

JCM Verification Report Form

A. Summary of verification

A.1. General Information

Title of the project	Introduction of 0.4MW Rooftop Solar Power System in Supermarket and Hotel
Reference number	PW 004
Monitoring period	30/06/2020 - 31/12/2020 (First monitoring period)
Date of completion of the monitoring report	06/12/2022
Third-party entity (TPE)	Japan Quality Assurance Organization (JQA) (TPE-PW-003)
Project participant contracting the TPE	Sharp Energy Solutions Corporation
Date of completion of this report	14/12/2022

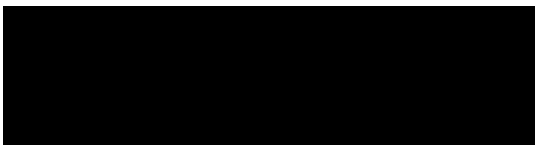
A.2 Conclusion of verification and level of assurance

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, JQA provides reasonable assurance that the emission reductions for Introduction of 0.4MW Rooftop Solar Power System in Supermarket and Hotel</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	<State the reasons>

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: Last name: Asada Title: Senior Executive Specimen signature: 	Mr. <input checked="" type="checkbox"/> Ms. <input type="checkbox"/> First name: Sumio Date: 14/12/2022
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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"/>	Tadashi Yoshida	External Individual	Team leader	<input checked="" type="checkbox"/>	Authorized	<input type="checkbox"/>
Mr. <input type="checkbox"/> Ms. <input checked="" type="checkbox"/>	Sachiko Hashizume	JQA	Internal reviewer	<input checked="" type="checkbox"/>	Authorized	<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>

The project was registered as a JCM project on 11/07/2021, which applied JCM approved methodology PW_AM001_ver01.0 "Displacement of Grid and Captive Genset Electricity by a Small-scale Solar PV System" under the scheme of Joint Crediting Mechanism between Republic of Palau and Japan.

The project participants (PPs) are Western Caroline Trading Company (WCTC) from Republic of Palau and Sharp Energy Solutions Corporation from Japan.

The purpose of the project is to reduce CO₂ emissions from the consumption of the grid and captive electricity mostly derived from diesel by introducing a total of 427.17 kW grid-connected solar photovoltaic (PV) systems at two project sites, namely 361.63 kW at the supermarket building of Western Caroline Trading Company (Site A) and 65.54 kW at West Plaza Hotel at Lebuu Street (Site B). The power generated by the solar PV system is basically self-consumed at the project sites. In case the surplus power is generated, it is exported to the grid, therefore the electricity imported from the grid is offset. Thus, the lower consumption of the electricity from the grid and captive genset has been achieved by the registered project. A remote monitoring system to measure the electricity generated by the solar PV system is also installed.

The JCM website and Validation Report indicate that the starting date of the project operation is 30/06/2020 and its expected operational lifetime is 10 years. The first monitoring

period is between 30/06/2020 and 31/12/20.

The verification team has assessed through the review of the sufficient documents and e-mail interview with the PPs that 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 during the first monitoring period.

Due to the COVID-19 pandemic, the verification team did not conduct an on-site visit for the first verification in accordance with the JC decision dated 20/05/2022. As the alternative means used for justification, the verification team has reviewed the following credible and sufficient evidence:

- Information on the project equipment and technology,
- Photos of the project equipment taken during the first monitoring period,
- Information of project operation and monitoring, and

The assessment results regarding the eligibility criteria are summarized as below:

Criterion 1

The project installs solar PV system(s).

Through the review of Commissioning Report for both project sites, issued by Island Engineering and Design, and Validation Report, the project information of Criterion 1 in the revised PDD is confirmed as follows:

- A solar PV system consisting of solar PV modules and inverters is installed at two project sites of the supermarket building and the hotel.
- The capacity of monocrystalline silicon PV modules (Model: Sharp NU-AD290) installed is 361.63 kW (1,247 modules) for the supermarket (Site A) and 65.54 kW (226 modules) for the hotel (Site B).
- The inverters (Model: SMA Sunny tripower 30000TL-US) are installed at both project sites.

Hence, it is concluded that the project meets the Criterion 1 with a satisfactory result.

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.

Through the review of Single line diagram of the solar system at both project sites, Approval Letters dated 19/07/2019 where Palau Public Utilities Corporation (PPUC) agrees to connect renewable energy system to its Power Distribution System, and Validation Report, the project

information of Criterion 2 in the revised PDD is confirmed as follows:

- The solar PV system of each project site (Supermarket and hotel) is connected through the internal power grid of the project site to the grid.

Hence, it is concluded that the project meets the Criterion 2 with a satisfactory result.

Criterion 3

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

Through the review of the certificates issued by VDE Testing and Certification Institute on 28/03/2017 and Validation Report, the project information of Criterion 3 in the revised PDD is confirmed as follows:

- The solar PV modules (Sharp NU-AD290) installed at the project sites have obtained a certification of design qualification (IEC 61215) and safety qualification ((IEC 61730-1 and IEC 61730-2).

Hence, it is concluded that the project meets the Criterion 3 with a satisfactory result.

Criterion 4

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

Through the review of Commissioning Report, Single line diagram, Specification of the electricity meter and pyranometer installed at both project sites and Validation Report, the project information of Criterion 4 in the revised PDD is confirmed as follows:

- A pyranometer (Model: RainWise Inc. PVmet-200) and electricity meter (Model: Accuenergy, Acuvim IIR Class 0.2S) are installed at both project sites to measure irradiance and power output of the solar PV system, respectively.

Hence, it is concluded that the project meets the Criterion 4 with a satisfactory result.

<Findings>

No issues are raised to the requirements.

<Conclusion based on reporting requirements>

The verification team concludes that the project implementation and operation complied with all eligibility criteria of the applied methodology PW_AM001 during the first monitoring

period.

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

<Means of verification>

The verification team has assessed the project implementation against the registered PDD through the review of relevant documents and the interview with the PPs. The project is implemented by Western Caroline Trading Company (Republic of Palau) and Sharp Energy Solutions Corporation (Japan).

The assessment results are summarized as follows;

[Physical features of the project]

It is confirmed through the review of relevant documents and the interview with the PPs that a total of 427.17 kW grid-connected solar PV system was installed at the supermarket building (361.63 kW) and the hotel (65.54 kW) to reduce CO₂ emissions from the grid and captive electricity mostly derived from diesel.

Through the verification, post-registration changes on the output capacities of the solar power system installed at the project sites were identified. Hence, CAR 01 was raised in “Findings”.

The starting date of the project operation was set to be 30/06/2020 as indicated in the registered PDD, but the commissioning test of the solar PV system installed at the hotel (Site B) was delayed until 22/08/2020 due to the redesign of the PV modules layout. The commissioning test at the supermarket (Site A) was also delayed until 13/01/2021 due to the redesign and reinforcement of its roof to install the PV modules. The equipment of the solar PV system at both project sites complies with the description of the revised PDD. It is therefore confirmed that the physical features of the project in the revised PDD are in place and the project has been partly operated in accordance with the revised PDD during the first monitoring period.

[Monitoring points]

One monitoring parameter, *i.e.*, quantity of the electricity generated by the solar PV system ($\sum EG_{i,p}$), is measured by the electricity meter, in accordance with the monitoring plan.

1. $\sum EG_{i,p}$: The total quantity of the electricity generated in the project during the period p [MWh/p]

The electricity meter is installed at the AC output of the inverter for each project site. The electricity generated by the solar PV system is continuously monitored by electricity meter and the data are read and recorded manually at the end of each month. Thus, it is confirmed through the review of relevant documents and the interview with the PPs that the monitoring point to measure the electricity generated by the solar PV system are in place, in line with the revised PDD.

[Monitoring structure]

The monitoring structure is established and the roles and responsibilities of the personnel are consistent with the description in Monitoring Structure Sheet. It is confirmed through the review of relevant documents that the monitoring activity has been implemented during the first monitoring period, in line with the monitoring plan of the revised PDD and Monitoring Manual.

<Findings>

< CAR 01 >

The output capacity of solar PV system at each project site in A.2 of the registered PDD is not consistent with the supporting document. The PPs are requested to provide the correct output capacity of each project site. These changes do not prevent the use of the applied methodology.

< Comments from the PPs >

The output capacity of solar PV system in A.2 of the registered PDD is revised to be a total of 427.17 kW, which consists of 361.63 kW for the supermarket and 65.54 kW for the hotel.

< Assessment by the TPE >

It is confirmed through the review of the revised PDD, supporting document such as Main Equipment List of the project and the interview with the PPs that there were minor changes in the numbers of the solar PV modules installed at the supermarket and the hotel after the project designing. The minor changes do not prevent the use of the applied methodology PW_AM001. Thus, CAR 01 is closed.

<Conclusion based on reporting requirements>

Through the verification, it is identified that there were minor changes in the output capacity of the solar PV system installed at the supermarket and the hotel. In addition, it is confirmed that the operation of the solar power system at the supermarket site was delayed until 13/01/2021 due to the redesign and reinforcement of its roof to install the PV modules. The change and the delay do not prevent the use of the applied methodology PW_AM001.

Therefore, the verification team concludes that the project has been implemented and operated in accordance with the revised PDD and monitoring plan during the first monitoring period.

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

<Means of verification>

The quantity of electricity generated by the solar PV system is measured by the electricity meter installed at the project sites of supermarket and the hotel. Two meters were tested by Accuenergy Technology Co., Ltd. at the time of shipment from the factory on 27/06/2019 and 09/07/2019, separately, and passed. Accuenergy (Canada) Inc. declares in a written confirmation dated 22/05/2013 that all Acuvim II series meters will maintain their accuracy without recalibration in 10 years after factory calibration. Hence, the measured values during the first monitoring period are applied in the calculation of emission reductions without correction.

<Findings>

No issues are raised to the requirements.

<Conclusion based on reporting requirements>

The verification team concludes that the calibration frequency of the electricity meter is 10 years as per the manufacturer's recommendation and the result of Factory Test Report at the time of shipment is still valid during the first monitoring period. Hence, no correction of the measured data during the first monitoring period is required.

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

<Means of verification>

The verification team has assessed the data and calculation of GHG emission reductions achieved by the project activity as follows:

(a) A confirmation that appropriate Monitoring Report Sheet of the applied methodology has been used;

Through the review of the monitoring report sheets which are titled as JCM_PW004_MP_20200630-20201231.xlsx, it is confirmed that the Monitoring Report Sheets (MRS(input), MRS(input_separate) and MRS(calc_process)) of applied methodology PW_AM001 are appropriately used.

(b) A confirmation that a set of data for the specified monitoring period was complete, or a list of actions taken by the TPE in line with the guidance from the Joint Committee when partial data are unavailable;

Monitoring Report Sheets (MRS) submitted by the PPs provides the quantity of electricity generated by the solar PV system only at the hotel during the first monitoring period. The operation start of the solar PV system at the supermarket has been delayed due to the redesign and reinforcement of its roof to install the PV modules. It is confirmed through the review of the monitored data that the electricity generation data at the hotel are fully provided for the first monitoring period of 30/06/2020 – 31/12/2020.

(c) A description of how the TPE checked reported data;

The verification team has reviewed the correctness of monitored data for the hotel given in the MRS for 2020, as shown in Table 1. It is confirmed through the check of the monitored data in the MRS (input_separate) that the value of electricity generated by the solar PV system is fully consistent with the sum of Monthly Power Meter Data. Reference emissions, project emissions and emission reductions in the MRS (input_separate) are also correctly calculated.

Table 1 Monitored values of electricity generated by the solar PV system during the first monitoring period of 30/06/2020 – 31/12/2020

Parameters	Monitored values (MWh/p)	Method to check values in the monitoring report with sources
$\Sigma E_{Gi,p}$	(2020) 32.12	Total quantity of electricity generated by the solar power system in the MRS is checked with its Monthly Power Meter Data which aggregates the daily data downloaded from the server.

(d) An opinion as to whether assumptions, emission factors, default values, and other reference values that were applied in the calculations have been justified;

Through the review of the MRS, it is confirmed that the assumptions used in the calculation of emission reductions have been justified. Furthermore, it is confirmed that the default CO₂ emission factor of grid and captive electricity (EF_{RE}) stipulated by the methodology PW_AM001 is correctly applied in the calculation of emission reductions.

Regarding the correctness of the monitored value in the MRS (input), the verification team raised CAR 02, and the issue was resolved as explained in “Findings”.

<Findings>**<CAR 02>**

The monitored value for the first monitoring period in the MRS is calculated from the data collected during the period of 30/06/2020-04/01/2021. The PPs are requested to recalculate the quantity of electricity generated during the first monitoring period of 30/06/2020-31/12/2020.

< Comments from the PPs >

The quantity of electricity generated during the first monitoring period of 30/06/2020-31/12/2020 was recalculated based on the figures of Monthly Power Meter Data with their photos which are adjusted by the daily power generation data downloaded from the data logger.

< Assessment by the TPE >

It is confirmed through the review of the revised MRS and the revised Monthly Power Meter Data that the monitored value during the first monitoring period of 30/06/2020-31/12/2020 is correctly calculated. Thus, CAR 02 is closed.

<Conclusion based on reporting requirements>

The verification team concludes that the monitored data and the default value are correctly applied in the calculation of emission reductions achieved during the first monitoring period, in accordance with the applied methodology PW_AM001 and the monitoring plan of the revised PDD.

C.5. Assessment of avoidance of double registration

<Means of verification>

The verification team received a written confirmation dated 08/11/2022 from the PPs which is signed by the primary authorized signatory of Sharp Energy Solutions Corporation. It declares that the registered JCM project is not registered under any international climate mitigation mechanisms other than JCM. Therefore, the project will not result in double counting of GHG emission reductions.

It is confirmed through the review of the written confirmation, the check of the relevant website and the interview with the PPs that the JCM project is not registered under any international climate mitigation mechanisms other than JCM.

<Findings>

No issues are raised to the requirements.

<Conclusion based on reporting requirements>

The verification team concludes that the project is not registered under other international climate mitigation mechanisms.

C.6. Post registration changes

<Means of verification>

Through the verification, the following post-registration changes are identified.

The output capacities of the solar power system installed at the supermarket and the hotel were changed from 351.48 kW and 75.98 kW provided in the registered PDD to 361.63 kW and 65.54 kW, respectively, due to the redesign of the PV modules layout at the hotel and the redesign and reinforcement of its roof to install the PV modules at the supermarket. Therefore, a total capacity of the solar PV system for the registered project was also changed a little bit from 427.48 kW to 427.17 kW.

It is confirmed through the review of relevant documents and the interview with the PPs that the post-registration changes from the registered PDD do not prevent the use of the applied methodology.

<Findings>

Please refer to CAR 01 and its resolution as detailed in Section C.2 on the change of output capacities of solar power systems installed at two project sites.

<Conclusion based on reporting requirements>

The verification team concludes that there were no post-registration changes from the registered PDD which prevent the use of the applied methodology PW_AM001. The revised PDD has been submitted with the first issuance request.

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)	Verified Project Emissions (tCO ₂ e)	Verified Emission Reductions (tCO ₂ e)
2014				
2015				
2016				
2017				
2018				
2019				
2020		17.1	0	17
2021				
2022				
2023				
2024				
2025				
2026				
2027				
2028				
2029				
2030				
Total (tCO ₂ e)				17

F. List of interviewees and documents received

F.1. List of interviewees

- Mr. Ikuo Takafuji	Supervisor, Overseas Business Dev. Div. II, Sharp Energy Solutions Corporation (SESJ)
- Mr. Clement K. Gbewonyo	Manager, Maintenance Dept, Western Caroline Trading Co. (WCTC)

F.2. List of documents received

- 1_ Monitoring Report Sheet, JCM_PW004_MP_20200630-20201231.xlsx for the first monitoring period
- 2_ Revised Monitoring Report Sheet, JCM_PW004_MP_20200630-20201231rev2.xlsx

for the first monitoring period

- 3-1_Daily and monthly monitoring data of the solar power system at the hotel during the first monitoring period
- 3-2_Photos of monthly meter reading data of the solar power system at the hotel during the first monitoring period
- 4-1_Registered PDD (PW004) _ver04.0, registered on 11/07/2021
- 4-2_Revised registered PDD, submitted with the first issuance request
- 4-3_Registered monitoring plan (PW004), registered on 11/07/2021
- 5_Validation Report (PW004), 19/03/2020, prepared by JMA
- 6_MoC Statement Form submitted for JC, dated 27/01/2020 and 24/01/2022
- 7_MoC Statement Form ANNEX 1 submitted for JC, submitted on 08/11/2022
- 8_Aproved Methodology JCM_PW_AM001_ver01.0, approved on 20/02/2015 (JC2, Annex 1)
- 9_Monitoring Spreadsheet JCM_PW_AM001_ver01.0.xlsx
- 10_JCM Glossary of Terms (JCM_PW_Glossary_ver01.0)
- 11_JCM Project Cycle Procedure (JCM_PW_PCP_ver04.0)
- 12_JCM Guidelines for Developing Project Design Document and Monitoring Report (JCM_PW_GL_PDD_MR_ver02.1)
- 13_JCM Guidelines for Validation and Verification (JCM_PW_GL_VV_ver01.0)
- 14_JCM Verification Report Form (JCM_PW_F_Vrf_Rep_ver02.1)
- 15_Layout drawing of solar power system installed at the supermarket and the hotel sites
- 16_Single line diagram of solar power system installed at the supermarket and the hotel sites
- 17_Project overall schedule chart showing the starting date of project operation
- 18_Grid connection approval issued by Renewable Energy Division, Palau Public Utilities Corporation (PPUC) on 19/07/2019
- 19-1_Commissioning report on WCTC West Plaza Hotel Solar PV Power Plant where warranty is in effect as of 22/08/2020
- 19-2_Commissioning report on WCTC Shopping Center Solar PV Power Plant where warranty is in effect as of 13/01/2021
- 20_List of main equipment for the solar PV power plant installed at the project sites
- 21_Specification of solar PV module (Sharp NU-AD290) installed at the project sites
- 22_Cetificates of design qualification (IEC 61215) and safety qualification (IEC 61730-1 and 61730-2) of NU-AD290, issued by VDE Testing and Certification Institute on 28/03/2017
- 23_Photos of solar PV modules (Sharp NU-AD290) installed at the project sites
- 24_Specification of inverter (SMA Sunny Tripower 30000TL-US) installed at the project sites

- 25_ Photos of inverter (SMA Sunny Tripower 30000TL-US) installed at the project sites
- 26_ Specification of pyranometer (RainWise Inc. PVmet-200) installed at the project sites
- 27_ Photos of pyranometer (RainWise Inc. PVmet-200) installed at the project sites
- 28_ Specification of electricity meter (ACCUENERGY Acuvim IIR) installed at the project sites
- 29_ Photos of electricity meter (ACCUENERGY Acuvim IIR) installed at the project sites
- 30_ Factory Test Reports of electricity meter (Test date: 27/06/2019 and 09/07/2019) issued by Accuenergy Technology Co., Ltd.
- 31_ Manufacturer's recommendation on the calibration frequency of electricity meter, issued by Accuenergy (Canada) Inc. on 22/05/2013
- 32_ JCM Monitoring Procedure for monitoring activity, prepared by SESJ and WCTC on 29/11/2022
- 33_ Monitoring structure of the JCM project implemented by SESJ and WCTC
- 34_ Declaration of avoidance of double registration
- 35_ JCM Proposed Methodology – Displacement of Grid and Captive Genset Electricity by a Small-scale Solar PV System Additional Information

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.

Statement of competence



Name: Dr. Tadashi Yoshida

Qualified and authorized by Japan Quality Assurance Organization.

Function	
	Date of qualification
Validator	2014/12/22
Verifier	2014/12/22
Team leader	2014/12/22

Technical area within sectoral scopes	
	Date of qualification
TA 1.1. Thermal energy generation	2014/12/22
TA 1.2. Renewables	2014/12/22
TA 3.1. Energy demand	2014/12/22
TA 4.1. Cement and lime production	2015/11/12
TA 5.1. Chemical industry	2014/12/22
TA 10.1. Fugitive emissions from oil and gas	2014/12/22
TA 13.1. Solid waste and wastewater	2014/12/22
TA 14.1. Afforestation and reforestation	-

Statement of competence



Name: Ms. Sachiko Hashizume

Qualified and authorized by Japan Quality Assurance Organization.

Function	
	Date of qualification
Validator	2015/11/20
Verifier	2015/11/20
Team leader	2018/6/22

Technical area within sectoral scopes	
	Date of qualification
TA 1.1. Thermal energy generation	2015/11/20
TA 1.2. Renewables	2015/11/20
TA 3.1. Energy demand	2015/11/20
TA 4.1. Cement and lime production	-
TA 5.1. Chemical industry	-
TA 10.1. Fugitive emissions from oil and gas	-
TA 13.1. Solid waste and wastewater	2015/11/20
TA 14.1. Afforestation and reforestation	-