be based on data from an official source (where available) and made publicly available. The Central electricity authority (CEA) database version 14 is the latest available data at the time of JOINT VCS PD & MR submission to DOE for validation, hence same is considered for emission factor calculations.

The combined margin of the Indian grid used for the project activity is as follows:

Parameter	Value	Nomenclature	Source
$EF_{grid,CM,y}$	0.9368 tCO_2/MWh	Combined margin CO_2 emission factor for the project electricity system	Calculated as the weighted average of the operating margin (0.75) & build margin (0.25) values, sourced from

Parameter	Value	Nomenclature	Source
		in year y	Baseline CO_2 Emission Database, Version 14.0, December 2018 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,OM,y}$	0.9610 tCO_2/MWh	Operating margin CO_2 emission factor for the project electricity system in year y	Calculated as the last 3 year (2014-15, 2015-16, 2016-17) generation-weighted average, sourced from Baseline CO_2 Emission Database, Version 14.0, December 2018 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,BM,y}$	0.8644 tCO_2/MWh	Build margin CO_2 emission factor for the project electricity system in year y	Baseline CO_2 Emission Database, Version 14.0, December 2018 published by Central Electricity Authority (CEA), Government of India

Moreover, Annex 3 of the EB 22 states that national and/or sectoral policies and circumstances have to be accounted for when considering the baseline scenario. Paragraph 7(a) states that, only those national and/or sectoral policies or regulations under paragraph 6(a), i.e., type E+ policy that increase GHG emissions, that have been implemented before adoption of the Kyoto Protocol by the COP (decision 1/CP.3, 11/12/1997), shall be taken into account when developing a baseline scenario. The Electricity Act of 2003 promoted cogeneration and generation of electricity from renewable sources of energy by providing suitable measures for connectivity with the grid and sale of electricity (Refer Section 86(1) of Electricity Act 2003). Therefore, it could be seen that the provincial and sectoral policies are E- i.e., policies that decrease GHG emissions and are after November 2001.Hence the baseline scenario of electricity generation by grid connected fossil fuel dominated power plants is in accordance with Annex 3 of EB 22.

Assessment team thus confirmed that baseline is selected as per the applied methodology and combined margin is calculated as per the tool and thus acceptable to the assessment team

3.4.5 Additionality

During conceptualization of the project activity, board of directors of the project proponents considered the VCS revenue to improve the project financials. During the board meeting for board of Directors decided that they would consider VCS revenue for their project activity. In continuation to the board decision, PP issued the respective purchase order for the supply of solar plant.

Step 0: Demonstration whether the proposed project activity is the first-of-its-kind

The proposed project activity is not the first-of-its-kind. Hence not applicable.

Step 1: Identification of alternatives to the project activity consistent with current laws and regulations

Alternative 1: The proposed project activity without VCS benefit;

Alternative 2: Continuation of the current situation, i.e., electricity will continue to be generated by the existing generation mix operating in the grid.

Having regard to the fact that the project activity under consideration is a solar power project, validation team is convinced that there are no other realistic and credible alternatives. Both the alternatives are in compliance with all applicable legal and regulatory requirements as;

- the implementation of project activity is a voluntary initiative and is not mandatory or a legal requirement;
- the applicable environmental regulations do not restrict the use of solar energy; and
- There is no legal requirement on the choice of a particular technology.

Assessment team noted that the project fulfils the norms put down by Central Pollution Control Board. As per Central Pollution Control Board (Ministry of Environment & Forests, Govt. of India), final document on revised classification of Industrial Sectors under Red, Orange, Green and White Categories (29/02/2016).

The newly introduced White category of industries pertains to those industrial sectors which are practically non-polluting such as Biscuit trays etc. from rolled PVC sheet (using automatic vacuum forming machines), Cotton and woollen hosiers making (Dry process only without any dying/washing operation), Electric lamp (bulb) and CFL manufacturing by assembling only, Scientific and mathematical instrument manufacturing, Solar power generation through photovoltaic cell, wind power and mini hydel power (less than 25 MW).

There shall be no necessity of obtaining the "Consent to Establish/Operate'' for White category of industries. Intimation to concerned SPCB / PCC is sufficient.

Being a renewable power project it falls under the category of White and thus these projects do not need clearance for Consent to operate and only needs to inform the relative State pollution control board. The same is done for the project and thus it can be confirmed that it follows the local laws of the host country.

Due to above categorization of white category and being the renewable in nature, the project activity does not emit any emissions. Thus, there are no any other surplus regulatory requirement for the project activity. This is found to be accepted by assessment team.

However, of the two alternatives identified, alternative (i) cannot be considered realistic as further analysis in the following paragraph reveals that it is not economically feasible option. Hence, alternative (ii) alone could be justified as realistic, credible and plausible alternative to the PP.

Validation team is, therefore, convinced that the project developer has taken into consideration all realistic and credible alternatives (having regard to the governing methodologies) including the project being undertaken as a non-VCS activity and continuation of current scenario. The identification of alternatives is in conformity with the guidance given by the tool.

Outcome of Sub-step 1a: All the realistic alternatives for the project activity have been enlisted above.

Sub-step 1b: Consistency with mandatory laws and regulations:

The alternative(s) shall be in compliance with all applicable legal and regulatory requirements, even if these laws and regulations have objectives other than GHG reductions, e.g. to mitigate local air pollution. (This sub-step does not consider national and local policies that do not have legally-binding status.)

Project compliance with applicable laws, statutes and other regulatory frameworks

Assessment team confirms that the Project has received necessary approvals for development and commissioning for the proposed Solar project from the state Nodal agencies and is in compliance to the local laws and regulations. Assessment team checked the Commissioning certificates, wheeling agreement with state board, Installation report for Solar power plant in the name of PP issued by state nodal agency of the respective state to confirm the project capacity and its relevant statutory requirements as per the host country regulations.

Assessment team noted that the project fulfils the norms put down by Central Pollution Control Board norms. As per Central Pollution Control Board (Ministry of Environment & Forests, Govt. of India), final document on revised classification of Industrial Sectors under Red, Orange, Green and White Categories (29/02/2016).

Being a renewable power project, it falls under the category of White and thus these projects do not need clearance vide MoEFCC Office Memorandum J-11013/41/2006-IA.II(I) dated 07/07/2017 and only needs to inform the relative State Pollution Control Board for Consent to operate. The same is done for the project and thus it can be confirmed that it follows the local laws of the host country.

The relevant national laws and regulations pertaining to generation of energy in India are:

- Electricity Act 2003
- National Electricity Policy 2005
- Tariff Policy 2006

The Project activity conforms to all the applicable laws and regulations in India:

- Power generation using renewable energy is not a legal requirement or a mandatory option.
- There are state and sectoral policies, framed primarily to encourage Solar power projects. These policies have also been drafted realizing the extent of risks involved in the projects and to attract private investments.
- The Indian Electricity Act, 2003 (May 2007 Amendment) does not influence the choice of fuel used for power generation.
- There is no legal requirement on the choice of a particular technology for power generation.

Hence, assessment team confirms that the project activity follows the National and local law and regulation of the host country.

Thus, both the alternatives are in compliance with all applicable legal and regulatory requirements as;

- The implementation of project activity is a voluntary initiative and is not mandatory or a legal requirement;
- The applicable environmental regulations do not restrict the use of solar energy; and
- There is no legal requirement on the choice of a particular technology.
- Moreover, Outcome of Sub-step 1b: Hence, both the alternatives enlisted above are found to comply with the mandatory laws and regulations taking into account the enforcement of the legislations in the region or country and EB decisions on national and/or sectoral policies and regulations. However, Alternative 2 has been selected as the appropriate baseline alternative for this project activity.

Step 2: Investment analysis

Determine whether the proposed project activity is economically or financially less attractive than at least one other alternative, identified in step 1, without the revenue from the sale of emission reductions credits. To conduct the investment analysis, use the following sub-steps:

Sub-step 2a: Determine appropriate analysis method and Sub-step 2b (Option III): Apply benchmark analysis

a) Suitability of investment analysis, financial indicator and benchmark:

Project developer had demonstrated that the financial returns of the proposed VCS project activity would be insufficient to justify the required capital investment as per CDM Validation and Verification Standard for project activities version 02.0. In the Initial Joint VCS PD & MR version 01. PP has adopted a conservative approach to identify the benchmark for the project activity. The project is earning revenue from the installation of the project activity. Thus, simple cost analysis (Option I) is not appropriate. Also in the absence of the project activity grid electricity would have been the obvious choice for the Project which requires no investment. Hence investment comparison analysis (Option II) is also not appropriate for the project activity. Therefore, benchmark analysis (Option III) is used for the project activity as per project type and decision-making context. Therefore, the Expected return on equity is considered appropriate benchmark. Accordingly, the post-tax Equity IRR has been considered as the relevant financial indicator for the project activity which is acceptable to the assessment team. Moreover, the financial indicator selected by the PP is correct based on the fact that tool do not restrict the PP to either use project IRR or Equity IRR. This is under the prerogative of the PP to select appropriate indicator based on his preferences to know the IRR based on his equity investment or debt investment. The same is thus acceptable to the assessment team. Assessment team however checked the Equity IRR calculation and found that input assumptions used for the calculation of Equity IRR are applicable at the time of investment decision of the project and thus is in accordance with the relevant guideline of the tool.

As per Methodological tool “Investment Analysis” Version 09, “In situations where an investment analysis is carried out in nominal terms and the available IRR benchmarks are in real terms, project participants shall convert the real term values of benchmarks to nominal values by adding the inflation rate. The inflation rate shall be obtained from the inflation forecast of the central bank of the host country for the duration of the crediting period. If this information is not available, the target inflation rate of the central bank shall be used. If this information is also not available, then the average forecasted inflation rate for the host country published by the IMF (International Monetary Fund World Economic Outlook) or the World Bank for the next five years after the start of the project activity shall be used”.

The investment analysis has been carried out in Nominal terms. Accordingly, default value has been adjusted by adding suitable forecasted inflation rate taken from RBI (Central Bank, India). PROJECT OWNERS have calculated Benchmark based on WPI mean inflation rate. As per appendix A of Methodological tool "Investment Analysis" Version 09, the inflation forecast should be for the duration of the crediting period. However, since RBI provides forecast inflation only for 5 & 10 years, the project investor has calculated benchmark using 10 years durations and the same is considered as Benchmark for the project activity.

The decision making dates for the project activity is provided in the table below.

SPV Name	Capacity (MW)	Decision Making Date
Avaada Clean Energy Pvt Ltd	5 MW	20/06/2017
Avaada Sustainable Energy Pvt Ltd	30 MW	29/05/2017
Giriraj Renewables Pvt Ltd	100 MW	29/05/2017
Solarsys Non Conventional Energy Pvt Ltd	30 MW	20/06/2017
	60 MW	20/06/2017

As Methodological tool "Investment Analysis" Version 09 the cost of equity is determined by selecting the values provided in the Appendix, i.e. Default values for cost of equity (expected return on equity) is presented below:

Appendix A in Methodological tool "Investment Analysis" Version 09 specifies default value of expected return on equity in real terms for Energy Industries (Group 1) in India = 9.79%

The Required return on equity (benchmark) was computed in the following manner:

Nominal Benchmark[10] = {(1+Real Benchmark) * (1+Inflation rate)} -1

Where:

- Default value for Real Benchmark = 9.79% (as per Appendix of Methodological tool "Investment Analysis" Version 09

Inflation Rate forecast by Reserve Bank of India (RBI) (i.e. Central Bank of India) for India & in case where RBI Inflation forecast was not available, average Inflation rate forecast for India has been sourced from IMF web site.

Benchmark estimation for 225 MW (combined capacity of the project activity):

Appendix in Methodological tool "Investment Analysis" Version 09 specifies default value of expected return on equity in real terms for Energy Industries (Group 1) in India = **9.79%**

Inflation Forecast for India as per RBI website[11]:

[10] As per Fisher Equation, https://en.wikipedia.org/wiki/Fisher_equation

[11] https://rbi.org.in/Scripts/PublicationsView.aspx?id=17458

Since RBI publishes the inflation forecast for 5 years and 10 years, PP has considered the maximum 10 year inflation considering the renewable crediting period of total 30 years.

Inflation Forecast for India as per RBI website[12].

Since RBI publishes the inflation forecast for 5 years and 10 years, PP has considered the maximum 10 year inflation considering the renewable crediting period of total 30 years.

Benchmark Calculations	Value	Sources Link	DPR Date
Default Value for India as per UNFCCC guidelines	**9.79%**	EB 101 Annex 11	29/11/2018
Inflation forecast (WPI Mean) as per RBI for 10yrs	**4.00%**	https://rbi.org.in/Scripts/PublicationsView.aspx?id=17458	06/04/2017
Benchmark (with 10yrs Forecast)	**14.18%**	Calculated	

Thus benchmark of **14.18%** has been selected for this project activity.

DoE confirms that approach used by PP to use most conservative benchmark is appropriate and in line with investment analysis guidelines.

Assessment of combined additionality as per VCS Standard, version 4.0

As per the section 3.5.5 of the VCS Project Standard v4, the additionality demonstration for all project activity instances shall be combined (e.g., multiple wind turbines shall be assessed in combination rather than individually).

Though the project is promoted by same group company, each project component is promoted by different legal entities. As per the host country requirement tax should be estimated individually. Also the financial input parameters (ie, PLF, Project Cost and tariff are different for each project component. Hence, the cash flow including tax estimation is done separately for each project component. Then the post tax net cash flow of equity IRR from the all the projects are added and the combined cash flow is estimated. From the combined cash flow of the all the project, the combined equity IRR is estimated for this project activity.

This project consists multiple projects i.e. Project 1, Project 2, Project 3, Project 4 & Project 5). Each project component is implemented by different legal entity and investment decision time, financial parameters (such as PLF, project cost, tariff etc.) are different for each project component. As per the host country requirement, cash flow and tax have been calculated individually for each project. After calculation of post-tax cash flow for each project, all the cash flows are added to obtain the combined cash flow for the project. Hence, it is appropriate to demonstrate additionality combinely for each project component (combined for all the 5 projects).

[12] https://rbi.org.in/Scripts/PublicationsView.aspx?id=17458

Hence, PP has calculated combined equity IRR is considering net cash flow of all 4 project component. The result of combined equity IRR is as below:

Combined Post tax Equity IRR	9.43%
Benchmark Value	14.18%

Suitability of benchmark: As decision making date for all 5 components are in year 2017 only, hence selection of most conservative benchmark is acceptable and in line with guidelines for investment analysis.

The combined financial analysis sheet checked and benchmark estimation and method for calculation of combined IRR found to be appropriate and acceptable.

From the above result it is evident that even the combined equity IRR is still below the benchmark.

b) Parameters and assumptions used:

The project activity is a renewable source of electricity generation and supplies the electricity to the INDIAN Electricity grid. The key parameters which determine the Equity IRR of the project activity are project cost, PLF and profitability estimates.

In the revised Joint VCS PD& MR Version 03, the project cost is based on the DPR (Detailed project report)/offer letter. The details of the DPR/offer letter are as below:

Project cost as per the DPR

Site Name	Name of the Investor/Owner/SPVs	Project Capacity	Project Cost (In Million)	DPR Date
Karnataka	Avaada Sustainable Energy Pvt Ltd	30 MW	1,620.00	28/04/2017
Uttar Pradesh	Avaada Clean Energy Power Limited	5 MW	110.00	30/05/2017
Maharashtra	Giriraj Renewables Pvt Ltd	100 MW	4,890.00	28/04/2017
Karnataka	Solarsys Non-Conventional Energy Pvt Ltd	30 MW	1,620.00	30/05/2017
		60 MW	3,240.00	30/05/2017

Actual Project cost as per CA Certificate

Site Name	Name of the Investor/Owner/SPVs	Project Capacity	Project Cost (In Million)	As on Date
Karnataka	Avaada Sustainable Energy Pvt Ltd	30 MW	1,627.50	25/03/2018
Uttar Pradesh	Avaada Clean Energy Power Limited	5 MW	78.30	20/06/2018
Maharashtra	Giriraj Renewables Pvt Ltd[13]	100 MW	389.90	31/12/2017

[13] Out of the 100 MW, only 28 MW has been commissioned till date. The CA certificate is available for that capacity only.

Site Name	Name of the Investor/Owner/SPVs	Project Capacity	Project Cost (In Million)	As on Date
Karnataka	Solarsys Non-Conventional Energy Pvt Ltd	30 MW	1,667.20	31/03/2018
		60 MW	3,315.80	31/03/2018

DPR has been submitted to validation team. The DPR were available during decision making and financial profitability of the project was decided based on this DPR. Validation team checked the DPR of the project activity and found that consideration of the project cost in revised Joint VCS PD& MR Version 03 is correct and it is in line with Appendix of Methodological tool "Investment Analysis" Version 09 as well as in compliance to CDM Validation and Verification Standard for project activities version 02. Hence, the project cost consideration is justified. Assessment team checked the actual project cost and still the project do not breach the benchmark. The sensitivity analysis below confirms the same. Since the actual cost is considered there is no way the cost can go up and thus the same is assessed to be correct.

In India, infrastructure projects are generally entitled to a debt equity ratio of 70:30. However, depending on the relationship of the client with the bank, its credit rating and collaterals offered, banks consider higher debt equity ratio also. The debt equity ratio for the project is 70:30. Assessment team checked the order for the respective state regarding ratio of debt and equity which was available at the time of investment decision and found that the ratio of Debt to equity was considered correctly for the present validation condition.

The profitability of the project, which forms the basis for IRR calculation is based on installed capacity, PLF, electricity tariff, O&M cost, depreciation and taxation.

c) Assessment of Plant Load Factor (PLF):

PP considered the Plant load factor from a third-party engineering company/offer letter, for expected electricity generation estimation. They are contracted by the PPs for this project. PP has submitted the copies of the PLFs estimation report to the assessment team.

PLF as per 3rd party PLF report/Offer Letter

Site Name	Name of the Investor/Owner/SPVs	Project Capacity (MW)	PLF (%) as per DPR	DPR Date
Karnataka	Avaada Sustainable Energy Pvt Ltd	30 MW	18.90%	28/04/2017
Uttar Pradesh	Avaada Clean Energy Power Limited	5 MW	18.11%	30/05/2017
Maharashtra	Giriraj Renewables Pvt Ltd	100 MW	17.90%	28/04/2017
Karnataka	Solarsys Non-Conventional Energy Pvt Ltd	30 MW	18.90%	30/05/2017
		60 MW	18.90%	30/05/2017

PLF estimation in offer letter is in line with Para 3 (b) Annex 11, EB 48 and acceptable to the assessment team. The deration factor for IRR calculation is sourced from offer letter which was available to the PP at the time of investment decision. Hence, the value is considered correct.

Further, the comparison of IRR based on actual values shows that the benchmark is not breached.

d) Assessment of Electricity Tariff:

Tariff rate as per Wheeling Agreement and SERC (State Electricity Regulatory Commission)

Site Name	Name of the Investor/Owner/SPVs	Tariff Rate (as per SERC)	Tariff Rate (as per PPA)	PPA Date
Karnataka	Avaada Sustainable Energy Pvt Ltd	4.3	4.3	10/10/2017
Uttar Pradesh	Avaada Clean Energy Power Limited	3.43	3.43	10/10/2017
Maharashtra	Giriraj Renewables Pvt Ltd	4.43	4.43	26/07/2017
Karnataka	Solarsys Non-Conventional Energy Pvt Ltd	4.3	4.3	28/12/2017
		4.3	4.3	07/10/2017

Validation team assessed the tariff and found that same value was available during decision making and in conformity with guidance Appendix of Methodological tool "Investment Analysis" Version 09. Furthermore, assessment team has also checked the actual tariff in the PPA signed for further substantiation as these values are available during the validation stage. IRR is still below benchmark with the consideration of PPA signed which is valid for total operational lifetime of the project.

e) Assessment of O&M cost:

O&M Cost as per DPR

Site Name	Name of the Investor/Owner/SPVs	Project Capacity (MW)	O&M (In Million) (Without tax)	DPR Date
Karnataka	Avaada Sustainable Energy Pvt Ltd	30 MW	16.50	28/04/2017
Uttar Pradesh	Avaada Clean Energy Power Limited	5 MW	5.25	30/05/2017
Maharashtra	Giriraj Renewables Pvt Ltd	100 MW	40.00	28/04/2017
Karnataka	Solarsys Non-Conventional Energy Pvt Ltd	30 MW	16.50	30/05/2017
		60 MW	33.00	30/05/2017

O&M Cost as per O&M Agreement

Site Name	Name of the Investor/Owner/SPVs	Project Capacity (MW)	O&M (In Million) (Without tax)
Karnataka	Avaada Sustainable Energy Pvt Ltd	30 MW	14.00
Uttar Pradesh	Avaada Clean Energy Power Limited	5 MW	4.00
Maharashtra	Giriraj Renewables Pvt Ltd	100 MW	35.00
Karnataka	Solarsys Non-Conventional Energy Pvt Ltd	30 MW	14.00
		60 MW	32.00

The DPR has been used in the financial calculation as same was available during decision making and hence applicable. According to Appendix of Methodological tool "Investment Analysis" Version 09, the cost should be based on the input parameters available at the time of decision making and the PP has

submitted offer letter supporting this consideration. Therefore, considering the above assessment, validation team concluded that the O&M cost considered from respective DPR in the computation of financial indicator is in conformity with guidance Appendix of Methodological tool "Investment Analysis" Version 09.

f) Assessment of Tax computation:

The project developer has adopted book depreciation rates as per Schedule XIV of the Companies Act, 1956 for computing book profit and Income Tax Act 1961 stipulated for income tax calculation, which are in conformity with the accepted accounting principles adopted by the company and income tax laws in the host country. The block of assets has been computed for depreciation purpose as per the accepted accounting principles. Tax liability has been calculated as per the income tax rules and the rulings given. In computing the income tax liability, the project developers have considered Tax holiday (u/s 80IA of the Income Tax Act, 1961). Accelerated depreciation on plant and machinery is also sourced from IT act. The tax rates assumed corresponds to the tax rate prevailing at the time of taking decision (conformity to Appendix of EB 85, Annex 12). Hence, these assumptions are appropriate during decision making context.

g) Cross checking parameters:

<table>
<tr><td>Name of the parameter</td><td>DOE assessment</td></tr>
<tr><td>Project Cost</td><td>The details of the proposed project activity are given below.
<table>
<tr><th>Name of the Investor/Owner/SPVs</th><th>Project Capacity (MW)</th><th>Project Cost (In Million)</th><th>Project cost (in Million) per MW</th></tr>
<tr><td>Avaada Sustainable Energy Pvt Ltd</td><td>30 MW</td><td>1,620.00</td><td>54.00</td></tr>
<tr><td>Avaada Clean Energy Power Limited</td><td>5 MW</td><td>110.00</td><td>22.00</td></tr>
<tr><td>Giriraj Renewables Pvt Ltd</td><td>100 MW</td><td>4,890.00</td><td>48.90</td></tr>
<tr><td rowspan="2">Solarsys Non-Conventional Energy Pvt Ltd</td><td>30 MW</td><td>1,620.00</td><td>54.00</td></tr>
<tr><td>60 MW</td><td>3,240.00</td><td>54.00</td></tr>
</table>
The project cost has been considered from DPR and was available at the time decision made for the project activity.

The DOE has also checked the actual cost of the each project site from the CA Certificates and found that, the reduction in project cost is within the range of sensitivity analysis. Since the comparison is done with actual project cost and hence, increase of the same in future is not possible. Thus, the project activity is additional with actual project cost.
<table>
<tr><th>Site Name</th><th>Name of the Investor/Owner/SPVs</th><th>Project Capacity (MW)</th><th>Project Cost (In Million)- Actual from CA Certificate</th><th>Project Cost (In Million) per MW- Actual from CA Certificate</th></tr>
<tr><td>Karnataka</td><td>Avaada Sustainable Energy Pvt Ltd</td><td>30 MW</td><td>1627.50</td><td>54.25</td></tr>
</table></td></tr>
</table>

Uttar Pradesh	Avaada Clean Energy Power Limited	5 MW	78.30	15.66
Maharashtra	Giriraj Renewables Pvt Ltd	100 MW	989.90	9.90
Karnataka	Solarsys Non-Conventional Energy Pvt Ltd	30 MW	1667.20	55.57
		60 MW	3,315.80	55.26

The difference in actual project cost for different project site is due to time difference, manufacturer, different EPC contractor, negotiation skills of individual PP etc.

The assessment team also checked the respective state tariff orders and found that project cost considered for project is found to be appropriate.

Based on sectoral scope expert and local knowledge, the project cost considered as per DPR for the proposed project activity is found to be appropriate for solar projects. Also since the actual cost is available to DOE and IRR is still within benchmark and thus the same is acceptable.

The IRR as per the assumption from the DPR is as follows:

Site Name	Name of the Investor/Owner/SPVs	Project Capacity (MW)	Project Cost (In Million)	IRR	Benchmark
Karnataka	Avaada Sustainable Energy Pvt Ltd	30 MW	1,620.00	9.43%	14.18%
Uttar Pradesh	Avaada Clean Energy Power Limited	5 MW	110.00		
Maharashtra	Giriraj Renewables Pvt Ltd	100 MW	4,890.00		
Karnataka	Solarsys Non-Conventional Energy Pvt Ltd	30 MW	1,620.00		
		60 MW	3,240.00		

Since for Giriraj Renewables Pvt Ltd, as of now only 28 MW has been commissioned out of the 100 MW, IRR calculation has been done by apportioning the DPR cost of 100 MW to 28 MW. The IRR comes to be 6.43% and the benchmark is 14.18%. Hence, the project activity is additional as the IRR is below the benchmark value.

The IRR as per the actual project cost is defined as below:

Site Name	Name of the Investor/Owner	Project Capacity (MW)	Actual project cost as per CA Certificate	IRR	Benchmark
Karnataka	Avaada Sustainable Energy Pvt Ltd	30 MW	1,627.50	10.11%	14.18%
Uttar Pradesh	Avaada Clean Energy Power Limited	5 MW	78.30		
Maharashtra	Giriraj Renewables Pvt Ltd[14]	100 MW	989.90		

[14] Till date only 28 MW is installed out of 100 MW.

	Karnataka	Solarsys Non-Conventional Energy Pvt Ltd	30 MW	1,667.20		
			60 MW	3,315.80		

As described above actual project cost with benchmark, the project is still additional. Since the comparison is done with actual project cost, the increase of the same in future is not possible. However, for Giriraj Renewables Pvt Ltd (100 MW); as of now only 28 MW capacity is commissioned till date and the actual project cost available is of only 28 MW. So, IRR calculation as per the actual project cost has been carried out for 28 MW. The IRR comes to be 13.06% and the benchmark is 14.18%. Hence, the project activity is additional as the IRR is below benchmark. Thus, assessment team is of the opinion that project is still additional with the consideration of actual project cost for the project activity.

O&M cost and Escalation in the operational expense =5(%)- Standard practice in India

The details of the proposed project activity are given below.

Name of the Investor/Owner/SPVs	Project Capacity	O&M (In Million)
Avaada Sustainable Energy Pvt Ltd	30 MW	16.50
Avaada Clean Energy Power Limited	5 MW	5.25
Giriraj Renewables Pvt Ltd	100 MW	40.00
Solarsys Non-Conventional Energy Pvt Ltd	30 MW	16.50
	60 MW	33.00

The O&M cost has been considered from DPR and was available at the time decision made for the project activity.

The assessment team also checked the O&M cost as per the O&M agreements for each site. Thus, the project activity is additional with as per the O&M cost from the respective O&M Agreements.

Site Name	Name of the Investor/Owner/SPVs	Project Capacity (MW)	O&M (In Million) (Without tax)- Actual
Karnataka	Avaada Sustainable Energy Pvt Ltd	30 MW	14.00
Uttar Pradesh	Avaada Clean Energy Power Limited	5 MW	4.00
Maharashtra	Giriraj Renewables Pvt Ltd	100 MW	35.00
Karnataka	Solarsys Non-Conventional Energy Pvt Ltd	30 MW	14.00
		60 MW	32.00

IRR value as per the assumptions from the DPR is as below:

Name of the Investor/Owner/SPVs	Project Capacity (MW)	O&M (In Million)	IRR	Benchmark
Avaada Sustainable Energy Pvt Ltd	30 MW	16.50	9.43%	14.18%
Avaada Clean Energy Power Limited	5 MW	5.25		
Giriraj Renewables Pvt Ltd	100 MW	40.00		
Solarsys Non-Conventional Energy Pvt Ltd	30 MW	16.50		
	60 MW	33.00		

Since for Giriraj Renewables Pvt Ltd, as of now only 28 MW has been commissioned out of the

100 MW, IRR calculation has been done by apportioning the O&M cost of 100 MW to 28 MW. With this approach, the IRR comes to be 6.43% and the benchmark is 14.18%. Hence, the project activity is additional as the IRR is below the benchmark value.

IRR value based on the actual O&M agreements signed is as below:

Site Name	Name of the Investor/Owner/SPVs	Project Capacity (MW)	O&M (In Million) (Without tax)- Actual	IRR	Benchmark
Karnataka	Avaada Sustainable Energy Pvt Ltd	30 MW	14.00	9.85%	14.18%
Uttar Pradesh	Avaada Clean Energy Power Limited	5 MW	4.00		
Maharashtra	Giriraj Renewables Pvt Ltd	100 MW	45.00		
Karnataka	Solarsys Non-Conventional Energy Pvt Ltd	30 MW	14.00		
		60 MW	35.00		

For Giriraj Renewables Pvt Ltd (100 MW); as of now only 28 MW capacity is commissioned till date and the actual project cost available is of only 28 MW. So, IRR calculation as per the actual O&M cost has been carried out for 28 MW. The IRR comes to be 11.05% and the benchmark is 14.18%. Hence, the project activity is additional as the IRR is below benchmark.

Benchmark for the project as described above along with actual O&M value, the project is still additional.

Based on sectoral scope expert and local knowledge, the project O&M cost and its escalation considered as per DPR for the proposed project activity is found to be appropriate for solar projects. Also since the O&M cost is available to DOE and IRR is still within benchmark and thus the same is acceptable.

Tariff

The Tariff rate has been considered from State tariff Order and the same was available at the time decision made for the project activity.

The DOE has also checked the PPA for each project site and found there are no changes in tariff rate and is within threshold limit. Thus the project activity is additional with actual Tariff rate.

Site Name	Name of the Investor/Owner/SPVs	Project Capacity (MW)	Tariff Rate (as per SERC)	Tariff Rate (as per PPA)
Karnataka	Avaada Sustainable Energy Pvt Ltd	30 MW	4.3	4.3
Uttar Pradesh	Avaada Clean Energy Power Limited	5 MW	3.43	3.43
Maharashtra	Giriraj Renewables Pvt Ltd	100 MW	4.43	4.43
Karnataka	Solarsys Non-Conventional Energy Pvt Ltd	30 MW	4.3	4.3
		60 MW	4.3	4.3

The tariff considered is levellised tariff and hence there is no any escalation. This is found to be appropriate and found to be accepted.

IRR value as per PPA signed with State electricity Board is as below:

Site Name	Name of the Investor/Owner/SPVs	Tariff Rate (as per PPA)	IRR	Benchmark
Karnataka	Avaada Sustainable Energy Pvt Ltd	4.3	9.43%	14.18%
Uttar Pradesh	Avaada Clean Energy Power Limited	3.43		
Maharashtra	Giriraj Renewables Pvt Ltd	4.43		
Karnataka	Solarsys Non-Conventional Energy Pvt Ltd	4.3		
		4.3		

Since the IRR is still below benchmark with the consideration of PPA signed which is valid for total operational lifetime of the project, assessment team confirms that the project is still additional with actual Tariff rate. Moreover, in the above table the order from State electricity tariff order is checked and it is confirmed that Wheeling Agreement signed with the rate as mentioned above and hence increase of the same is not possible.

Based on sectoral scope expert and local knowledge, the project tariff rate considered as per state tariff order for the proposed project activity is found to be appropriate.

PLF

The details of the proposed project activity are given below.

Name of the Investor/Owner/SPVs	Project Capacity (MW)	PLF (%)
Avaada Sustainable Energy Pvt Ltd	30 MW	18.90%
Avaada Clean Energy Power Limited	5 MW	18.11%
Giriraj Renewables Pvt Ltd	100 MW	17.90%
Solarsys Non-Conventional Energy Pvt Ltd	30 MW	18.90%
	60 MW	18.90%

Validation team assessed the DPR. Same report has been used in the financials and the emission reduction calculation. PLF estimation by 3rd party engineering company is in line with Para 3 (b) Annex 11, EB 48 and acceptable to the assessment team.

The PLF has been taken from the DPR, and the same has been checked and found that PLF considered for the project activity in within the range of sensitivity analysis and found to be appropriate.

IRR for PLF value as per the DPR = 3rd party report, Annex 11 EB 48

Name of the Investor/Owner/SPVs	Project Capacity (MW)	PLF (%)	IRR	Benchmark
Avaada Sustainable Energy Pvt Ltd	30 MW	18.90%	9.43%	14.18%
Avaada Clean Energy Power Limited	5 MW	18.11%		
Giriraj Renewables Pvt Ltd	100 MW	17.90%		
Solarsys Non-Conventional Energy	30 MW	18.90%		

	Pvt Ltd | 60 MW | 18.90% | |

IRR as per the PLF value of the Tariff orders= SERC (=**State electricity regulatory commission**) order. The details link are given above:

Name of the Investor/Owner/SPVs	Project Capacity (MW)	PLF (%)- As per the tariff order of State electricity regulatory commission	IRR	Benchmark
Avaada Sustainable Energy Pvt Ltd	30 MW	18.90%	9.43%	14.18%
Avaada Clean Energy Power Limited	5 MW	18.11%		
Giriraj Renewables Pvt Ltd	100 MW	17.90%		
Solarsys Non-Conventional Energy Pvt Ltd	30 MW	18.90%		
	60 MW	18.90%		

Assessment team confirms that since with the value as mentioned in the tariff order for State Electricity regulatory commission report are considered and still the IRR is still below the benchmark, hence the project is additional.
Further, benchmark is not breaching on the actual values of the PLF achieved.

Tax Rates

Income tax rate (%)	30.00%
MAT (Minimum Alternate tax) (%)	33.00%
Service Tax (%)	15.00%

The above table shows the tax rate considered for individual project Owner and the same is found suitable.

Assessment team noted that the project developer has adopted book depreciation rates as per Schedule XIV of the Companies Act, 1956 for computing book profit and Income Tax Act 1961 stipulated for income tax calculation, which are in conformity with the accepted accounting principles adopted by the company and income tax laws in the host country i.e. INDIA. Tax liability has been calculated as per the income tax rules and the rulings given. In computing the income tax liability, the project developers have considered Tax holiday (u/s 80IA of the Income Tax Act, 1961). Accelerated depreciation on plant and machinery is also sourced from IT act. The tax rates assumed corresponds to the tax rate prevailing at the time of taking decision. Hence, these assumptions are appropriate during decision making context and thus acceptable to the assessment team.

No further assessment is required as the Values are directly procured from Income Tax Act, 1961 which is standard guideline for Tax value in India.

Sensitivity analysis:

The Guidance on Appendix of Methodological tool "Investment Analysis" Version 09 requires the robustness of the conclusion arrived at to be proved through a sensitivity analysis by varying the critical assumptions to a reasonable variation. The project developer has identified Plant Load Factor (PLF), Project cost, Electricity tariff and O&M cost as critical assumptions. These critical parameters constitute more than 20% of either total project costs or total project revenues. The sensitivity analysis reveals

that even under more favourable conditions, the IRR without CDM revenue would not cross the benchmark return as given in the following table:

For 225 MW Project

Variation %	-10%	Normal	10%	Variation required to reach benchmark
Tariff	6.58%	9.85%	12.45%	15.51%
PLF	6.58%	9.85%	12.45%	15.51%
Project Cost	12.07%	9.85%	7.37%	-16.15%
O&M Cost	9.79%	9.85%	9.03%	-131.72%

The results of sensitivity analysis show that even with a variation of +10% & -10% in project cost, O&M cost, PLF and Tariff Rate, the Equity IRR is significantly lower than the benchmark. And it is evident from the results given above; the project remains additional even under the most favourable conditions.

Common Practice analysis:

The common practice analysis is proved by following points as per the requirement of Methodological tool "Common Practice", version 03.1 EB 84, Annex 7[15]:

1. Applicable Geographical Area (Para 9): The Karnataka, Uttar Pradesh & Maharashtra state has been considered as the applicable geographical area for this project. PP had considered these states as geo-graphical area due to regulatory regime since applicable power tariff structure for renewable energy projects is unique for all the states across national boundary of India; which is based on Electricity Act 2003 (EA 2003), section 82 which clearly mentions "Every State Government shall, within six months from the appointed date, by notification, constitute for the purposes of this Act, a Commission for the State to be known as the (name of the State) Electricity Regulatory Commission" Appropriateness of the same has been checked and confirmed from EA 2003 (http://www.cercind.gov.in/08022007/Act-with-amendment.pdf/40/).

Furthermore, following significant points on the State specific policy & regulatory framework on the renewable energy projects with special emphasis to solar power projects have been validated:

- Electricity Act 2003 (EA 2003) has changed the legal and regulatory framework for the renewable energy sector in India. The EA 2003 mandates policy formulation to promote renewable sources of energy by the federal government, the State governments and the State Electricity Regulatory Commissions (=SERCs) within their jurisdictions.

- The Electricity Act 2003 introduced some enabling provisions conducive to accelerated development of grid connected renewable energy sources. Under Section 61(h), promotion of cogeneration and generation of electricity from renewable sources of energy has been made the explicit responsibility of SERCs, which are bound by law to take these considerations into account while drafting their terms and conditions for tariff regulations. Nearly all SERCs have issued their tariff regulations incorporating suitable clauses, which will enable them to provide a preferential treatment to renewable energy (RE) during the tariff determination process. The SERCs determine the tariff for all renewable energy projects across the States, and the state-owned power Distribution Companies (DISCOMs) ensure grid connectivity to the renewable energy project sites.

[15] https://cdm.unfccc.int/methodologies/PAmethodologies/tools/am-tool-24-v1.pdf

- EA 2003 has initiated the adoption of the National Tariff Policy, 2006 as one of the key policies, National Tariff Policy (2006) framed under the Section 3 of the EA 2003. As per the excerpt from National Tariff Policy, 2006; pursuant to provisions of section 86(1)(e) of the EA 2003, the Appropriate Commission shall fix a minimum percentage for purchase of energy from such sources taking into account availability of such resources in the region and its impact on retail tariffs. Such percentage for purchase of energy should be made applicable for the tariffs to be determined by the SERCs latest by 01/04/2006.

- As mandated under section 86(1)(e) of the Electricity Act (2003), by 26/06/2012 SERCs had fixed quotas (in terms of % of electricity being handled by the power utility) to procure power from renewable energy sources. The mandate, which is called a Renewable Purchase Specification (RPS), varies from 0.5% to 14% in various states over varying time-scales. Few states have come out with technology specific RPSs. Besides, the state regulators determine the tariff for all RE projects in the states and ensure connectivity to the grid through extension of power evacuation from the RE project sites.

- At present thirteen SERCs have declared preferential feed–in tariffs (FITs) for purchase of electricity generated from solar power projects established in respective states, which varies from state to state in India. All the SERCs have adopted a 'cost plus' methodology to fix the feed–in tariff, which varies across the states depending upon the state resources, project cost and more importantly the tariff regulations of SERCs. Solar power related tariff polices in different states also has difference in regulatory and policy incentives. Several states have implemented fiscal and financial incentives for renewable energy generation, including; energy buy back (i.e. a guarantee from an electricity company that they will buy the renewable power produced); preferential grid connection and transportation charges and electricity tax exemptions.

Therefore, the investment climate for the renewable energy projects varies from State to State within India due to state specific local policy & regulatory framework as outlined by the State Electricity Regulatory Commissions of the respective state. This difference in investment condition leads to essential distinction among solar energy projects between different States of the host country India.

Thus, the specific geographical area i.e. states of the project activities for the common practice analysis of the proposed project activity is considered and thus the same is acceptable to the assessment team.

2. Measure (Para 10): The project activity reduces greenhouse gas emissions by generating electricity using renewable energy source- solar. Therefore, the project activity falls under the following measure:

(b) Switch of technology with or without change of energy source including energy efficiency improvement as well as use of renewable energies.

3. Output (Para 11): The project activity produces electricity. Therefore, electricity is considered as output of the project activity.

4. Different Technologies (Para 12): The project activity uses solar energy for producing electricity and hence as per Para 12(a), the technologies which use energy source/ fuel other than solar will be considered as the different technologies for the project activity.

For the concerned project activity, Common Practice Analysis has been carried out for 225 MW capacity solar Power Projects in these states which is developed by **Giriraj Renewables Private Limited**.

Stepwise approach for common practice analysis has been carried out as per Methodological tool "Common Practice", version 03.1 EB 84, Annex 7:

Step (1): Calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity.

Range	Capacity	Unit
+50%	337.5	MW
Capacity of the proposed project activity	225	MW
-50%	112.5	MW

Step (2): Identify similar projects (both CDM and non-CDM) which fulfil all of the following conditions:

(a) The projects are located in the applicable geographical area;

(b) The projects apply the same measure as the proposed project activity;

(c) The projects use the same energy source/fuel and feedstock as the proposed project activity, if a technology switch measure is implemented by the proposed project activity;

(d) The plants in which the projects are implemented produce goods or services with comparable quality, properties and applications areas (e.g. clinker) as the proposed project plant;

(e) The capacity or output of the projects is within the applicable capacity or output range calculated in Step 1;

(f) The projects started commercial operation before the project design document (CDM-PDD) is published for global stakeholder consultation or before the start date of proposed project activity, whichever is earlier for the proposed project activity.

Identification of the similar projects (CDM and non-CDM) is carried out as per sub-steps of Step (2) as follows:

a) As the projects are located in these states of India, therefore, projects in the geographical area of these states has been chosen for analysis. The project activity involves generation of electricity from solar energy. The project activity is located in these states in India and the policy applicable for the solar projects is regulated by respective state policy. The policies/tariff for each state is regulated by State Electricity Regulatory Commissions of respective states and they differ for respective states. The project implemented in these states is claimed as different since the policies and regulations differ in each state. Each state has different policies regarding renewable energy, hence these states are considered as geographical region for common practise analysis.

b) The project activity is a green-field solar power project and uses measure (b) "Switch of technology with or without change of energy source including energy efficiency improvement as well as use of renewable energies". Therefore, projects applying same measure (b) are candidates for similar projects.

c) The energy source used by the project activity is solar energy. Hence, only solar energy projects have been considered for analysis.

d) The project activity produces electricity; therefore, all power plants that produce electricity are candidates for similar projects.

e) The capacity range of the projects is within the applicable capacity range from 112.5 MW to 337.5 MW.

f) The start date of the concerned project activity is 02/03/2018. Therefore projects, which have started commercial operation before 02/03/2018, have been considered for analysis.

Numbers of Similar projects identified, which fulfil above-mentioned conditioned are

N_{solar}= 0

Step (3): Within the projects identified in Step 2, identify those that are neither registered CDM project activities, project activities submitted for registration, nor project activities undergoing validation. Note their number N_{all}.

CDM project activities, which have got registered or are under validation have been excluded in this step. The list of the power plants identified is provided to the DOE. After excluding the registered and under validation projects the total number of projects.

N_{all} = 0

Step (4): Within similar projects identified in Step 3, identify those that apply technologies that are different to the technology applied in the proposed project activity. Note their number N_{diff}.

As per the tool on Common Practice, the project activities have been separated from the different technologies on the basis two criteria:

1. Size of Installation – Since project activity is large scale project, small and micro scale projects are considered as different technology project. Based on this criteria, there are no any different technology project out of similar identified projects.

2. Investment climate on the date of the investment decision – For proposed project activity, there are no any different technology project considered out of similar identified projects.

Hence, projects where either of the conditions is satisfied those projects are counted for calculating N_{diff} projects.

N_{diff} = 0

Step (5): Calculate factor $F=1-N_{diff}/N_{all}$ representing the share of similar projects (penetration rate of the measure/technology) using a measure/technology similar to the measure/technology used in the proposed project activity that deliver the same output or capacity as the proposed project activity.

Calculate $F=1-N_{diff}/N_{all}$

$F = 1-(0/0) = 1$

As per methodological tool "common practise" version 03.1, the proposed project activity is a "common practice" within a sector in the applicable geographical area if the factor F is greater than 0.2 and N_{all} - N_{diff} is greater than 3.

Thus, if both conditions are fulfilled, then project activity will be a common practise otherwise, the project activity is treated as not a common practise.

Outcome of Common Practise analysis:

As,

i. F = 1; is greater than 0.2

ii. N_{all} - N_{diff} = 0; is not greater than 3

Thus, the proposed project activity is not a "common practice" within a sector in the applicable geographical area.

The above discussions show that solar power development is not a common practice and the project activity is not financially attractive; hence the project activity is additional and the assessment team considers the approach and calculations acceptable as per the requirements in the methodological tool.

3.4.6 Quantification of GHG Emission Reductions and Removals

Assessment team checked the baseline, project and leakage calculation and confirm that the evaluation of baseline, project and leakage is as per the approved methodology and formula used to calculate the same is correct. The detail analysis is as below:

Baseline Emission:

As per the approved consolidated Methodology ACM0002 version 19.0:

Baseline emissions include only CO_2 emissions from electricity generation in fossil fuel fired power plants that are displaced due to the project activity. The methodology assumes that all project electricity generation above baseline levels would have been generated by existing grid-connected power plants and the addition of new grid- connected power plants. The baseline emissions are to be calculated as follows:

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

Where:

BE_y = Baseline emissions in year y (t CO_2/yr)

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

$EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO_2/MWh)

The grid emission factor is calculated as the weighted average of the operating margin (0.75) & build margin (0.25) values. The value of combined margin is sourced from Baseline CO_2 Emission Database, Version 14, December 2018 published by Central Electricity Authority (CEA), Government of India. CEA calculates the data based on Tool to Calculate the Emission Factor for an Electricity System", Ver. 7.0. No further assessment is required for grid emission calculation as the ex-ante value is sourced directly from the Govt. of India database.

Emission factor (EF_y):

$EF_y = EF_{grid,CM,y} = 0.9368$ t CO_2/MWh. This value is fixed ex-ante for the crediting period.

$EG_{PJ,y}$ is calculated based on capacity (Checked from the manufacturer specification), PLF= sourced from offer letter thus fulfilling the requirement of Para 3 (b), Annex 11 EB 48 and 8,760 (365*24) annual hours. Moreover, $EG_{PJ,y}$ is a monitoring parameter and the actual value will be obtained during the verification of the project activity.

$BE_y = 351{,}965 \times 0.9368 = 329{,}720$ tCO_2

Project Emission:

As per the approved consolidated ACM0002 version 19.0: "For most renewable energy power generation project activities, $PE_y = 0$. However, some project activities may involve project emissions that can be significant. These emissions shall be accounted for as project emissions by using the following equation:

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

Where:

PE_y = Project emissions in year y (t CO_2e/yr)

$PE_{FF,y}$ = Project emissions from fossil fuel consumption in year y (t CO_2/yr)

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

$PE_{HP,y}$ = Project emissions from water reservoirs of hydro power plants in year y (t CO_2e/yr)

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

Leakage Emission:

Leakage emission is not considered as per the requirement of ACM0002 version 19.0.

Net Emission reduction:

Reductions are calculated as follows:

$ER_y = BE_y - PE_y$

Where:

ER_y	=	Emission reductions in year *y* (t CO_2e/yr)
BE_y	=	Baseline emissions in year *y* (t CO_2/yr)
PE_y	=	Project emissions in year *y* (t CO_2e/yr)

Therefore, Net GHG Emission Reductions and Removals are calculated as follows:

$ER_y = BE_y - PE_y$

Year	Estimated baseline emissions or removals (tCO_2e)	Estimated project emissions or removals (tCO_2e)	Estimated leakage emissions (tCO_2e)	Estimated net GHG emission reductions or removals (tCO_2e)
Year 1	340,444	0	0	340,444
Year 2	338,061	0	0	338,061
Year 3	335,678	0	0	335,678
Year 4	333,295	0	0	333,295
Year 5	330,911	0	0	330,911
Year 6	328,528	0	0	328,528
Year 7	326,145	0	0	326,145
Year 8	323,762	0	0	323,762
Year 9	321,379	0	0	321,379
Year 10	318,996	0	0	318,996
Total	**3,297,199**	**0**	**0**	**3,297,199**

3.4.7 Methodology Deviations

Assessment team confirms that No methodology deviation is applicable for the present project activity.

3.4.8 Monitoring Plan

Assessment team checked the monitoring practice onsite and also checked the guideline of respective State electricity regulatory commission. The detail analysis is as below:

Parameters determined ex-ante:

Baseline emission factor of INDIAN Grid is established ex-ante based on Tool to calculate the grid emission factor, using a combined approach consisting 75 % operating margin and 25 % build margin. The emission coefficient from official data published in Central Electricity Authority (CEA) CO_2 Baseline database available to the project participant at the time of submission of joint VCS PD & MR for joint validation& Verification and global stakeholder's consultation process. CEA is an official source of Ministry of Power, Government of India have worked out baseline as CO_2 baseline database. The assumption were verified by the validation team and found to be correct.

Parameters determined ex-post:

The parameters monitored ex-post involves net electricity supplied to the grid (calculated from electricity exported and imported) to the INDIAN grid by the project activity.

As per the Joint VCS PD & MR Version 03, Joint Energy Meter Reading Report will be the source of data during verification. The DOE will use the same source for verification of emission reductions.

In accordance with the methodology requirement, net electricity supplied by the project activity is obtained from Joint Energy Meter Reading Report issued by State electricity authority which provide input values used for calculation of $EG_{PJ,y}$ by the project activity and forms the basis for emission reduction calculation. Electricity export to the grid and import from the grid is metered by main and check tri-vector energy meters. The main meter reading is taken jointly on a fixed day of every month for the preceding month at the delivery point and signed by the representatives of state utility and O&M personnel.

In the event of failure of main meter, the check meter will be used in monitoring the electricity data. The agency is experienced in the monitoring system and is managing O&M of numerous other Solar farm projects. The validation team therefore is of the opinion that the project participant through the O&M agency is capable of implementing the monitoring plan in the context of the project activity.

Calibration of all the meters is done by state electricity board officials as per the industry standards. However, the calibration will be done once in a 5 year[16] for all the project activity. The energy meter recording the export and import from the grid at substation is under the control and supervision of state electricity board officials. Similarly, O&M contractor is responsible for monitoring of the generation data at CMS.

It is reported that the data will be kept for 2 years following the end of the crediting period or till the last issuance of VERs for the project activity whichever occurs later.

The responsibilities and authorities of project management, data handling and recording, measurement methods and QA/QC procedure have been systematically established and formalized and the same was verified during the site visit.

3.5 Non-Permanence Risk Analysis

Not applicable for the present project activity.

4 VERIFICATION FINDINGS

[16] http://powermin.nic.in/whats_new/pdf/Metering_Regulations.pdf, page 12

4.1 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 Joint VCS PD & MR. 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 Joint VCS PD & MR.
Findings	CAR 04 & CAR 08 raised on this section and closed successfully. Please refer Appendix 2 for further details
Conclusion	The baseline Emissions for a given year is calculated by multiplying the energy baseline (EB) with the regional grid emission factor. The grid in this case would be the 'INDIAN Grid' **Formula Used:-** $BE_y = EG_{PJ,y} \times EF_{grid,CM,y}$ Where: BE_y = Baseline emissions in year y (t CO_2/yr) $EG_{PJ,y}$ = Quantity of net electricity generation that is produced and fed into the grid as a result of the implementation of the CDM project activity in year y (MWh/yr) $EF_{grid,CM,y}$ = Combined margin CO_2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (t CO_2/MWh) The verification team has checked the entire monthly JMR report and invoices applicable for the monitoring period as per the project activity applied for verifications and found all the parameters are monitored and recorded as per the monitoring plan in the Joint VCS PD & MR. The verification team has crosschecked the emission reduction sheet and monitoring report data with the JMR sheet and invoice bills and found all the values are matching.

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4.2 Quality of Evidence to Determine GHG Emission Reductions and Removals

Means of verification	The verification team checked the break down log for the monitoring period. During the verification site visit the feeder wise location of the project is also checked. The Calibration details of the monitoring meters are also checked with calibration certificates.
Findings	CAR 06 raised on this section and closed successfully. Please refer Appendix 2 for further details.
Conclusion	The metering arrangement is tri-vector bi-directional energy meters (main and check) at the plant sites/State Electricity Board's (SEB) pooling substations. These meters record several parameters including electricity exported &

	imported. Moreover, the meters are located at the HT side of the transformer and are of accuracy class of 0.2s for each project activity applied for verification. These electricity meters are being used by state electricity board for JMR (Joint Meter Reading)/Share Certificate. The Net electricity supplied to the grid is then calculated from export and import values. The net electricity exported to the grid is also cross checked from the invoices raised to respective state electricity board which is in line with Methodology requirement. Hence assessment team confirmed that the value of net electricity exported to the grid as used in emission reduction calculation is correct. Electricity export to the grid and import from the grid is metered by main and check/Standby tri-vector energy meters. The main meter reading is taken jointly on a fixed day of every month for the preceding month at the delivery point and signed by the representatives of state utility and O&M personnel. In the event of failure of main meter, the check meter will be used in monitoring the electricity data. The agency is experienced in the monitoring system and is managing O&M of numerous other Solar farm projects. The validation team therefore is of the opinion that the project participant through the O&M agency is capable of implementing the monitoring plan in the context of the project activity. Calibration of all the meters is done by state electricity board officials as per the industry standards. However, the calibration is done once in a 5 year[17]. The details of Calibration of the meters are mentioned in Appendix 5 of this report. The energy meter recording the export and import from the grid at substation is under the control and supervision of state electricity board officials. Similarly O&M contractor is responsible for monitoring of the generation data at CMS. It is reported that the data will be kept for 2 years following the end of the crediting periodor till the last issuance of VERs for the project activity whichever occurs later. The responsibilities and authorities of project management, data handling and recording, measurement methods and QA/QC procedure have been systematically established and formalized and the same was verified during the site visit. On-site visit and interview with O&M personnel also confirms that the operational and organizational chart as mentioned in Joint VCS PD & MR is as per the site practice and thus assessment team confirms that the details are correct. The break down log is checked and found that the plant undergone scheduled maintenance and break down. No unforced error observed.

[17] http://powermin.nic.in/whats_new/pdf/Metering_Regulations.pdf, page 12

5 VALIDATION AND VERIFICATION CONCLUSION

Applus+ Certification has been engaged by **Giriraj Renewables Private Limited** to perform the Joint validation and verification of the "Solar Photovoltaic Project by Giriraj Renewables Private Limited"

The management of the project participant/owner is responsible for the preparation of the GHG emissions data and the reported/estimated GHG emissions reductions on the basis set out within the project's Monitoring Plan in the Joint VCS PD & MR and the approved methodology ACM0002- Version 19.0.

Our Validation approach was based on the requirements as defined under the Kyoto Protocol, Marrakesh accord, as well as those defined by the CDM Executive Board and VCS board. Our approach is risk-based, drawing on an understanding of the risks associated with estimated GHG emissions data and the controls in place to mitigate these. The validation can confirm that:

- The projects description 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 4.0

- The project's baseline and additionality is assessed against "ACM0002- Version 19.0" for large scale project

- The project's monitoring plan is assessed against "ACM0002- Version 19.0" for small scale project

- A risk based approach has been followed to perform this validation activity. The review of the project description and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews with Project Owner have provided LGAI Technological Center S.A. (Applus+ Certification) with sufficient evidence for positive validation opinion as per the requirement of VCS.

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 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;
- No limitation observed for the present verification;
- A Reasonable Level of assurance was achieved as planned during verification process.

Verification period: 02/03/2018 to 31/03/2019 (first and last date included)

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

Year	Baseline emissions or removals (tCO2e)	Project emissions or removals (tCO2e)	Leakage emissions (tCO2e)	Net GHG emission reductions or removals (tCO2e)
2018	174,210	0	0	174,210
2019	74,318	0	0	74,318
Total	**248,528**	**0**	**0**	**248,528**

The estimated emission reduction to be achieved from the project activity for the current monitoring period is 356,820 tCO_2e[18], whereas actual emission reductions achieved are 248,528 tCO_2e, which is approximately 30%[19] lower than the estimated emission reductions. The generation of electricity depends upon climatic conditions and monitoring period considered and not within the control of the project participant.

Detailed calculations are as below for each project. Assessment team checked the same found to be appropriate and accepted.

Project Investor	Capacity (MW)	Estimated VCUs per year	Commissioning Date	Operational days of Plant	Estimated VCUs during current monitoring period	Actual VCUs during current monitoring period	% change
Avaada Sustainable Energy Private Limited	30	46,529	02/03/2018	395	50,353	62,232	23.59%

[18] Calculated based on the actual operational days of each project.

[19] These estimation is based on annual (365 days) estimation of ER as 329,720 tCO_2e and current monitoring period is for 395 days.

Avaada Clean Energy Power Limited	5	7,430	14/09/2018	199	4,050	4,769	17.75%
Giriraj Renewable Private Limited[20]	28	41,130	16/04/2018	350	39,439	21,509	-45.46%
Solarys Non-Conventional Energy Private Limited	30	46,529	30/03/2018	367	46,783	56,032	19.77%
	60	93,059	31/03/2018	366	93,313	103,986	11.44%

For Avaada Sustainable Energy Private Limited SPV of 30 MW, Avaada Clean Energy Power Limited SPV of 5 MW, Solarys Non-Conventional Energy Private Limited SPVs of 30 MW & 60 MW, the actual emission reductions are higher than estimated emission reductions. There is no impact on the additionality of the projects due to increase of the PLF values as it is not crossing the breaching values for PLF.

[20] As out of 100 MW, only 28 MW has been commissioned, the comparison has been showed as per 28 MW only.

APPENDIX 1: DOCUMENTS REVIEWED DURING VALIDATION AND VERIFICATION

No.	Author	Title	References to the document	Provider
1.	NA	Commissioning certificates	Commissioning certificates of the each Solar Power project	Project participant
2.	NA	Contract of the PP with the DOE	Contract of the PP with the DOE	Project participant
3.	NA	Technical specifications	Technical specifications of SPVs from manufacturers	Project participant
4.	NA	Draft Joint VCS PD&MR Version 01 Revised Joint VCS PD&MR Version 02 Revised (Final) Joint VCS PD&MR Version 03	23/07/2018 12/08/2019 15/05/2020	Project participant
5.	NA	Emission Calculation sheet- version 01- Estimated ER Emission Calculation sheet- Version 02- Estimated ER	23/07/2018 12/08/2019	Project participant
6.	NA	Emission Calculation sheet- version 01– Actual ER Emission Calculation sheet- Version 02– Actual ER	23/07/2018 12/08/2019	Project participant
7.	NA	IRR calculation sheet Ver-01 IRR calculation sheet Ver-02	12/08/2019 15/05/2020	
8.	NA	The operational lifetime of the project activity from the manufacturer=(Technic	Manufacturer technical specifications	Project participant

No.	Author	Title	References to the document	Provider
		al specefications)		
9.	NA	Reference link is provided.	SERC order of the respective states 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	Independent Search
10.	NA	Tools/ guidelines used in the project activity	UNFCCC CDM web site • 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 07 • UNFCCC Methodology: ACM0002 version 19.0 • Glossary of CDM terms version 07 • VCS joint validation and verification report template Version 3.1 • Tool for the demonstration and assessment of additionality version 06 & 07	UNFCCC
11.	NA	Calibration details of the project activity undergoing verifications	Please refer to Appendix 5	Project participant
12.	NA	DPR/Offer letters/PLF	DPR / Offer letters /PLF reports for Individual project owners	Project participant
13.	NA	JMR records+ Invoices for the complete monitoring period	JMR records+ Invoices for the respective states	Project participant
14.	NA	PPA Agreement	Power purchase Agreement between Project Proponent & State Utility	Project participant

No.	Author	Title	References to the document	Provider
15.	NA	Actual O&M agreement	O&M agreements for all sites	Project participant
16.	NA	VCS Declaration	Declaration from PP for Participation under Other GHG Programs	Project participant

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

CAR ID	01	Section no.	1	Date: 06/12/2018
Description of CAR				
Following inconsistencies are observed during review of the documents: • PP requested to apply Instructions for completing *"VCS Joint Project Description & Monitoring Report Template"* as necessary. • Submission of all supporting documents for technical specification of the project activity. • Location of the project activity along with geo-coordinates in DMS or decimals. • Commissioning certificates of the project activity along with schedule of commissioning. • PP requested to submit Declaration regarding participation in other trading / GHG programs, rejection under other GHG program etc.				
Project participant response				**Date:** 12/08/2019
1. The VCS PD MR is completed with applying necessary instructions as per VCS guidelines. 2. Supporting documents for technical specification are submitted. 3. Location of the project activities along with geo-coordinates are now provided. 4. Commissioning certificates are now provided. 5. PP declaration is now provided.				
Documentation provided by project participant				
1. Revised VCS Joint PD MR 2. DPR 3. Commissioning Certificates 4. PP Declaration Letter				
DOE assessment				**Date:** 25/09/2019
• VCS Joint PD & MR now completed inline with guidelines. • Technical specification of the project activity now submitted. • Location of the project activity along with geo-coordinates in DMS is now provided. • Commissioning certificates of the project activity now submitted. • Declaration regarding participation in other trading / GHG programs, rejection under other GHG program etc. is now submitted. CAR closed.				

CAR ID	02	Section no.	2	Date: 06/12/2018
Description of CAR				
Revision in Joint VCS PD & MR and ER calculation sheets is requested for application of latest version of applied methodology, latest version of Tool to calculate the emission factor for an electricity system and latest version of CEA database.				
Project participant response				**Date:** 12/08/2019
ER calculation is now revised with application of latest version of "Tool to calculate the emission factor for an electricity system and latest version of CEA database". The Joint VCS PD MR is revised with latest tools and methodology.				
Documentation provided by project participant				
1. Estimated ER sheet 2. Revised VCS Joint PD MR				
DOE assessment				**Date:** 25/09/2019
Latest version of methodology and tools is now applied. CAR closed.				

CAR ID	03	Section no.	2.5	Date: 06/12/2018
Description of CAR				
PP requested to justify additionality along with submission of all supporting documents for additionality justification.				
Project participant response				**Date:** 12/08/2019
All supporting documents for IRR calculation is now submitted.				
Documentation provided by project participant				
Supporting documents for IRR calculation				
DOE assessment				**Date:** 25/09/2019
PP has submitted revised Joint PD & MR along with supporting documents. Additionality justification found correct. CAR closed.				

CAR ID	04	Section no.	3.1 & 6	Date: 06/12/2018
Description of CAR				
Recalculation of combined margin emission factor calculations using latest version of "CEA database" is released by CEA is requested. Accordingly revision in ER calculations and other sections of Joint VCS PD & MR and ER sheet as applicable.				
Project participant response				**Date:** 12/08/2019
Estimated ER calculation and Actual ER sheets are now revised as per the latest CEA data base. Respective sections of Joint VCS PD MR is also revised.				
Documentation provided by project participant				
1. Estimated ER sheet 2. Revised VCS Joint PD MR 3. Actual ER sheet				
DOE assessment				**Date:** 25/09/2019
Emission factor and ER calculations revised appropriately. CAR closed.				

CAR ID	05	Section no.	4.3	Date: 06/12/2018
Description of CAR				
Line diagram of metering arrangement is inadequate with respect to actual site meeting arrangements. Also calibration details of the meters are missing in the Joint VCS PD & MR. Also details of monitoring equipments along with calibration certificates to be submitted.				
Project participant response				Date: 12/08/2019
Line diagram is provided in the Joint VCS PD MR. Calibration details of the Meters are provided in the Joint VCS PD MR.				
Documentation provided by project participant				
Revised VCS Joint PD MR				
DOE assessment				Date: 25/09/2019
Line diagrams included are found inline with site visit observations. CAR closed.				

CAR ID	06	Section no.	5.3	Date: 06/12/2018
Description of CAR				
PP is requested to submit supporting documentation for local stakeholder's consultation process.				
Project participant response				Date: 12/08/2019
Supporting documentation for local stakeholder consultation is now provided.				
Documentation provided by project participant				
Supporting documentation for local stakeholder consultation.				
DOE assessment				Date: 25/09/2019
Supporting documents submitted for LSC and found inline. CAR closed.				

CAR ID	07	Section no.	5.4	Date: 06/12/2018
Description of CAR				
PP is requested to update section for public comments during GSP of VCS.				
Project participant response				Date: 12/08/2019
Section of public comments during GSP is now updated in the Joint VCS PD MR.				
Documentation provided by project participant				
Revised VCS Joint PD MR				
DOE assessment				Date: 25/09/2019
Section updated appropriately and found inline with VCS webpage. CAR closed.				

CAR ID	08	Section no.	6.0	Date: 06/12/2018
Description of CAR				
ER achieved are reserved for submission of all supporting documents viz. JMR, Invoices and calibration certificates for the complete monitoring period.				
Project participant response				Date: 12/08/2019
JMR, Invoices & Calibration reports for the entire monitoring period is now provided.				

Documentation provided by project participant	
JMR, Invoices & Calibration reports.	
DOE assessment	**Date:** 25/09/2019
All supporting documents related to ER calculation submitted and same are checked. ER calculation sheet found correct. 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	LGAI Technological Center S.A. (Applus+ Certification)
2.	Approver	IR	Sendin	Juan	LGAI Technological Center S.A. (Applus+ Certification)

Short CVs of the Team:

1. 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.

Hanshen (Denny) Xue has a Bachelor's Degree on Thermal Energy Engineering and Master´s Degree on Environmental Engineering. He has more than10 years of experience on 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. He is working with Applus+ since 2011 carrying out Validation and verification for CDM/GS/VCS project under scope 1 and 13 as auditor, lead auditor, technical expert and technical reviewer.

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_2e	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)
OM	Operating Margin
GWP	Global Warming potential
JMR	Joint Metering reading
RBI	Reserve Bank Of India
SEB	State Electricity Board

APPENDIX 5: CALIBRATION DETAILS

Meter and Calibration Details for 30 MW solar project by Avaada Sustainable Energy Private Limited

Meter Details	Main Meter	Check Meter
Meter Serial No	18015390	18015388
Meter Make	L&T	L&T
Accuracy Class	0.2s	0.2s
Date of Calibration	15/02/2018	15/02/2018
Due date of next calibration	14/02/2023	14/02/2023

Meter and Calibration Details for 5 MW solar project by Avaada Clean Energy Power Limited

Meter Details	Main Meter	Check Meter	Standby Meter
Meter Serial No	UPP67363	UPP67364	UPP67365
Meter Make	Secure	Secure	Secure
Accuracy Class	0.2s	0.2s	0.2s
Date of Calibration	10/08/2018	10/08/2018	10/08/2018
Due date of next calibration	09/08/2023	09/08/2023	09/08/2023

Meter and Calibration Details for 100 MW solar project by Giriraj Renewable Private Limited

Meter Details	Main Meter	Check Meter	Standby Meter
Meter Serial No	XC477938	XC477939	XC477940
Meter Make	Secure	Secure	Secure
Accuracy Class	0.2s	0.2s	0.2s
Date of Calibration	12/03/2018	12/03/2018	12/03/2018
Due date of next calibration	11/03/2018	11/03/2018	11/03/2018

Meter and Calibration Details for 30 MW solar project by Solarys Non-Conventional Energy Private Limited

Meter Details	Main Meter	Check Meter
Meter Serial No	18015356	18015439
Meter Make	L&T	L&T
Accuracy Class	0.2s	0.2s
Date of Calibration	10/03/2018	10/03/2018
Due date of next calibration	09/03/2023	09/03/2023

Meter and Calibration Details for 60 MW solar project by Solarys Non-Conventional Energy Private Limited

Meter Details	Main Meter	Check Meter
Meter Serial No	18015391	18015392
Meter Make	L&T	L&T
Accuracy Class	0.2s	0.2s
Date of Calibration	08/03/2018	08/03/2018
Due date of next calibration	07/03/2023	07/03/2023

Meters installed at all sites are of 0.2s accuracy class. Considering five years calibration frequency as per CEA notification and pre-calibrated meters installed at time of commissioning, there is no any delay in calibration applicable for the project activity during this monitoring period.