

JCM Verification Report Form

A. Summary of verification

A.1. General Information

Title of the project	Small Scale Solar Power Plants for Schools in Island States
Reference number	PW002
Monitoring period	From 08/02/2016 to 31/07/2017
Date of completion of the monitoring report	27/09/2017
Third-party entity (TPE)	Lloyd's Register Quality Assurance Limited (LRQA)
Project participant contracting the TPE	Pacific Consultants Co., Ltd. (PCKK)
Date of completion of this report	13/10/2017

A.2 Conclusion of verification and level of assurance

Overall verification opinion	<input checked="" type="checkbox"/> Positive <input type="checkbox"/> Negative
<input checked="" type="checkbox"/> Unqualified opinion	<p>Based on the process and procedure conducted, <i>Lloyd's Register Quality Assurance Limited (LRQA)</i> (TPE's name) provides reasonable assurance that the emission reductions for <i>Small Scale Solar Power Plants for Schools in Island States</i> (project name)</p> <ul style="list-style-type: none"> ✓ Are free of material errors and are a fair representation of the GHG data and information, and ✓ Are prepared in line with the related JCM rules, procedure, guidelines, forms and other relevant documents
<p><i>(If overall verification opinion is negative, please check below and state its reasons.)</i></p> <input type="checkbox"/> Qualified Opinion <input type="checkbox"/> Adverse opinion <input type="checkbox"/> Disclaimer	<p><State the reasons> Not applicable</p>

A.3. Overview of the verification results

Item	Verification requirements	No CAR or CL remaining
The project	The TPE determines the conformity of the actual	<input checked="" type="checkbox"/>

Item	Verification requirements	No CAR or CL remaining
implementation with the eligibility criteria of the applied methodology	project and its operation with the eligibility criteria of the applied methodology.	
The project implementation against the registered PDD or any approved revised PDD	The TPE assesses the status of the actual project and its operation with the registered/validated PDD or any approved revised PDD.	<input checked="" type="checkbox"/>
Calibration frequency and correction of measured values with related requirements	If monitoring Option C is selected, the TPE determines whether the measuring equipments have been properly calibrated in line with the monitoring plan and whether measured values are properly corrected, where necessary, to calculate emission reductions in line with the PDD and Monitoring Guidelines.	<input checked="" type="checkbox"/>
Data and calculation of GHG emission reductions	The TPE assesses the data and calculations of GHG emission reductions achieved by/resulting from the project by the application of the selected approved methodology.	<input checked="" type="checkbox"/>
Avoidance of double registration	The TPE determines whether the project is not registered under other international climate mitigation mechanisms.	<input checked="" type="checkbox"/>
Post registration changes	The TPE determines whether there are post registration changes from the registered PDD and/or methodology which prevent the use of the applied methodology.	<input checked="" type="checkbox"/>

Authorised signatory:	Mr. <input checked="" type="checkbox"/>	Ms. <input type="checkbox"/>
Last name: Chiba	First name: Michiaki	
Title: Climate Change Manager - Asia & Pacific		
Specimen signature		Date: 13/10/2017

B. Verification team and other experts

	Name	Company	Function*	Scheme competence*	Technical competence*	On-site visit
Mr. <input checked="" type="checkbox"/> Ms. <input type="checkbox"/>	Michiaki Chiba	LRQA Ltd.	Team leader	<input checked="" type="checkbox"/>	Technical competence authorised	<input checked="" type="checkbox"/>
Mr. <input checked="" type="checkbox"/> Ms. <input type="checkbox"/>	Xianxin Yan	LRQA China	Internal reviewer	<input checked="" type="checkbox"/>	N/A	<input type="checkbox"/>
Mr. <input type="checkbox"/> Ms. <input type="checkbox"/>				<input type="checkbox"/>		<input type="checkbox"/>
Mr. <input type="checkbox"/> Ms. <input type="checkbox"/>				<input type="checkbox"/>		<input type="checkbox"/>

Please specify the following for each item.

- * *Function:* Indicate the role of the personnel in the validation activity such as team leader, team member, technical expert, or internal reviewer.
- * *Scheme competence:* Check the boxes if the personnel have sufficient knowledge on the JCM.
- * *Technical competence:* Indicate if the personnel have sufficient technical competence related to the project under validation.

C. Means of verification, findings and conclusions based on reporting requirements

C.1. Compliance of the project implementation and operation with the eligibility criteria of the applied methodology

<Means of verification>

LRQA has determined through the verification process that the actual implementation and operation of the project has been conducted in conformance with the eligibility criteria of the applied methodology.

The project applied the approved methodology: JCM_PW_AM001_ver01.0 "Displacement of Grid and Captive Genset Electricity by a Small-scale Solar PV System, Ver 01.0".

LRQA assessed by means of an on-site visit that the physical features of the project are in place and that the PPs have operated the project as per the eligibility criteria of the applied methodology. The steps taken to verify each eligibility criterion and the conclusions about implementation of the project are summarised as below.

Criterion 1: The project installs solar PV system(s).

Justification in the PDD: A solar PV system is installed at each site. The solar PV module employed is Kyocera KU265-6MCA. The inverter employed is SMA Sunny Boy 10000TL-US.

Steps taken for assessment: The verification team assessed the project documentation, technical specification of the project solar PV system, the contract, the commissioning report and

conducted physical on site assessment.

Conclusion: The verification team confirmed that the project installs solar PV systems at the 2 sites including the solar PV modules and inverters, and the criterion is met by the project.

Criterion 2: The solar PV system is connected to the internal power grid of the project site and/or to the grid for displacing grid electricity and/or captive electricity at the project site.

Justification in the PDD: The solar PV system of each site is connected to the internal power grid of the project site and to the grid. The system displaces grid electricity.

Steps taken for assessment: The verification team assessed the project documentation, technical specification of the project solar PV system, the electricity diagram, and conducted physical on site assessment.

Conclusion: The verification team confirmed that the solar PV systems are connected to the electricity system of two project sites that are connected with the public electricity grid and the electricity generated by the solar PV systems displaces grid electricity. The criterion is met by the project.

Criterion 3: The PV modules have obtained a certification of design qualifications (IEC 61215, IEC 61646 or IEC 62108) and safety qualification (IEC 61730-1 and IEC 61730-2).

Justification in the PDD: The installed PV module (Kyocera KU265-6MCA) has obtained a certification of design qualifications (IEC 61215) and safety qualification (IEC 61730-1 and IEC 61730-2).

Steps taken for assessment: The verification team reviewed the technical specification of the PV module and the quality certificates.

Conclusion: The verification team confirmed that the Kyocera PV module model KU265-6MCA employed by the project has been certified with IEC 61215, IEC61730-1 and IEC61730-2 as appropriate. The criterion is met by the project.

Criterion 4: The equipment to monitor output power of the solar PV system and irradiance is installed at the project site.

Justification in the PDD: The Sunny SensorBoxes are installed at the project sites to measure irradiance. An electricity meter is installed at each site to measure output power of the solar PV system.

Steps taken for assessment: The verification team assessed the project documentation, technical specification of the monitoring system, and conducted physical on site assessment.

Conclusion: The verification team confirmed that the equipment to monitor output power of the solar PV system and irradiance have been installed at the project sites. The criterion is met by the project.

The verification team confirmed that the eligibility conditions are satisfied by the project by reviewing the supporting documents and the on site assessment.

The details of the persons interviewed and the documents reviewed are shown in the Section F of this report.

<Findings>

Please state if CARs, CLs, or FARs are raised, and how they are resolved.

No issue was raised to the requirements of the section.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The verification team confirmed that the project has been implemented in conformity with the eligibility criteria of the applied methodology.

C.2. Assessment of the project implementation against the registered PDD or any approved revised PDD

<Means of verification>

The project installed total 155.025 kW grid connected solar PV systems at the two sites. 51.675 kW system is installed on top of the gymnasium of Palau Seventh-Day Adventist Elementary School (SDA) in Madalaih Hamlet, Koror State (Site A), and 103.350 kW system is installed on top of the gymnasium of Palau Mission Academy (PMA) in Ngerikiil Hamlet, Airai State (Site B), the Republic of Palau. The electricity generated by the solar PV systems is basically self-consumed in the school facility but surplus power if any is exported to the public electricity grid.

The project solar PV systems apply Kyocerra's PV module model KU265-6MCA. The project has been implemented by Palau Adventist Schools from Republic of Palau, and Pacific Consultants Co., Ltd. (PCKK) from Japan (the PPs).

The start date of project operation is on 08/02/2016 for Site A, 12/02/2016 for Site B and the expected operational lifetime of the project is for 20 years.

The project has been selected as one of the JCM model projects by the Ministry of the Environment, Japan (MOE) and receives financial support from the Government of Japan.

The verification team assessed the Monitoring Report (MR) consists of Monitoring Report Sheet (MRS) parts of the Monitoring Spreadsheet and the supporting documents, conducted a physical site visit to assess the status of the actual project and its operation in accordance with the registered PDD. No revision to the registered PDD was requested.

The verification team determined through the verification process that the implementation and operation of the project has been in accordance with the description contained in the registered PDD. The verification team, by means of a desk review and an on-site visit, assessed that:

- all physical features of the JCM project described in the registered PDD are in place, and
- the PPs have operated the JCM project as per the registered PDD.

The MR follows the Monitoring Plan (MP) of the registered PDD that have been established based on the approved methodology. The parameter to be monitored ex-post is $EG_{i,p}$, the total quantity of the electricity generated by the project solar PV system i during the period p (in MWh/p).

The roles and responsibilities of the persons are described in the Monitoring Structure Sheet (MSS) in accordance with the requirements of the applied methodology. There was no change in the organizational structure during the monitoring period.

Through the processes taken, CL 1 and CL 2 were raised as the resolution detailed below.

The details of the persons interviewed and the documents reviewed are shown in the Section F of this report.

<Findings>

Please state if CARs, CLs, or FARs are raised, and how they are resolved.

Grade / Ref: CL 1

Nature of the issue raised: The PPs were requested to clarify implementation of the procedures to keep the relevant data and information required for the verification and issuance.

Nature of responses provided by the PPs: The PPs revised the monitoring manual to ensure maintaining of data and information until two years after the final issuance of the credits.

Assessment of the responses: The verification team reviewed the procedures in the revised monitoring manual and confirmed that the data and information required for the verification and issuance will be kept until two years after the final issuance of the credits under the monitoring procedures being implemented by the PPs. The CL was closed.

Grade / Ref: CL 2

Nature of the issue raised: The PPs were requested to clarify the implementation of the monitoring procedures on responsibility of maintaining the monitoring equipment for each site.

Nature of responses provided by the PPs: The PPs revised the monitoring manual to clarify the responsibility of maintaining the monitoring equipment.

Assessment of the responses: The verification team reviewed the procedures in the revised monitoring manual and confirmed that the responsibility of maintaining the monitoring equipment is clarified for each site under the monitoring procedures being implemented by the PPs. The CL was closed.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The verification team confirmed that the project was implemented and operated in accordance with the registered PDD and no revision to the same was requested for the monitoring period.

C.3. Compliance of calibration frequency and correction of measured values with related requirements

<Means of verification>

The parameter No. (1) EGi,p applies the monitoring Option C and the monitoring of the parameter uses electricity meters as the measuring equipment. The meters successfully passed the factory tests of the manufacturer in compliance with the standard ANSI C12.20 with accuracy class 0.2% on 14/10/2015. The meters will be replaced within 10 years in accordance with the registered MP. No correction was required to the measured values to calculate emission reductions in line with the PDD and Monitoring Guidelines during the monitoring period.

Through the processes taken, CAR 1 was raised as the resolution detailed below.

The details of the persons interviewed and the documents reviewed are shown in the Section F of this report.

<Findings>

Please state if CARs, CLs, or FARs are raised, and how they are resolved.

Grade / Ref: CAR 1

Nature of the issue raised: The date of factory test for the electricity meters was not indicated in the MRS.

Nature of responses provided by the PPs: The date of factory test was added in the revised MRS.

Assessment of the responses: The verification team reviewed the revised MRS and the supporting evidence, and confirmed that the date of factory test is correctly indicated for the electricity meters in the revised MRS. The CAR was closed.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The verification team confirmed that the measuring equipment applied for the parameter satisfied the requirements of the MP concerning the regular calibration and no correction was required to the measured values during the monitoring period.

C.4. Assessment of data and calculation of GHG emission reductions

<Means of verification>

The MR is developed using the MRS applied to the registered JCM project that is confirmed fulfilment of the requirements of the MRS of the applied methodology.

LRQA has determined that:

1. a complete set of data for the specified monitoring period is available,
2. information provided in the MR has been cross-checked with other sources such as plant log books, inventories, purchase records, laboratory analysis,

3. calculations of reference emissions (REs) and project emissions (PEs), as appropriate, have been carried out in accordance with the formulae and methods described in the MP and the applied methodology,
4. any assumptions used in emission calculations have been justified, and
5. appropriate emission factors, default values and other reference values have been correctly applied.

The project introduces solar PV systems at two schools and emission source is consumption of grid electricity in the reference scenario. PEs are not applicable for generation of electricity from solar PV systems in accordance with the applied methodology.

The REs are determined as a product of total electricity generation and the default reference CO2 emission factor of the applied methodology at 0.533 tCO2/MWh.

The GHG emission reductions during the monitoring period (each for year 2016 and 2017) are calculated as: $ER_p = RE_p - PE_p = RE_p = \sum_i E_{Gi,p} \times EF_{RE}$

Year 2016 (from 08/02/2016 to 31/12/2016)

$$(63.15 + 99.77) \times 0.533 \text{ tCO}_2/\text{MWh} = 162.92 \times 0.533 = 86 \text{ tCO}_2\text{e.}$$

Year 2017 (from 01/01/2017 to 31/07/2017)

$$(37.63 + 74.36) \times 0.533 \text{ tCO}_2/\text{MWh} = 111.99 \times 0.533 = 59 \text{ tCO}_2\text{e.}$$

Achieved electricity generation in first monitoring period of 18 months (540 days) is 274.91 MWh in total, that is 185.82 MWh (274.91 MWh x 365/540) in a year and 11% lower level than ex-ante estimate in the registered PDD of 209.36 MWh.

The verification team assessed the reported data with documented evidence and by means of on site visit.

The details of the persons interviewed and the documents reviewed are shown in the Section F of this report.

Parameters	Monitored values	Method to check values in the monitoring report with sources
EG _{i,p} (2016)	162.92 MWh/p	Assesment was conducted based on records of monthly meter readings and on site assessment.
EG _{i,p} (2017)	111.99 MWh/p	Assesment was conducted based on records of monthly meter readings and on site assessment.

<Findings>

Please state if CARs, CLs, or FARs are raised, and how they are resolved.

No issue was raised to the requirements of this section.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The verification team confirmed that appropriate methods and formulae for calculating REs and PEs have been followed. The verification team is of the opinion that all assumptions, emissions factors and default values that were applied in calculations have been justified.

C.5. Assessment of avoidance of double registration

<Means of verification>

The verification team assessed and confirmed relevance of the written confirmation from the PPs that the project is not registered under the other international climate mitigation mechanisms.

The team, in addition to the interviews with the PPs, checked publicly accessible information of Clean Development Mechanism (CDM), Joint Implementation (JI), Verified Carbon Standard (VCS) and Gold Standard (GS) and found no identical project as the registered JCM project in terms of the name of entities, applied technology, scale and the location. The result of researches confirmed that the project was not registered under the other international climate mitigation mechanisms than JCM and it will not result in a double counting of GHG emission reductions.

The details of the persons interviewed and the documents reviewed are shown in the Section F of this report.

<Findings>

Please state if CARs, CLs, or FARs are raised, and how they are resolved.

No issue was raised to the requirements of this section.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The verification team confirmed that the projects not registered under other international climate mitigation programs.

C.6. Post registration changes

<Means of verification>

The verification team assessed the project documentation and through the on site visit and confirmed that there was no post registration change from the registered PDD or the approved methodology.

<Findings>

Please state if CARs, CLs, or FARs are raised, and how they are resolved.

No issue was raised to the requirements of this section.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The verification through the verification processes determined that there was no post registration change from the registered PDD or approved methodology which prevent from use of the applied methodology.

D. Assessment of response to remaining issues

An assessment of response to the remaining issues including FARs from the validation and/or previous verification period, if appropriate

No FAR was issued in the validation and this is the first verification of the project.

E. Verified amount of emission reductions achieved

Year	Verified Emissions (tCO ₂ e)	Reference Emissions (tCO ₂ e)	Project Emissions (tCO ₂ e)	Verified Emission Reductions (tCO ₂ e)
2014				
2015				
2016		86	0	86
2017		59	0	59
2018				
2019				
2020				
2021				
2022				
2023				
2024				
2025				
2026				
2027				
2028				
2029				
2030				
Total (tCO ₂ e)		145	0	145

F. List of interviewees and documents received

F.1. List of interviewees

Palau Adventist Schools
 Abner Sanchez, Principal
 Nelson Sisor, Vice-Principal
 Marlon M. Thomas, Maintenance

Pacific Consultants Co., Ltd. (PCKK)
 Hirofumi Ishizaka, Senior Researcher, PC-Institute for Global Environment Research, International Division
 Minako Sasaki, Researcher, PC-Institute for Global Environment Research, International

Division

F.2. List of documents received

Category A documents (documents prepared by the PP)

- Monitoring report dated 01/08/2017 and 27/09/2017
- SDA electricity meter reading logbook
- MPA electricity meter reading logbook
- Project Documents of SDA dated 08/02/2016 and PMA dated 12/02/2016, including commissioning report, grid connection acceptance, contract, electricity diagram, etc.
- Technical specification of project solar PV system, Island Engineering and Design
- Technical specification of electricity meter, Acuvim II Series, Accuenergy
- Technical specification of Sunny Webbox and SensorBox, SMA America, LLC
- Factory test reports of the electricity meters dated 14/10/2015
- Introductory information of Palau Adventist Schools
- Certificate No. PV03-53202-1077, Japan Electrical Safety & Environment Technology Laboratories, dated 02/04/2015
- Monitoring manual Ver.2.0 and Ver.3.0, Pacific Consultants Co., Ltd.
- Records of training
- Declaration letter on no double registration

Category B documents (other documents referenced)

- Registered PDD Version 03.0 dated 22/03/2016 and the Monitoring spreadsheet
- MoC dated 08/02/2016
- Validation report for the project dated 25/03/2016
- JCM_PW_AM001_ver01.0 Displacement of Grid and Captive Genset Electricity by a Small-scale Solar PV System, Ver.01.0
- JCM Project Cycle Procedure JCM_PW_PCP_ver03.0
- JCM Guidelines for Validation and Verification JCM_PW_GL_VV_ver01.0
- JCM Guidelines for Developing PDD and MR JCM_PW_GL_PDD_MR_ver02.0
- JCM Glossary of Terms JCM_PW_Glossary_ver01.0
- Monitoring reports and verification reports of JCM project Ref #PW001 (issued)
- Proposed and registered projects under CDM, VCS, Gold Standard, and the other international schemes
- Sunny Portal



Annex Certificates or curricula vitae of TPE's verification team members, technical experts and internal technical reviewers

Please attach certificates or curricula vitae of TPE's validation team members, technical experts and internal technical reviewers.

Certificate of Appointment is attached to this report.

Joint Crediting Mechanism Certificate of Appointment

Title of Project: Small Scale Solar Power Plants for Schools in Island States (Ref# PW002)

Verification for the first monitoring period: 08/02/2016 – 31/07/2017

We hereby certify that the following personnel have engaged in the verification process that has fully satisfied the competence requirements of the verification of the JCM project.

Name of Person	Assigned Roles
Michiaki Chiba	Team Leader
Xianxin Yan	Technical Reviewer

Signed by



Michiaki Chiba
Climate Change Manager – Asia & Pacific
15/08/2017