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 01/08/2017 to 31/12/2020
Date of completion of the monitoring report	12/01/2022
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	02/03/2022

A.2 Conclusion of verification and level of assurance

Overall verification opinion	☒ Positive ☐ Negative
☒ Unqualified opinion	Based on the process and procedure conducted, *Lloyd's Register Quality Assurance Limited (LRQA)* (TPE's name) provides reasonable assurance that the emission reductions for *Small Scale Solar Power Plants for Schools in Island States* (project name) ✓ 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
(If overall verification opinion is negative, please check below and state its reasons.) ☐ Qualified Opinion ☐ Adverse opinion ☐ Disclaimer	<State the reasons> Not applicable

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	☒

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.	☒
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.	☒
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.	☒
Avoidance of double registration	The TPE determines whether the project is not registered under other international climate mitigation mechanisms.	☒
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.	☒

Authorised signatory:	Mr. ☒	Ms. ☐
Last name: Chiba	First name: Michiaki	
Title: Climate Change Manager - Asia & Pacific		
Specimen signa [redacted]		Date: 02/03/2022

B. Verification team and other experts

	Name	Company	Function*	Scheme competence*	Technical competence*	On-site visit
Mr. ☒ Ms. ☐	Michiaki Chiba	LRQA Ltd.	Team leader	☒	Technical competence authorised	☐
Mr. ☒ Ms. ☐	Ketan S. Deshmukh	LRQA Ltd.	Team member	☐	N/A	☐
Mr. ☒ Ms. ☐	Cholid Bafagih	LRQA Indonesia	Team member	☒	N/A	☐
Mr. ☒ Ms. ☐	Xianxin Yan	LRQA China	Internal reviewer	☒	N/A	☐

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 during 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 a remote assessment including interviews 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 a remote assessment including interviews.
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 a remote assessment including interviews.
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 a remote assessment including interviews.

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 remote assessment including interviews.
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 Madalaii 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 remote assessment including interviews 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 a remote assessment including interviews, 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 EGi,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, CAR 1, CAR 2 and CAR 3 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: CAR 1
Nature of the issue raised: The quantity of electricity generated in the project was not recorded for the below months.
Site B - Palau Mission Academy (PMA):
- March, April, May, June and July of year 2019
Nature of responses provided by the PPs: The PPs provided supporting data for electricity generation and analysis of electricity generation data and the generation efficiency to confirm consistency of the monitored data during the period for both Site A and Site B for the relevant months in year 2019 in absence of back up data of the inverters for the Site B (PMA) due to data transmission error. The preventive measures were taken to CAR 3 below by reviewing and improving of the monitoring procedures.
Assessment of the responses: The verification team reviewed the supporting data and analysis for the monitored data. Although the monthly monitored data was missed for some months of year 2019, the emission reductions achieved during the period could be confirmed based on the aggregated electricity generation data and the supporting data for electricity generation, analysis of electricity generation data and the generation efficiency. The verification team also confirmed that the preventive measures were taken by the PPs through the reviewing and

improving of the monitoring procedures in reply to the below CAR 3.
The CAR was closed.

Grade / Ref: CAR 2
Nature of the issue raised: The PPs were required to report the quantity of electricity generated in the project monitored in line with the monitoring plan of the registered PDD. The readings of electricity meter delayed including but not limited to the below months:
Site A (SDA): April 2018, October and December 2019, and July 2020
Site B (PMA): April 2018 and October 2019
Besides the above, the date of meter reading was not recorded for PMA for December 2019.
Nature of responses provided by the PPs: The PPs provided supporting data for electricity generation in the relevant months of years 2018, 2019 and 2020 for the Site A (SDA) based on the inverters. The PPs conducted analysis of electricity generation data and the generation efficiency to confirm consistency of the monitored data during the period for both Site A and Site B in absence of back up data of the inverters for the Site B (PMA) due to data transmission error.
The preventive measures were taken to CAR 3 below by reviewing and improving of the monitoring procedures.
Assessment of the responses: The verification team reviewed the supporting data and analysis for the monitored data. Although the monthly monitoring was delayed for some months during the monitoring period, the emission reductions achieved during the period could be confirmed based on the aggregated electricity generation data, the back up data from the inverters, and the analysis of electricity generation data and the generation efficiency to confirm consistency of the monitored data during the period. The verification team also confirmed that the preventive measures were taken by the PPs through the reviewing and improving of the monitoring procedures in reply to the below CAR 3.
The CAR was closed.

Grade / Ref: CAR 3
Nature of the issue raised: The PPs were required to demonstrate how that ensure implementation of the QA/QC procedures established in the monitoring manual in line with the monitoring plan of the registered PDD in particular the checking of monitored data, including use of data of the inverters and irradiance for it.
Nature of responses provided by the PPs: The PPs reviewed implementation and revised the monitoring procedures to ensure implementation of the monitoring activities in accordance with the monitoring plan of the registered PDD.
Assessment of the responses: The verification team reviewed the revised monitoring

procedures and confirmed measures taken by the PPs to ensure implementation of the monitoring activities in accordance with the monitoring plan of the registered PDD including prevention of omission or delay of monitoring, improvements of the QA/QC measures.
The CAR 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 parameters use 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 electricity meter of the Site B (PMA) was replaced by the new meter in the same model on 11/02/2020 since the display was not clear. The new meter passed the factory tests of the manufacturer on 08/07/2019. 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.
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 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 PPs are responsible for the preparation and fair presentation of the MR in accordance with the requirements of JCM rules and the verifier is responsible for expressing an opinion on the MR based on the 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 is 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 2017, 2018, 2019 and 2020) are calculated as: $ERp = REp - PEp = REs = \Sigma_i EG_{i,p} \times EF_{RE}$

From 01/08/2017 to 31/12/2017

(28.56 + 51.82) x 0.533 tCO2/MWh = 80.38 x 0.533 = 42.8 tCO2e.

From 01/01/2018 to 31/12/2018

(72.69 + 131.17) x 0.533 tCO2/MWh = 203.86 x 0.533 = 108.7 tCO2e.

From 01/01/2019 to 31/12/2019

(70.48 + 115.19) x 0.533 tCO2/MWh = 185.67 x 0.533 = 98.96 tCO2e.

From 01/01/2020 to 31/12/2020

(64.14 + 111.34) x 0.533 tCO2/MWh = 175.48 x 0.533 = 93.5 tCO2e.

Achieved electricity generation in the second monitoring period of 41 months (1,248 days) is 645.39 MWh in total, that is 188.76 MWh (645.39 MWh x 365/1,248) in a year and 10% lower level than ex-ante estimate in PDD of 209.36 MWh.

The verification team assessed the reported data with documented evidence and by means of remote assessment including interviews.

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

Parameters	Monitored	Method to check values in the monitoring report with

	values	sources
EGi,p (2017)	80.38 MWh/p	Assessement was conducted based on records of monthly meter readings and a remote assessment including interviews.
EGi,p (2018)	203.86 MWh/p	Assessement was conducted based on records of monthly meter readings and a remote assessment including interviews.
EGi,p (2019)	185.67 MWh/p	Assessement was conducted based on records of monthly meter readings and a remote assessment including interviews.
EGi,p (2020)	175.48 MWh/p	Assessement was conducted based on records of monthly meter readings and a remote assessment including interviews.

<Findings>

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

Please refer to the findings CAR1, CAR 2 and CAR 3 and the resolutions in the above Section C.2.

<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 proposed JCM project in terms of the name of entities, applied technology, scale and the location. The result of researches confirmed that the proposed 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 remote assessment including interviews 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 previous verification of the project.

E. Verified amount of emission reductions achieved

Year	Verified Reference Emissions (tCO_2e)	Verified Project Emissions (tCO_2e)	Verified Emission Reductions (tCO_2e)
2014			
2015			
2016			
2017	42	0	42
2018	108	0	108
2019	98	0	98
2020	93	0	93
2021			
2022			
2023			
2024			
2025			
2026			
2027			
2028			
2029			
2030			
Total (tCO_2e)			341

F. List of interviewees and documents received

F.1. List of interviewees

Palau Adventist Schools

Mr. Abner Sanchez, Principal

Mr. Nelson Sisor, Vice-Principal

Mr. Marlon M. Thomas, Maintenance

Pacific Consultants Co., Ltd. (PCKK)

Mr. Shigezane Kidoura, Consultant

F.2. List of documents received

Category A documents (documents prepared by the PP)

- Monitoring report dated 09/11/2021 and 12/01/2022
- SDA electricity meter reading logbook
- MPA electricity meter reading logbook
- Electricity bills
- 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
- Factory test report of new electricity meter (PMA) dated 08/07/2019
- Introductory information of Palau Adventist Schools
- Certificate No. PV03-53202-1077, Japan Electrical Safety & Environment Technology Laboratories, dated 02/04/2015
- Revised MoC dated 20/10/2021
- Monitoring manual Ver.2.1, Pacific Consultants Co., Ltd.
- 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 and the revision dated 09/11/2016
- Validation report for the project dated 25/03/2016
- Verification report for the previous monitoring period
- 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_ver04.0
- 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 and JCM_PW_GL_PDD_MR_ver02.1
- JCM Glossary of Terms JCM_PW_Glossary_ver01.0
- Proposed and registered projects under CDM, VCS, Gold Standard, and the other international schemes
- Sunny Portal
- Temperature data of Palau
- World Health Organization COVID-19 Palau Situation
- ISO 14064-2:2019 - Specification with guidance at the project level for quantification,

monitoring and reporting of greenhouse gas emission reductions or removal enhancements - ISO 14064-3:2019 – Specification with guidance for the verification and validation of greenhouse gas statements

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 second monitoring period: 01/08/2017 – 31/12/2020

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
Ketan S. Deshmukh	Team Member
Cholid Bafagih	Team Member
Xianxin Yan	Technical Reviewer

Signed by

Michiaki Chiba
Climate Change Manager – Asia & Pacific
16/11/2021