JOINT VALIDATION & VERIFICATION REPORT FOR "216 MWAC KAMUTHI SOLAR POWER PROJECT"

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Summary:

LGAI Technological Center, S.A. (hereafter referred to as Applus+ Certification) has been contracted by M/s Kamuthi Solar Power Limited to conduct the joint validation and verification of the project "216 MWac Kamuthi Solar Power Project", VCS PL ID 1768, against VCS Standard Version 3.7.

The validation and verification includes confirming the project's design description, project's baseline, monitoring plan and the project's compliance with relevant VCS and host party criteria and implementation of the monitoring plan of the PD and MR (Project ID 1768) and the application of the monitoring methodology as per ACM0002 version 18.1: "Grid-connected electricity generation from renewable sources". A site visit was conducted to verify the data submitted in the monitoring report.

The purpose of this project activity is to generate clean form of electricity through renewable solar energy source for sale of electricity to the grid. The project activity involves installation of 216 MWac (corresponding 261 MWp) solar power project in Tamil Nadu. The project will replace anthropogenic emissions of greenhouse gases (GHG's) estimated to be approximately 346,116 tCO_2e per year, thereon displacing 358,559 MWh/year amount of electricity from the generation-mix of power plants connected to the Indian electricity grid, which is mainly dominated by thermal/fossil fuel based power plant. Total estimated GHG emission reductions for the chosen 10 year renewable crediting period will be 3,461,169 tCO_2e.

The review of the project design documentation, monitoring report and additional documents related to baseline and monitoring methodology; the subsequent background investigation, follow-up interviews and stakeholders have provided Applus+ Certification with sufficient evidence to validate the fulfillment of the stated criteria.

The purpose of the validation is to have a thorough and independent assessment of the proposed project activity against the applicable VCS requirements, in particular, the project's baseline, monitoring plan and the project's compliance with relevant VCS and host party criteria. These are validated in order to confirm that the project design, as documented, is sound and reasonable and meets the identified criteria. 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 emission reductions. Applus+ Certification's objective is to perform a thorough, independent assessment of the validation of the project activity.

The validation scope is defined as an independent and objective review of the Joint PD & MR. The Joint PD & MR is reviewed against the relevant criteria and guidance documents provided by VCS which included: VCS Program Guide (v3.7, dated 21/06/2017), VCS Standard (v3.7, dated 21/06/2017, Program Definitions (v3.7, dated 21/06/2017), Registration & Issuance Process (v3.8, dated 21/06/2017) and in line with the VCS Validation and Verification Manual (v3.2, dated 19/10/2016) applicable at the time in order to confirm that the project meets the applicability conditions of the selected baseline and monitoring methodology namely ACM0002 (version 18.1) and also assess the claims and assumptions made in the Joint PD & MR without limitation on the information provided by the project proponents.

The purpose of the verification is to review the Joint VCS PD & MR for the monitoring results and verify that monitoring methodology was implemented according to monitoring plan and monitoring data, further based on review of ER sheet confirm that the reductions in anthropogenic emissions by sources is sufficient, definitive and presented in a concise and transparent manner. In particular, monitoring plan, Joint VCS PD & MR, ER sheet and the project's compliance with relevant VCS, UNFCCC and host party criteria are verified in order to confirm that the project has been implemented in accordance with design and conservative assumptions, as documented.

The scope of the verification included as verification of project implementation and operation with respect to the Joint PD & MR, implemented monitoring plan with the Joint PD & MR and applied baseline and monitoring methodology, the actual monitoring systems and procedures are in compliance with the monitoring systems and procedures described in the monitoring plan , Evaluation of the GHG emission reduction data and express a conclusion with a reasonable level of assurance about whether the reported GHG emission reduction data is free from material misstatement, confirmation of reported GHG emission data is sufficiently supported by evidence.

A risk based approach has been followed to perform this verification. In the course of validation and verification, 02 Corrective Action request (CARs) and 00 Clarification request (CRs) were raised and successfully closed.

Applus+ Certification confirms that that the project is meeting the criteria specified by Joint PD & MR template version 3.1 , VCS Standard version 3.7 and applied methodology ACM0002 (version 18.1), and hence be successfully validated, verified and further certified for emission reductions under VCS. Further confirms a combined positive validation and verification opinion confirming the project complies with the applicable VCS requirements, thus recommending the project for registration and issuance.

Our opinion relates to the projects GHG emissions and the resulting GHG emission reductions reported and related to the valid project baseline and monitoring and its associated documents. Based on the information seen and evaluated we confirm that the emission reductions from the project activity “216 MWac Kamuthi Solar Power Project” in India during the period 18/09/2016 – 27/03/2018 (including both days) amount to 563,810 tonnes of CO_2e.

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1 INTRODUCTION

1.1 Objective

Applus+ LGAI has been contracted by Kamuthi Solar Power Project, (project proponent), to undertake the validation and verification of the renewable energy project titled "216 MWac Kamuthi Solar Power Project". The verifiers have reviewed the GHG data collected to date for the monitoring period from 18/09/2016 to 27/03/2018 (both days included) covered in this verification. The objective of the combined validation and verification is to have an independent third party assessment of the Joint PD & MR[/1/] and supporting documentation to ensure compliance with the rules, regulations and guidelines by CDM and VCS requirements. In particular;

- The project's baseline is assessed against "ACM0002 - Version 18.1"
- The project's monitoring plan is assessed against "ACM0002 - Version 18.1"
- The project's additionality justification is assessed against "Tool for the demonstration and assessment of additionality", Version 07.0.0.
- The projects compliance with, the requirements of Article 12 of the Kyoto Protocol, the CDM Modalities and Procedures as agreed in the Marrakech Accords under decision 3/CMP.1, the annexes to this decision, subsequent decisions and guidance made by COP/MOP & CDM Executive Board and other relevant rules, including the Host Country legislation and sustainability criteria along with VCS guideline and standard version 3.7
- CDM project standard for project activities Version 01.0
- CDM project cycle procedure for project activities Version 01.0
- VCS standard v3.7
- VCS guideline v3.7

Validation and verification is a requirement for all VCS projects and is seen as necessary to provide assurance to stakeholders of the quality of the project and its intended generation of verified carbon units (VCUs). This report contains the findings and resolutions from the validation and verification of the project activity.

1.2 Scope and Criteria

For validation:

The validation scope is given as an independent and objective review of the project design, the project's baseline study and monitoring plan (ACM0002 Version 18.1 "Grid-connected electricity generation from renewable sources") which are included in the VCS joint PD & MR[/1/] and other relevant supporting documents. The scope of work covered in the validation is described below:

- To validate whether the project activity meets the requirements of VCS Standard, VCS Validation and Verification Manual and VCS program guide including additionality, proof of title and compliance with local laws.
- To evaluate whether the baseline and monitoring plan are in conformance with the applied methodology from the VCS approved GHG program
- To confirm that the information presented are completed, consistent, transparent and free of omission or material error
- Background investigation and follow up interviews
- Issuance of draft validation report with CARs, CRs & FARs, if any
- Final validation opinion

The information in the VCS joint PD & MR is reviewed against the criteria of VCS Standard; the VCS program guide and the applied consolidated baseline and monitoring CDM methodology.

Applus+ Certification has performed validation based on a risk based approach focusing mainly on the significant risks to meet the qualification criteria and the ability to generate Verified Carbon Units (VCUs).

For Verification:

The scope of the verification was the independent and objective review and ex-post determination of the monitored reductions in GHG emissions from “216 MWac Kamuthi Solar Power Project” The verification of this project was based on the validated VCS joint project description & monitoring report and supporting documents submitted by the project proponent to the verification team. The documents were reviewed against the following guidance and protocols:

- VCS Program Guide (v3.7, dated 21/06/2017)
- VCS Standard (v3.7, dated 21/06/2017)
- VCS Program Definitions (v3.7, dated 21/06/2017)
- VCS Registration & Issuance Process (v3.8, dated 21/06/2017)
- VCS Validation and Verification Manual (v 3.2, dated 19/10/2017)
- UNFCC CDM approved methodology ACM0002 (version 18.1)
- The project's additionality justification is assessed against "Tool for the demonstration and assessment of additionality",(version 07.0.0)
- ISO 14064-3: Specification with guidance for the validation and verification of greenhouse gas assertions, 2006

The validation & verification is not meant to provide any consulting towards the client. However, stated request for clarifications and/or corrective actions may provide input for improvement of the project design

1.3 Level of Assurance

The verification and validation has 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 purpose of the project activity is the installation, commissioning and operation of Solar Power Projects at Tamil Nadu. The electricity generated by the solar projects will be supplied to the Indian grid. As the project involves power generation through renewable sources of energy, it will result in emission reductions due to displacement of grid electricity, which is majorly fossil fuel based. The implementation status of the project as s below:

Project Investors' Name	**Commissioning Date**	**Capacity in MW_{AC}/ MWp**	**Location (Village/State)**

Kamuthi Solar Power Limited	18/09/2016	216/261	O. Karisalkulam Village, Ramanathpuram Dist., *Tamil Nadu*

The project activity promotes environmental and social well being as it results in zero GHG emissions due to installation and operation of clean, renewable energy technology for electricity generation. The design lifetime of the entire solar project is 25 years, which is based on the DPR and deemed acceptable to the validation team.

The total estimated GHG emission reductions expected for the project is 3,461,169 tCO_2e for the entire crediting period (of ten years). Thus, the estimated annual average emission reductions will be 346,116 tCO_2e.

The total actual GHG emission reduction for the project is 563,810 tCO_2e for the current monitoring period ranging from 18/09/2016 to 27/03/2018.

This was confirmed based on review of Joint PD & MR/1/, ER verification spreadsheet/02/, Joint Metering Reading reports/13/ and Invoices/14/ issued to state DISCOMs.

2 VALIDATION AND VERIFICATION PROCESS

2.1 Method and Criteria

Validation and Verification was conducted using Applus+ Certification's procedures in line with the requirements specified in the VCS standard Requirements, CDM M&P, the latest version of the CDM Validation and Verification Standard, and relevant decisions of the COP/MOP and the CDM EB and applying standard auditing techniques.

It is to be assessed and determined whether the proposed implementation and operation of the project activity, and the steps taken to report emission reductions comply with the criteria and relevant guidance provided by the VCS Board. The validation and verification process consist of the following three phases;

- A desk review of the VCS PD and VCS MR
- Site visit and follow up interviews with project stakeholders
- The resolution of outstanding issues and issuance of final report and opinion

2.2 Document Review

The verification is performed primarily as a document review of the joint PD and MR and associated documents as stated in details in appendix 1 of this document. The assessment is performed by a verification team using a protocol. The cross checks between information provided in the Monitoring report, VCS PD and information from sources other than those used, if available, the team's sectoral or local expertise and, if necessary, independent background investigations.

2.3 Interviews

The site visit for the project location, by the assessment team, was conducted on 20/06/2018 – 21/06/2018 and the following stakeholders were interviewed.

S N	Name	Role	Organization
1	Mr. D. Trivedi	Sr. Manager – Business Development	APL
2	Mr. A Gedhia	Manager - Business Development	KSPL
3	Mr. Sankaranarayanan N		KSPL
4	Mr. Jimmy Sah	VCS Project Consultant	Infinite Solutions

The topics covered during interview ranges from general features and implementation of project to project technical details of the project like design & technical specification, project implementation status, project start date, location, baseline identification and additionality calibration details, monitoring and measuring system and data collection, recording and archiving procedures. The assessment was drawn based on the feedback received during interview coupled with the documentation and on-site observations.

2.4 Site Inspections

Site Location visited: O. Karisalkulam Village, Ramanathpuram Dist., Tamil Nadu.

A site visit was undertaken by the verification team on 20/06/2018 - 21/06/2018 to carry out the following;

- An assessment of the project design and technical specification, project location, implementation status and operation of the project activity as per the VCS PD and VCS MR;
- A review of information flows for generating, aggregating and reporting the monitoring parameters;
- Interviews with relevant personnel to determine whether the operational and data collection procedures are implemented in accordance with the monitoring plan in the PD;
- A cross check between information provided in the monitoring report and data from other sources such as plant logbooks, inventories, purchase records or similar data sources;
- A check of the monitoring equipment including calibration performance and observations of monitoring practices against the requirements of the PD, the applied methodology including applicable tool(s), and, where applicable, the applied standardized baseline;
- A review of calculations and assumptions made in determining the GHG data and emission reductions;
- An identification of quality control and quality assurance procedures in place to prevent or identify and correct any errors or omissions in the reported monitoring parameters.

2.5 Resolution of Findings

The objective of this step is to identify, discuss and conclude on the issues related to the project description, technical specification, baseline and additionality, monitoring parameter and monitoring plan, implementation status and operations of the registered project activity that could impair the capacity of the registered project activity to achieve emission reductions or influence the monitoring and reporting of emission reductions. This is done based on the desk review and onsite assessment. The verification team prepares and/or updates a validation cum verification protocol (internal document) that records the conformities and non-conformities, which may be of following types;

CAR (Corrective Action Request) is raised if one of the following occurs:

- Non-compliance with the project description, applicability of monitoring methodology and its tools, additionality tools and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;

- Non-compliance with the monitoring plan, the methodology or the standardized baseline are found in monitoring and reporting and has not been sufficiently documented by the project participants, or if the evidence provided to prove conformity is insufficient;

- Modifications to the implementation, operation and monitoring of the registered project activity has not been sufficiently documented by the project participants;

- Mistakes have been made in applying assumptions, data or calculations of emission reductions that will impact the quantity of emission reductions;

- Issues identified in a FAR during validation to be verified during verification or previous verification(s) have not been resolved by the project participants.

Clarification request (CR) is raised if information is insufficient or not clear enough to determine whether the applicable CDM requirements have been met. All CARs and CRs raised by the Applus+ Certification during validation and verification shall be resolved prior to submitting a request for registration and issuance.

During the current validation and verification, 02 Corrective Action request (CARs) and 00 Clarification request (CRs) were raised and successfully closed.

All the findings that are raised and communicated to project participant during the validation and verification are included under Appendix 3. The section also includes the response, if provided, by the project participants and an assessment by the verification team if it was closed out or otherwise.

2.5.1 Forward Action Requests

Forward Action Request (FAR) is to be raised when the monitoring and reporting require attention and/or adjustment for the next verification period. FARs does not relate to VCS requirements for issuance of ERs achieved during subject monitoring.

Applus+ Certification has not raised any FAR during this joint validation and verification.

3 VALIDATION FINDINGS

3.1 Project Details

The main purpose of the proposed project activity is to generate clean energy through renewable energy sources. The proposed project activity is a solar power project owned by Kamuthi Solar Power Limited, who is also the project proponent for the project activity. The proposed total installed capacity of the solar power plant would be 216 MWac. The electricity produced from the project activity shall be supplied to the regional electrical grids of India.

Technical specifications of the project as stated in section 1.8 of the Joint PD & MR /01/ were verified from the technical specification supporting documents submitted by the PP /09/. The project is located within the state TamilNadu in India and the geographical boundary is within the country of India.

The VCS start date of the project activity is 18/09/2016 and is the earliest date of commissioning of solar project. The start date of the project activity has been confirmed through review of Commissioning certificate of currently operating power project /08/.

The project crediting period starts on 18/09/2016 and ends on 17/09/2026 with a total crediting period of 10 years (renewable two times).

The project scale is “Large Project” as the expected ERs (i.e. 346,116 tCO_2e/year) as from the project activity is more than 300,000 tCO_2e/year.

The total estimated GHG emission reductions expected for the project is 3,461,169 tCO_2e for the entire crediting period (of ten years). Thus, the estimated annual average emission reductions will be 346,116 tCO_2e. This was confirmed based on the review of ER validation spreadsheet /02/ and other supporting documents like DPR /5/.

The total actual GHG emission reduction for the project is 563,810 tCO_2e for the current monitoring period ranging from 18/09/2016 to 27/03/2018. This was confirmed based on the review of ER verification spreadsheet /2/.

Prior to the project initiation, the entire 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.

The above scenario is also the respective baseline scenario and was confirmed to be accurate during on site assessment and interviews with representatives of PP /25/.

The project is in compliance with the applicable regulatory framework on solar power projects in targeted country of India.

It has been confirmed in the Joint PD & MR /01/ that the project or any of its components are not seeking registration and has not been registered under any GHG program.

Based on its assessment through review of relevant documentation (as cited above), the assessment team confirms that the description given in the Joint PD & MR /01/ is accurate, complete, and provides an understanding of the nature of the project, and the project has been implemented as described in the Joint PD & MR /01/.

3.2 Participation under Other GHG Programs

The project has applied under CDM mechanism and is currently under development.

3.3 Application of Methodology

3.3.1 Title and Reference

The project uses the following approved large-scale CDM methodology:

ACM0002: Grid-connected electricity generation from renewable sources (version 18.1) /18/.

In addition, the project activity also uses the following tools:

- Tool to calculate the emission factor for an electricity system --- Version 06.0/19/,
- Tool for the demonstration and assessment of additionality --- Version 07.0.0/22/

The methodologies and the tools referenced are valid at the time of joint validation and verification of the project activity have been checked and confirmed by the assessment team.

3.3.2 Applicability

The project activity applies the approved large-scale CDM methodology; ACM0002, version 18.1/18/. Applicability criteria for the baseline line methodology are assessed by the validation team by means of document review and interview. Validation team confirms that the project activity meets the criteria of the applied methodology.

Applicability criteria as per methodology	Justification from PP	Means of validation
1. This methodology is applicable to grid-connected renewable energy power generation project activities that: a. Install a Greenfield power plant; b. Involve a capacity addition to (an) existing plant(s); c. Involve a retrofit of (an) existing operating plants/units; d. Involve a rehabilitation of (an) existing plant(s)/unit(s);or e. Involve a replacement of (an) existing plant(s)/unit(s).	The project activity is a Renewable Energy Project i.e. Solar Power Project which falls under applicability criteria option 1 (a) i.e., "Install a Greenfield power plant". Hence the project activity meets the given applicability criterion.	The validation team reviewed the Joint PD & MR/01/, DPR/05/, Equipment purchase orders / EPC contract/07/, Power purchase agreement/10/ and conducting physical inspections during onsite visit with interviewing representatives of PP confirms that the current project activity involves generation of electricity through renewable energy by operation of green field solar PV power plants that supply electricity to the Indian grid. Thus, based on

		the above, the assessment team concludes that the project activity has successfully complied with requirements of the current applicability criteria 1 (a) of the applied methodology ACM0002, (version 18.1) /18/.
2. The methodology is applicable under the following conditions: (a) The project activity may include renewable energy power plant/unit of one of the following types: hydro power plant/unit with or without reservoir, solar power plant/unit, geothermal power plant/unit, solar power plant/unit, wave power plant/unit or tidal power plant/unit; (b) In the case of capacity additions, retrofits, rehabilitations or replacements (except for solar, solar, wave or tidal power capacity addition projects the existing plant/unit started commercial operation prior to the start of a minimum historical reference period of five years, used for the calculation of baseline emissions and defined in the baseline emission section, and no capacity expansion, retrofit, or rehabilitation of the plant/unit has been undertaken between the start of this minimum historical reference period and the implementation of the project activity.	The option (a) of applicability criteria 2 is applicable as project is renewable energy solar power plant/unit.	The validation team reviewed the Joint PD & MR /01/ and by conducting physical inspections during onsite visit with interviewing representatives of PP confirms that the current project activity involves installation and operation of solar PV power plants thereby resulting in generation of electricity through renewable energy. Thus, based on the above, the assessment team concludes that the project activity has successfully complied with requirements of the current applicability criteria 2 (a) of the applied methodology ACM0002, (version 18.1) /18/.
3. In case of hydro power plants, one of the following conditions shall apply: (a) The project activity is implemented in existing single or multiple reservoirs, with no	The project is installation of new solar based electricity generation plants (not a hydro power plant). Hence this criterion is not applicable.	Criterion not applicable as the project is a Greenfield project.

change in the volume of any of the reservoirs; or (b) The project activity is implemented in existing single or multiple reservoirs, where the volume of the reservoir(s) is increased and the power density calculated using equation (3), is greater than 4 W/m2; or (c) The project activity results in new single or multiple reservoirs and the power density, calculated using equation (3), is greater than 4 W/m2; or (d) The project activity is an integrated hydro power project involving multiple reservoirs, where the power density for any of the reservoirs, calculated using equation (3), is lower than or equal to 4 W/m2, all of the following conditions shall apply: (i) The power density calculated using the total installed capacity of the integrated project, as per equation (4), is greater than 4 W/m2; (ii) Water flow between reservoirs is not used by any other hydropower unit which is not a part of the project activity; (iii) Installed capacity of the power plant(s) with power density lower than or equal to 4 W/m2 shall be: a. Lower than or equal to 15 MW; and b. Less than 10 per cent of the total installed capacity of integrated hydro power project		
4. In the case of integrated hydro power projects, project proponent shall:	The project is solar power project and thus the criterion is not applicable to this project activity.	Criterion not applicable as the project is a Greenfield project.

5. Demonstrate that water flow from upstream power plants/units spill directly to the downstream reservoir and that collectively constitute to the generation capacity of the integrated hydro power project; or	The project is solar power project and thus the criterion is not applicable to this project activity.	Criterion not applicable as the project is a Greenfield project
6. Provide an analysis of the water balance covering the water fed to power units, with all possible combinations of reservoirs and without the construction of reservoirs. The purpose of water balance is to demonstrate the requirement of specific combination of reservoirs constructed under CDM project activity for the optimization of power output. This demonstration has to be carried out in the specific scenario of water availability in different seasons to optimize the water flow at the inlet of power units. Therefore this water balance will take into account seasonal flows from river, tributaries (if any), and rainfall for minimum five years prior to implementation of CDM project activity.	The project is solar power project and thus the criterion is not applicable to this project activity.	Criterion not applicable as the project is a Greenfield project solar PV power project.
7. The methodology is not applicable to: (a) Project activities that involve switching from fossil fuels to renewable energy sources at the site of the project activity, since in this case the baseline may be the continued use of fossil fuels at the site; (b) Biomass fired power plants/units	(a) The project activity is Greenfield and there is no switching of fossil fuel to renewable energy. Hence the criteria is not applicable to the project activity (b) The project is not a biomass fired power plant. Hence the criteria is not applicable to the project activity	Criterion not applicable as the project is a Greenfield project.

8. In the case of retrofits, rehabilitations, replacements, or capacity additions, this methodology is only applicable if the most plausible baseline scenario, as a result of the identification of baseline scenario, is "the continuation of the current situation, that is to use the power generation equipment that was already in use prior to the implementation of the project activity and undertaking business as usual maintenance.	Not applicable, the solar project is a Green field project activity and this project is not the enhancement or up gradation project.	Criterion not applicable as the project is a Greenfield project.
9. In addition, the applicability conditions included in the tools referred to below apply.	Please refer tables below.	Please refer tables below.

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

This tool may be applied to estimate the OM, BM and/or CM when calculating baseline emissions for a project activity that substitutes grid electricity that is where a project activity supplies electricity to a grid or a project activity that results in savings of electricity that would have been provided by the grid (e.g. demand-side energy efficiency projects).	The project is a grid connected Greenfield solar power project and thus the tool is applicable.	The validation team reviewed the Joint PD & MR /01/ and confirms that the current project activity complies with the applicability conditions included in the referred tools. Thus, based on the above, the assessment team concludes that the project activity has successfully complied with requirements of the current applicability criteria of the applied methodology ACM0002, (version 18.1) /18/.

Under this tool, the emission factor for the project electricity system can be calculated either for grid power plants only or, as an option, can include off-grid power plants. In the latter case, two sub-options under the step 2 of the tool are available to the project participants, i.e. option II.a and option II.b. If option II.a is chosen, the conditions specified in "Appendix 2: Procedures related to off-grid power generation" should be met. Namely, the total capacity of off-grid power plants (in MW) should be at least 10 per cent of the total capacity of grid power plants in the electricity system; or the total electricity generation by off-grid power plants (in MWh) should be at least 10 per cent of the total electricity generation by grid power plants in the electricity system; and that factors which negatively affect the reliability and stability of the grid are primarily due to constraints in generation and not to other aspects such as transmission capacity.	Steps involved in calculation of Emission Factor are included in section B.6.3 of the PDD as per the requirement of the tool.	The validation team reviewed the Joint PD & MR /01/ and confirms that the current project activity complies with the applicability conditions included in the referred tools.
In case of CDM projects the tool is not applicable if the project electricity system is located partially or totally in an Annex I country.	Project is located in non-Annex I country and hence the tool is applicable.	Project is located in non-Annex I country and hence the tool is applicable.
Under this tool, the value applied to the CO2 emission factor of bio fuels is zero.	The project is a solar project and there is no involvement of bio fuels.	Criterion not applicable as the project is a Greenfield project.

Methodological Tool- Tool for the demonstration and assessment of additionality- Version 07.0.0 (EB 70, Annex 08)

Applicability Criteria has been demonstrated in section on additionality below. 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 216 MW which is applicable as per large scale project activities methodology ACM0002: Grid-connected electricity generation from renewable sources Version 18.1. 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.	The validation team reviewed the Joint PD & MR /01/ and confirms that the current project activity complies with the applicability conditions included in the referred tools.

3.3.3 Project Boundary

As per §22 of the applied methodology /18/ the project boundary is defined as:

"*The spatial extent of the project boundary includes the project power plant/unit and all power plants/units connected physically to the electricity system that the CDM project power plant is connected to.*"

The information regarding the project boundary has been also correctly given in the Joint PD & MR /01/.The project boundary includes the solar project, sub-stations, grid and all power plants connected to grid. The proposed project activity will evacuate power to the Indian grid. Therefore the entire Indian grid and all connected power plants have been considered in the project boundary for the proposed VCS project activity.

The assessment team confirms that the project boundary for the project instances is based on the applied methodologies /18/ and that there are no sources and gases within the boundary.

The physical delineation of the project boundary and the description of the emission sources and GHGs that are included in the boundary are appropriate for the purpose of calculating project and baseline emissions for the project.

3.3.4 Baseline Scenario

To describe the baseline scenario the PP has employed the requirements listed under §24 of the applied methodology /18/ which states that:

"If the project activity is the installation of a Greenfield power plant, the baseline scenario is electricity delivered to the grid by the project activity would have otherwise been generated by the operation of grid-connected power plants and by the addition of new generation sources, as reflected in the combined margin (CM) calculations described in the "Tool to calculate the emission factor for an electricity system." The combined margin of the Indian grid used for the project activity is as follows:

Parameter	Value (tCO_2e/ MWh)	Nomenclature	Source
$EF_{grid,CM,y}$	0.9653	Combined margin CO2 emission factor for the project electricity system in year y	Calculated as the weighted average of the operating margin (0.75) & build margin (0.25) values, sourced from Baseline CO2 Emission Database, Version 12 published by Central Electricity Authority (CEA), Government of India
$EF_{grid,OM,y}$	0.9843	Operating margin CO2 emission factor for the project electricity system in year y	Calculated as the last 3 year (2013-14, 2014-15 & 2015-16) generation-weighted average, sourced from Baseline CO2 Emission Database, Version 12, published by Central Electricity Authority (CEA), Government of India
$EF_{grid,BM,y}$	0.9083	Build margin CO2 emission factor for the project electricity system in year y	Baseline CO2 Emission Database, Version 12, published by Central Electricity Authority (CEA), Government of India

As that the project involves installation and operation of green-field, grid-connected solar power plants, the above assigned baseline scenario is deemed to be consistent. This was confirmed based sectoral expertise of the assessment team and further by reviewing the Joint PD & MR /01/, DPR /05/, Power purchase agreements/10/ and conducting physical inspections during On-Site Visit combined with interviewing representatives of PP /25/.

Thus, the baseline scenario has been identified in line with the requirements of the applied methodology ACM0002 (version 18.1) /18/ and is deemed to be appropriate and justified.

3.3.5 *Additionality*

The project is large scale project. Therefore, in accordance with ACM0002, the additionality of the project has been demonstrated based on the valid version of the "Tool for demonstration and assessment of additionality" (Version 07) /22/ and the "Methodological Tool: Investment analysis" (Ver 7)/23/. For the above reasons, this approach has been assessed to be appropriate for the assessment of additionality for this project activity.

Prior consideration:

During conceptualization of the project activity, board of directors of the project proponents considered the GHG revenue to improve the project financials. During the board meetings dated 04/06/2015 /27/, board of Directors decided that they would consider GHG revenue for their project activity. In continuation to the board decision, Project milestones as follows:

Serial No.	Milestones achieved	Date
1	Board Resolution for the project activity (Decision making)/27/	04/06/2015
2	Local stakeholder meeting/28/	10/06/2015
3	Purchase order released/07/	13/06/2015
4	PPA Signed/10/	04/07/2015
5	Pollution Control Board approval received/12/	20/08/2015
6	Commissioning of Project (start date) /08/	18/09/2016

In the above background, the Validation Team concludes that the start date is the date on which the actual emissions reductions have accrued i.e. project commissioning date of this project (18/09/2016), hence, start date of the VCS project is 18/09/2016. The justification regarding the VCS consideration and start date of VCS project activity given by the project developer is in accordance with the requirements derived from VCS version 3.7 .

Alternatives:
This is a solar PV power project and is based on the Methodology ACM0002 Ver. 18.1. The methodology states, "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". Since the approved methodology ACM0002 used by the project activity prescribes the baseline scenario, no further analysis of alternatives is required for the project activity.

Investment analysis:

Suitability of investment analysis, financial indicator and benchmark:

PP had demonstrated that the financial returns of the proposed VCS project activity would be insufficient to justify the required capital investment as per CDM VVS for PA 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 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 analysis is also not appropriate for the project activity. Therefore, benchmark analysis is used for the project activity as per project type and decision making context. The choice of post-tax equity IRR and the corresponding benchmark is considered appropriate by the validation team.

PP identified the benchmark using the guideline vide "Methodological Tool: Investment analysis", version 07.0 /23/. "*The values in the table in Appendix A may also be used, as a simple default option*". However, since RBI (Reserve Bank of India, India Central Bank) provides forecast inflation for both 5 & 10 years. The WPI mean inflation forecast for 5 & 10 years are added to the default values for the project participant as below:

Project Participants' Name	**Inflation Forecast**		**Appendix A in EB62, Annex 5 specifies default value of expected return on equity in real terms for Energy Industries (Group 1) in India**	**Benchmark**	
	5 Yrs	**10 Yrs**		**5 Yrs**	**10 Yrs**
Kamuthi Solar Power Limited	5.00%	5.00%	11.75%	17.34%	17.34%

As a conservative approach, benchmark of 17.34% has been selected for this project activity.

b) Parameters and assumptions used:

The project involves installation of grid connected Solar PV power plants with an installed capacity of 216 MWac. The important parameters, which determine the equity IRR of the project, are project cost, PLF, financing pattern and profitability estimates.

The project cost is based on the DPR submitted by solar project suppliers. The DPR was available during decision making and financial profitability of the project. Validation team checked the DPR of the project activity and found that consideration of the project cost is correct and justified. Further, signed purchase order has been checked by the assessment team as the actual cost is available during the validation. The validation team noted that even after taking the actual cost in the financial analysis, the equity IRR does not breach the benchmark for both the projects.

In India, infrastructure projects are generally entitled to a debt equity ratio of 70:30 and the same has been considered for the both the projects in the financial analysis which is deemed appropriate by the validation team.

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. The installed capacity is based on the capacity of solar project, which is evidenced by the DPR and purchase order issued subsequently.

Assessment of PLF: PP considered the Plant load factor from third party prepared DPR/05/. PP has submitted the copy of the PLF estimation report to the assessment team. This is deemed acceptable.

Assessment of Electricity Tariff: The tariff for the project was taken from the TNERC order dated 12/09/2014 available at the time of decision making. The tariff was further cross checked from the signed PPA /10/ and found to be appropriate.

Assessment of O & M Cost: The PP considered the O&M cost from the TNERC order dated 12/09/2014[1]. The TNERC order has been used in the financial calculation as same was available during decision making and hence applicable.

[1] http://www.tnerc.gov.in/order.htm

Assessment of Tax computation: The project developers have adopted book depreciation rates as per Schedule XIV of the Companies Act, 1956 for computing book profit[2] and Income Tax Act 1961 stipulated for income tax calculation[3], 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. Hence, these assumptions are appropriate during decision making context.

Cross checking of the parameters: The cost of solar project, electricity tariff, O&M cost, depreciation, salvage value and tax rate have been checked with Purchase Order, tariff order, Income Tax Act, power purchase agreement. The DPR value has been used in the financial calculation as same was available during decision making and hence applicable. The same is acceptable to the assessment team. 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 documents supporting the financial calculations, in the opinion of Validation Team, are therefore authentic and conform to the guidance given by CDM EB/VCS. All the input parameters considered in computation, the basis, correctness and appropriateness thereof are checked and found correct.

Assessment of correctness of computation: The assessment involved checking the data input taken from DPR, power purchase agreement / tariff order, adoption of correct accounting principle and arithmetical accuracy. Validation Team checked the documents and ensured that appropriate input has been taken in the project cost and projections. The arithmetical accuracy was also found to be correct. The equity IRR has been computed for a period of 25 years, which is the life time of the project and is in conformity with the Methodological Tool: Investment Analysis, version 07.0. In computing the IRR, the project developer has taken into account profit after tax, depreciation tax shield and salvage value (in the terminal year). The principle adopted conforms to the accepted accounting and taxation principles. Validation team also confirms that rest of the input parameters are considered appropriately and are in line with the Methodological Tool: Investment Analysis, version 07.0.

Sensitivity analysis:

The Methodological Tool: Investment Analysis, version 07.0 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 developers have 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 favorable conditions, the IRR without VCUs revenue would not cross the benchmark return as given in the following tables:

Input Parameters	-10%	Base IRR	+10%
PLF	7.46%	10.67%	14.88%
O&M cost	11.31%	10.67%	10.04%

[2] http://www.mca.gov.in/Ministry/latestnews/Explanatory_Statement_alongwith_Schedule_XIV_4dec2008.pdf
[3] https://www.incometaxindia.gov.in/Pages/tax-calculators.aspx

Project Cost	15.36%	10.67%	7.74%
Tariff	7.46%	10.67%	14.88%

Validation Team further carried out its own independent assessment, which reveals that the project would become *non additional* if

- Generation goes up by 22.38%
- Project cost goes down by 13.44%
- O&M cost goes down by -105.97%
- Tariff goes up by 15.49%

PP has submitted that such a reduction in project cost (considering the actual cost incurred) or increase in PLF or tariff is highly unrealistic and unlikely to happen considering that the firm PPA has already been signed (and invoices being raised based on the PPA), actual PLF being achieved by the project is lower than the considered PLFs in the financial analysis. Decrease in O & M cost is such an extent is impossible.

The assessment of conformity of additionality demonstration and benchmark selection to the latest version of the guidance issued by CEM EB on the assessment of investment analysis, plausibility and appropriateness of parameters used and correctness of financial calculations, Validation Team concludes that the project scenario is not economically feasible without benefits from VCUs sales.

Common practice analysis:

The PP has follows the stepwise approach for demonstration of common practice analysis as as per Methodological tool "Common Practice", version 03.1 EB84, Annex 7:

Step 01: Calculate applicable capacity or output range as +/-50% of the total design capacity or output of the proposed project activity.

For the purpose of common practice analysis, project developer has chosen all solar power generating projects under operation as on the start date of the project with a capacity ranging from 108 MW to 324 MW in location of Tamil Nadu state of India.

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

The project is located in Tamil Nadu state of India; therefore, the PP has considered the geographical area of Tamil Nadu for analysis. Furthermore, the PP has demonstrated that 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. The energy source used by the project activity is solar. Hence, only solar energy projects have been considered for analysis. The project activity produces electricity; therefore, all power plants that produce electricity are candidates for similar projects. The capacity range of the projects is within the applicable capacity range from 108 MW to 324 MW. The start date of the VCS project activity is 18/09/2016, i.e. the actual emissions reductions have accrued. Therefore projects, which have started commercial operation before 18/09/2016, have been considered for analysis. Therefore, 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}.

The PP has explained that the 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 by the PP has been verified and found that 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}.

The PP has justified as per the tool on Common Practice, the project activities have been separated from the different technologies on the basis of Investment climate on the date of the investment decision. Hence, projects where this condition is satisfied projects are counted for calculating Ndiff 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.

The PP has provided the calculation as:

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

F = 1-(0/0) = Undefined

Outcome of Step 4: As,

i. F = 0; which is not less than 0.2
ii. $N_{all} – N_{diff} = 0$ which is less than 3

As the project activity does not satisfy condition (i) and (ii) both, the proposed project activity is not a “common practice” within a sector in the applicable geographical area.

Hence it is concluded that the project activity is not a common practice. The details of the projects, the source of data and the calculations are given in the Joint PD & MR[/1/].

In the above background, Validation Team concludes that the project is not a business-as-usual scenario and is additional. The VCS benefits would enable the project to become financially attractive.

3.3.6 *Quantification of GHG Emission Reductions and Removals*

The equations and choices provided in the applied methodology ACM0002 (version 18.1) /18/ and all other methodological tools are correctly quoted in the Joint PD & MR /01/. The emission reductions of the project would be calculated using the formulae mentioned in the applied methodology /18/.

Validation team based on the review of the Joint PD & MR /01/ confirms that the formulae are correctly presented for the determination of emissions reductions. The parameters and equations presented in the Joint PD & MR /01/, as well as other applicable documents, have been compared with the information and requirements presented in the applied methodology/18/. An equation comparison has also been made to ensure consistency between all the formulae presented in the Joint PD & MR/01/ and ER validation spreadsheet /4/ and the applied methodology /18/.

Baseline Emissions:

The baseline emissions associated with the applied methodology are calculated as:

$BE_y = EG_{PJ, y} * EF_{grid, CM, y}$ ..... (1)

Where:

BE_y= Baseline emissions in year y (tCO_2e/yr)

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

$EF_{grid, CM, y}$ = Combined margin CO2 emission factor for grid connected power generation in year y calculated using the latest version of the "Tool to calculate the emission factor for an electricity system" (tCO_2e/MWh)

The estimation of the baseline energy generation was done by using the total installed capacity of the project activity, yearly generation hour and plant load factor. The project activity involves installation of 216 MW grid connected power plant in the state of Tamil Nadu. This was confirmed based on assessment of Joint PD & MR and ER validation spreadsheet.

Assessment for calculating the value of grid emission factor:

Baseline emission factor is calculated as combined margin, consisting of a combination of operating margin (OM) and build margin (BM) factors according to the procedure prescribed in the "Tool to calculate the emission factor for an electricity system" version 06.0/19/. The data for calculation of the grid emission factor is sourced from CEA data base version 12.0, Nov 2017, Govt. of India/21/ which is the latest available data. The baseline emission factor calculation is checked by the validation team and found that the calculation is transparent and conservative.

For estimating the operating margin emission factor, PP calculated ex-ante Simple Operating Margin (OM). As per the "Tool to calculate the emission factor for an electricity system": for grid power plants, use a 3-year generation-weighted average, based on the most recent data available at the time of submission to the DOE for validation. Hence, PP considered the weighted average of latest net electricity generation and import of electricity and associated emission from CEA data base version 12, Nov 2017. The value of operating margin considered as 0.9843 tCO_2 e/MWh and the value of build margin as 0.9083 tCO_2e /MWh (based on the latest one year data). The weighting for both operating margin is taken as 0.75 and build margin as 0.25 for solar power generation project. Validation team checked the estimation procedure and considered data and found transparent and conservative. Thus, the emission factor for the project is calculated to be EFy = 0.9653 tCO_2e/MWh and it is fixed ex ante for the crediting period. Considering this process, combined margin emission factor has been considered and same value is confirmed correct.

Project Emissions:

The project involves solar technology which is a renewable energy source. Thus, as per §36 the ACM002 (version 18.1) /18/ there are no project related emissions associated with the current project.

Thus, $PE_y = 0$.

Leakage Emissions:

As per the section 5.6 of the applied methodology ACM0002 (version 18.1) /18/, no other leakage emissions are considered. Thus, the leakage is considered as zero, therefore

$LE_y = 0$

Emission Reductions:

The emissions reductions associated with the applied methodology are calculated as:

$ER_y = BE_y – PE_y$

ER_y = Emission reductions in year y (t CO_2e/yr)

BE_y = Baseline emissions in year y (t CO_2e/yr)

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

As $PE_y = 0$

$ER_y = BE_y$

The assessment team confirms that the applied methodology and the referenced tools have been applied correctly to calculate baseline emissions and net GHG emission reductions the project crediting period.

3.3.7 Methodology Deviations

Not applicable

3.3.8 Monitoring Plan

The project employs the large-scale approved CDM methodology namely ACM0002 (version 18.1) and in accordance with the same, the parameters to be monitored ex-post are given below:

Parameters to be monitored:

Parameter (s)	Units	Description	Source of monitoring data
$EG_{PJ,y}$	MWh	Quantity of net electricity generation supplied by the project plant/unit to the grid in year y	Monthly Credit Report by TANGEDCO

Thus, the parameter to be monitored ex-post involves monitoring of net electricity generation supplied to the grid (calculated from electricity exported and imported) by the project activity.

As mentioned in the Joint PD & MR, Joint Meter Readings (JMRs)/ Monthly Credit Reports (MCRs) by TANGEDCO will serve as source of monthly values of net electricity supplied by the project. The electricity generation data recorded in the JMRs/MCRs shall form the basis of the emission reductions calculations. The assessment team shall review the same for verification of emission reduction results.

In order to measure the net export electricity supplied to the grid two bi-directional tri-vector electricity meters (main meter and check meter) are installed at the respective substation of the project and the meters are sealed and under the control of the state electricity board. The main meter reading is taken jointly on a fixed day of every month for the preceding month at the delivery point (sub-station) and signed by the representatives of state utility and O&M personnel of the power plant. In the event of failure of main meter, the check meter will be used in monitoring the electricity data.

The calibration of all electricity meters is under the jurisdiction of the state electricity board and shall be conducted as per the existing industry standards. The calibration frequency for the electricity meters installed under the project is 5 years.
Based on the review of the Joint PD & MR/01/, the assessment team confirms that detailed monitoring procedures, monitoring structure, management team, monitoring items and functions have been clearly demonstrated.

All electricity data will be archived electronically and further maintained for the entire crediting period plus two years.

Based on the above assessment the validation team concludes that the PP is capable to implement the monitoring plan and hence confirms compliance of VCS guidelines/20/ and the applied methodology /18/.

3.4 Non-Permanence Risk Analysis

Not applicable

4 SAFEGUARDS

4.1 No Net Harm

No potential negative environmental and socio-economic impacts have been identified by the project proponent. 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.

This is as per the requirements laid out in Appendix-1 of the VCS Standard (version 3.7) /20/ and deemed acceptable to the validation team.

4.2 Environmental Impact

The project activity is the installation and operation of solar power plant which would result in generation of clean, renewable energy. Thus, the project activity is not expected to have any significant adverse environmental impacts. Moreover, the project activity would help promote environmental and socio-economic well-being in the region. Also, there is no mandatory legal requirement in the host country to carry out environmental impact assessment of such project types. The assessment team reviewed the official government notification in the form of 'Schedule I of the EIA notification S.O.1533 (E)' dated 14th September 2006 and further affirmation provided by MOEF in the form of 'OM J-11013/41/2006 - IA II (I)' dated 13th May 2011 to confirm that solar power projects are not included in the list of project activities for which EIA in mandatory.

Thus, no EIA has been carried out by the PP which is deemed acceptable to the validation team.

4.3 Local Stakeholder Consultation

The local stakeholder consultation process has been described in detail, by the PP, in section 5.3 of the Joint PD & MR/01/. The project proponent identified the relevant stakeholder like the local village head and the villagers (from the villages listed in the PD) and local govt. officials as local stakeholders for the project activity. Thus, the validation team is of the opinion that the relevant stakeholders have been consulted appropriately and adequately.

Stakeholders were invited through public notices and invitation letters given by the PP. The documentary evidence provided as proof of date of the invitation, meeting; and mode of invitation/28/ has been checked by the assessment team and found to be appropriate.

After sharing information with the local stakeholders about the company and the purpose of proposed activity, the stakeholders were briefed about non-conventional energy sources and their importance. The PP also informed the stakeholders about their intention of securing carbon credit benefits for the proposed project activity. The Minutes of the meeting of the stakeholder meeting and attendance sheet/28/ have been submitted by the PP.

During the site visit the assessment team interviewed some of the local villagers. Based on the replies of the villagers, the validation team was convinced that the process of stakeholder consultation was carried out as described in the joint PD & MR/01/. The villagers also confirmed that they were invited for the meeting through public notice. This was found to be consistent with the invitation process mentioned in the joint PD & MR/01/.

4.4 Public Comments

The project has undergone Public Comment period from 31/05/2018 – 30/06/2018. There is no comment received for project. This is as per the requirements laid out in Appendix-1 of the VCS Standard (version 3.7) /20/ and deemed acceptable to the validation team.

5 VERIFICATION FINDINGS

5.1 Accuracy of GHG Emission Reduction and Removal Calculations

The data and parameters used to calculate the GHG emission reductions and removals have been listed below:

Parameters with Default Values (ex-ante parameters):

Parameter	Description	Value	Unit	Source
$EF_{grid,OM,y}$	Operating Margin CO_2 emission factor in year y	0.9843	tCO_2e/MWh	Calculated as per "Tool to calculate the emission factor for an electricity system (version 06.0.0)/19/„
$EF_{grid,BM,y}$	Build Margin CO_2 emission factor in year y	0.9083	tCO_2e/MWh	Calculated as per "Tool to calculate the emission factor for an electricity system (version 06.0.0)/19/„
$EF_{grid,CM,y}$	Combined Margin CO_2 emission factor in year y	0.9653	tCO_2e/MWh	Calculated as per "Tool to calculate the emission factor for an electricity system (version 06.0.0)/19/„

Parameter(s) monitored ex-post:

Parameter	**$EG_{PJ,y}$** (Quantity of net electricity generation supplied by the project plant/unit to the grid in year y)	
Means of verification	**Criteria/Requirements**	**Assessment/Observation**
	Measuring /Reading /Recording frequency	The electronic energy meter at the sent out point of the project activity plant is used to measure the data of net electricity generated.

	Is measuring and reporting frequency in accordance with the monitoring plan and monitoring methodology? (Yes / No)	Yes. The reporting frequency is in line with the monitoring plan as outlined in the Joint PD & MR[/01/] and monitoring methodology[/18/]. This para,eter is continuous monitoring and Monthly recording from Energy Meters, Summarized Annually. The Net electricity supplied to the grid by the project activity is calculated as a difference of electricity exported to the grid, electricity imported from the grid obtained from joint meter reading certificates/credit notes.
	Monitoring equipment	**Energy Meter : 01** Equipment Name : Energy meter-Secure Type : Electronic Accuracy : 0.2s Serial number of equipment : TNE81534 Date of Calibration :19/02/2016 **Energy Meter : 02** Equipment Name : Energy meter-Secure Type : Electronic Accuracy : 0.2s Serial number of equipment : TNE81535 Date of Calibration :19/02/2016 **Energy Meter : 03** Equipment Name : Energy meter-Secure Type : Electronic Accuracy : 0.2s Serial number of equipment : TNE81536

		Date of Calibration :15/03/2016
	Is accuracy of the monitoring equipment as stated in the monitoring plan? If the monitoring plan does not specify the accuracy of the monitoring equipment, does the accuracy of the monitoring equipment comply with local/national standards, or as per the manufacturer's specification?	Yes, the accuracy of the monitoring equipment used is 0.2s, which is as per the joint PD & MR[/01/].
	Is the accuracy valid for the entire measuring range or do different accuracy levels apply to different measuring ranges?	Yes. The accuracy of monitoring equipment's is valid for the entire range.
	Calibration frequency /interval:	Calibration frequency of the meters is once in 5 years.
	Is the calibration interval in line with the monitoring plan and/or methodology? If the monitoring plan does not specify the frequency of calibration, is the selected frequency in accordance with the local/national standards, or as per the manufacturer's specifications?	Yes. The calibration frequency is in line with the monitoring plan as outlined in the joint PD & MR[/01/].
	Is the calibration of measuring equipment carried out by an accredited person or institution?	Yes the calibration is conducted by NABL accredited lab [/15/].
	Is(are) calibration(s) valid for the whole reporting period?	Yes. Calibration of meters is valid for the whole reporting period.
	Is the calibration carried out for a measuring range comparable with the range for which measurements have been carried out?	Yes. The calibration is carried out appropriately.
	How were the values in the monitoring report verified?	Cumulative value of $\mathbf{EG_{PJ,y}}$ for entire monitoring period is reported in the monitoring report, however monthly values are reported in the ER

			calculation sheet /02/. The monthly values were verified from the plant data and found to be consistent. The project was commissioned on 18/09/2016; therefore start date of monitoring period is 18/09/2016 for this verification; also the first month billing cycle is end on 27/09/2016. Thereon each month billing is from 28th Day of the month to till 27th Day of the next month. So, the end date of monitoring period for this verification end on 27/03/2018. Value of this parameter for the current monitoring period was verified as 584,079.00 MWh
		If applicable, has the reported data been cross-checked with other available data?	Quantity of net electricity supplied to the grid is cross checked from the invoices raised by the project participant to the grid. The same is found to be consistent.
		Does the data management ensure correct transfer of data and reporting of emission reductions and are necessary QA/QC processes in place?	On site assessment of the project activity confirms that the necessary QA/QC procedures are in place and the data management system is effective and reliable.
Findings	Not Applicable		
Conclusion	The parameter has been monitored appropriately, in accordance with the PD monitoring plan (as per measurement methods and procedures to be applied) and applied methodology. The monitoring results were recorded consistently as per the approved frequency in the monitoring plan.		

The equations for calculation of emission reduction as provided in the Joint PD & MR /01/ and confirmed with the applied methodology ACM0002 (version 18.1) /18/ have been checked and found to be correct. The values as provided in the Joint PD & MR /01/ have been compared with ER verification sheet /02/ and raw values from monthly Joint Meter Reading reports/Monthly Credit Notes Reports /13/ and Invoices issued to state utility /14/ to ensure that no manual transposition errors between data sets have occurred. The verification team confirms that that all electricity generation values are matching between the above three documents. Moreover, the formulae applied in the ER spreadsheet /02/ were also reviewed and found to be consistent with the applied methodology. The verification team confirms that all parameters are used correctly in the calculations, all results are verifiable and transparent, all assumptions are described and based on verifiable evidence and calculations are done in accordance with the formulae laid out in the applied methodology ACM0002 (version 18.1) /18/ and requirements of the monitoring plan.

The total number of emission reductions for the monitoring period from 18/09/2016 to 27/03/2018 is 563,810 tCO_2e.

Comparison of actual GHG emission reductions or net anthropogenic GHG removals by sinks with estimates in PD:

Based on review of ER sheet[/02/], it confirm that the comparison between actual GHG emission reductions with estimated in PD:

Annual estimated GHG emission reductions in the PD (tCO_2e)	Estimated GHG emission reductions for current monitoring period , tCO_2e	Actual GHG emission reductions achieved in the current monitoring period, tCO_2e	Difference
346,116	527,234	563,810	6.94%

There is around 6.97% higher emission reduction achieved during the current monitoring period as compared to the projected ERs of equivalent period, which is mainly due to the higher PLF achieved during the current monitoring period.

5.2 Quality of Evidence to Determine GHG Emission Reductions and Removals

The quality of supporting documents that are provided by the PP as evidence is adequate. Raw values from Monthly Credit Reports [/13/] and Invoices issued to state utility [/14/] are provided, which tallies with the data provided in the ER verification spreadsheet [/02/].

Competent employees are recruited for the management and operation of the project. The quality of supporting evidences submitted to DOE for verification is adequate and found to be verifiable. Monthly Credit Reports [/13/,] Invoices issued to state utility [/14/] and other supporting documents related to quality and maintenance were checked by the assessment team to confirm the authenticity of the documents and to check the correctness of the calculations. The verification team for the records and future reference also obtains copies of these documents. The detailed information flow with the roles and responsibilities of the individuals and the monitoring system have been discussed and found to be appropriate.

Based on the above, the assessment team confirms the sufficiency and appropriateness of the quality of evidence provided by the PP to determine the GHG reductions and further deems them to be acceptable.

6 VALIDATION AND VERIFICATION CONCLUSION

LGAI Technological Center, S.A. (also referred to as Applus+ Certification), contracted by M/s Kamuthi Solar Power Limited, to performed a joint validation and verification of the VCS project activity “216 MWac Kamuthi Solar Power Project” in India.

The joint validation and verification process was performed on the basis of all guidance and criteria as provided in VCS Standard (version 3.7), VCS Program Guide (version 3.7), VCS Validation and Verification Manual (version 3.2) and Registration & Issuance Process (version 3.8) /20/.

The conclusions of validation and verification process can be individually summarised as follows:

Validation Conclusion:

The project activity provides the information in Joint PD & MR /01/ as required by VCS Standard, version 3.7 /20/ and Validation and Verification Manual, version 3.2 /20/ and in Applus+ Certification's opinion meets the requirements of the applied baseline and monitoring methodology, ACM002 (version 18.1)/18/ and is likely to achieve the estimated emission reductions. The validation has been performed using a risk-based approach, as described above. The expected emission reductions from the project activity during the course of its crediting period (ten years) will be 3,461,169 tCO_2e.

Applus+ Certification concludes the validation with a positive opinion and confirms that the VCS Project Activity "216 MWac Kamuthi Solar Power Project" in India, as described in the Joint PD & MR /01/ meets all applicable VCS requirements, including those specified in the CDM Project Standard /26/, relevant methodologies, tools and guidelines.

The selected baseline and monitoring methodology ACM002 (version 18.1)/18/ is applicable to the project and correctly applied. Applus+ Certification therefore requests the registration of the project as a VCS project activity.

Verification Conclusion:

Applus+ Certification verification approach is based on the understanding of the risks associated with reporting of GHG emission data and the controls in place to mitigate these. Applus+ Certification planned and performed the verification by obtaining evidence and other information and explanations that Applus+ Certification considered necessary to give reasonable assurance that reported GHG emission reductions are fairly stated.

In our opinion the GHG emissions reductions reported for the project activity for the period 18/09/2016 – 27/03/2018 are fairly stated in the joint PD and MR/01/. The GHG emission reductions were calculated correctly on the basis of the approved baseline and monitoring methodology and the VCS standard.

Verification period: From 18-September-2016 to 27-March-2018 (including both days)

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

Year	Baseline emissions or removals (tCO_2e)	Project emissions or removals (tCO_2e)	Leakage emissions (tCO_2e)	Net GHG emission reductions or removals (tCO_2e)

2016	78,110	0	0	78,110
2017	374,893	0	0	374,893
2018	110,807	0	0	110,807
Total	563,810	0	0	563,810

Applus+ Certification confirms a positive verification opinion confirming that the project complies with the applicable VCS requirements, thus recommending the project for issuance.

APPENDIX 1: DOCUMENT REFERENCES

S. No	Title of Document	Version	Date
1.	Joint PD & MR	02	15/07/2018
2.	Emission reduction spreadsheet	01	29/05/2018
3.	IRR spreadsheet	01	29/05/2018
4.	Prior consideration Email and CDM Form as evidence of VCUs for the project activity	-	27/08/2015
5.	Detailed Project Report (DPR)	-	01/05/2018
7	EPC contract(s) / Purchase orders for the project activity	-	13/06/2015, 27/06/2015, 16/07/2015
8.	Commissioning certificates issued by respective state electricity board. (proof of VCS project start date)	-	18/09/2016
9.	Evidence for the Technical specifications of the projects as per PO	-	13/06/2015, 27/06/2015, 16/07/2015
10.	PPA signed with TENGEDCO	-	04/07/2015
11.	Tariff order	-	12/09/2014
12.	Statutory clearances	-	20/08/2015
13.	Monthly Credit Report for the monitoring period	-	From 18/09/2016 to 27/03/2018
14.	Invoices raised by the PP to the state electricity board for the monitoring period	-	From 18/09/2016 to 27/03/2018
15.	Calibration certificates for the electricity meters used during the monitoring period	-	From 18/09/2016 to 27/03/2018
16.	Declaration(s) from Project proponent on the following (for section 1.12 of the Joint PD & MR): a) Project not registered or under process of registration in any other Emissions Trading Programs and Other Binding Limits. b) Project not registered or under process of getting and Other Forms of Environmental Credit c) The project has not been registered and is not seeking registration under any other GHG program. d) Projects not Rejected by Other GHG Programs	-	-
17.	Declaration from PPs for: - No Generation based incentives are claimed by the projects - No ODA funding is used in the projects from any Annex 1 country	-	-
18.	Approved CDM monitoring methodology: ACM0002: Grid-connected electricity generation from renewable sources	18.1	-
19.	Tool to calculate the emission factor for an electricity system,	06.0	-
20.	VCS Requirements: - Verified Carbon Standard Program Guide, v3.7; - Verified Carbon Standard, v3.7; - VCS Program Definitions, Ver. 3.7 - VCS Registration and Issuance Process, v3.8	-	-

S. No	Title of Document	Version	Date
	- VCS Validation and Verification Manual, v3.2 - VCS Joint Project Description & Monitoring Report Template, v3.1 - VCS Joint Validation & Verification Report Template, v3.1		
21.	Baseline CO2 Emission Database, published by Central Electricity Authority (CEA), Government of India.	12.0	-
22.	Methodological Tool: Tool for the demonstration and assessment of additionality	07.0	-
23.	Methodological Tool: Investment analysis	07.0	-
24.	Methodological Tool: Common practice	03.1	-
25.	On site assessment –interviews of staff personnel, photographs, physical inspection of monitoring system	-	20/06/2018 & 21/06/2018
26.	CDM Validation and Verification Standard for PA and CDM Project Standard for PA	01.0	-
27.	Board Meeting MOM	-	04/06/2015
28.	Local Stakeholder Meeting records	-	-
29.	Joint PD & MR	01	29/05/2018

APPENDIX 2: ABBREVIATIONS

Abbreviations	Full texts
ABT	Availability Based Tariff
CAR	Corrective Action Request
CDM	Clean Development Mechanism
CDM PCP	Clean Development Mechanism Project Cycle Procedure
CDM PS	Clean Development Mechanism Project Standard
CDM VVS	Clean Development Mechanism Validation and Verification Standard
EB	Executive Board
EF	Emission Factor
EPC	Engineering ,Procurement and Construction
ER	Emission Reductions
CEA	Central Electricity Authority
CER	Certified Emission Reduction
CR	Clarification Request
DOE	Designated Operational Entity
DNA	Designated National Authority
FAR	Forward Action Request
GCEES	Green Carbon Energy and Environment Services
GHG	Greenhouse Gas(es)
GOI	Government of India
IPCC	Intergovernmental Panel on Climate Change
MCR	Monthly Credit Reports
MP	Monitoring Plan
MR	Monitoring Report
MWh	Megawatt hour
PD	Project Description
PP	Project Proponent
PS	Project Standard
TR	Technical Review
UNFCCC	United Nations Framework Convention on Climate Change
VVS	Validation and Verification Standard

APPENDIX 3: Findings Overview

Table 1. Remaining FAR from validation and/or previous verification

FAR ID	N/A	**Section no.**	N/A	**Date:**N/A
Description of FAR				
N/A				
Project participant response				**Date:** N/A
N/A				
Documentation provided by project participant				
N/A				
DOE assessment				**Date:** N/A
N/A				

Table 2. CL from this verification

CL ID	N/A	**Section no.**	N/A	**Date :** N/A
Description of CL				
N/A				
Project participant response				**Date :** N/A
N/A				
Documentation provided by project participant				
N/A				
DOE assessment				**Date:** N/A
N/A				

Table 3. CAR from this verification

CAR ID	01	**Section no.**	3.3.5	**Date:** 14/07/2018
Description of CAR				
The PP is considered PPA as start date of project activity; therefore, the PP is requested to further demonstrate how this start date of project activity is appropriately considered as CDM VVS for PA ver 01 and also the PP is requested to justify the prior consideration for project activity in the PD.				
Project participant response				**Date:** 15/07/2018
In line with VCS version 3.7 the start date is the date on which the actual emissions reductions have accrued. Accordingly the start date of the VCS project is 18/09/2016. Further, the project has sent the prior notification to CDM EB in line with CDM requirements, however that would be described in case the project is taken under CDM Mechanism currently the CDM requirements are not applicable for the vcs project.				
Documentation provided by project participant				
Joint PD and MR version 2				
DOE assessment				**Date:** 16/07/2018
The PP has provided the revised joint PD and MR with corrected start date of VCS project activity which is the actual emissions reductions have accrued i.e. date of commissioning of project. This is found to be in-line with VCS version 3.7. Therefore, CAR#1 satisfactorily closed.				

CAR ID	02	**Section no.**	4.3	**Date:** 14/07/2018
Description of CAR				
The PP is requested to provide stakeholder meeting details like date and location , date of invitation in PD.				
Project participant response				**Date:** 15/07/2018

The revised joint PD and MR is attached herewith with the details of LSC meetings.	
Documentation provided by project participant	
Joint PD and MR version 2	
DOE assessment	**Date:** 16/07/2018
The PP has provided the revised joint PD and MR with details of LSC meetings for project. This is found to be in-line with VCS version 3.7. Therefore, CAR#2 satisfactorily closed.	

Table 4. FAR from this verification

FAR ID	N/A	**Section No.**	N/A	**Date :** N/A
Description of FAR				
No FAR raised				
Project participant response				**Date :** N/A
N/A				
Documentation provided by project participant				
N/A				
DOE assessment				**Date:** N/A
N/A				

APPENDIX 4: Competency Statements

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

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

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

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

The sectoral scope / technical area knowledge linked to the applied methodology/ies shall be covered by the assessment team.

Name	**Qualification**	**Coverage of scope**	**Coverage of technical Area**	**Financial aspect**	**Host country Experience**	**Attendance to the On-Site Assessment**
Vivek Kumar Ahirwar	Lead Auditor (LA)	Yes (1)	Yes (1.2)	N/A	Yes	Yes

Vivek Kumar Ahirwar	Technical Expert (TE)	Yes (1)	Yes (1.2)	N/A	Yes	Yes
Ravi Kant Soni	Auditor in Training (AiT)	Yes (1)	Yes (1.2)	N/A	Yes	Yes
Simon Shen	Technical Reviewer (TR)	Yes (1)	Yes (1.2)	N/A	N/A	N/A

The curricula vitae of the DOE's team members are provided below:

Vivek Kumar Ahirwar is a BEE-Certified Energy Auditor by Govt of India with over eight years of relevant experience in energy efficiency, energy audit, thermal and electrical energy generation technology from renewable source and energy conservation in energy intensive industries, designated consumers and commercial buildings, implementation of energy conservation building codes, research, process and green building projects. He is a certified lead auditor for ISO 14001 EMS and 14064. He has experience under various categories of projects stating from renewable to waste to supercritical projects and WCD. He has successfully audited more than 100 GHG (CDM/VCS/GS) projects in different states across the India. He has done Mater in Technology (Energy Management) from a premier institute, School of Energy& Environmental Studies, DAVV, Indore (M.P.), India and Bachelor of Engineering (Mechanical Engineering) from Govt. Engineering college, Rewa, RGPV, India.

Ravi Kant Soni is a certified lead auditor for Lead Auditor ISO 14001:2004&Lead Auditor ISO 14064:2006 GHG Inventory and verification. He has more than 10 years of work experience across Climate Change, Environmental Management & Monitoring, Health & Safety Management, and Statutory Compliance. He was involved in more than 100 CDM validation and verifications activities and Gold Standard, VER projects as a team leader/technical reviewer / validator / verifier covering the sectoral scope 1 technical area 1.2. He has done Mater in Technology (Energy Management) from a premier institute, School of Energy & Environmental Studies, DAVV, Indore (M.P.), India and Bachelor of Engineering (Mechanical Engineering) from M.I.T.S Gwalior Jiwaji University Gwalior, India

Simon Shen (Master Degree in Thermal Energy Engineering, Bachelor Degree in Environmental Engineering) is a Lead Auditor appointed by Applus+ Certification for the GHG project assessment. He is based in Shanghai. He has several years of work experience in environmental protection field. Before he joined Applus+ Certification, he had been worked for TÜV SÜD as a GHG Validator/Verifier and ISO 9001/14001 Lead Auditor for 3.5years.

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