

JCM Verification Report Form

A. Summary of verification

A.1. General Information

Title of the project	Introduction of 5MW Floating Solar Power System on Industrial Water Reservoir in Thailand
Reference number	TH014
Monitoring period	01/01/2021-31/12/2021
Date of completion of the monitoring report	12/12/2022
Third-party entity (TPE)	Bureau Veritas India Pvt. Ltd.
Project participant contracting the TPE	TSB Co., Ltd.
Date of completion of this report	10/03/2023

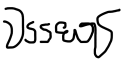
A.2 Conclusion of verification and level of assurance

Overall verification opinion	☒ Positive ☐ Negative
☐ Unqualified opinion	Based on the process and procedure conducted, <i>Bureau Veritas India Pvt. Ltd.</i> (TPE's name) provides reasonable assurance that the emission reductions for <i>Introduction of 5MW Floating Solar Power System on Industrial Water Reservoir in Thailand</i> (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
<i>(If overall verification opinion is negative, please check below and state its reasons.)</i> ☐ Qualified Opinion ☐ Adverse opinion ☐ 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	☒

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: Chanyawut	First name: Engsuwan
Title: Lead Verifier	
Specimen signature: 	Date: 10/03/2023

B. Verification team and other experts

	Name	Company	Function*	Scheme competence*	Technical competence*	On-site visit
Mr. ☒ Ms. ☐	Chanyawut Engsuwan	Bureau Veritas India Pvt. Ltd.	Team Leader	☒	Authorised	☒
Mr. ☒ Ms. ☐	Tadpong Ratanasophonchai	Bureau Veritas India Pvt. Ltd.	Team Member	☒	Authorised	☐
Mr. ☒ Ms. ☐	Dr Chumpol Sriprapakorn	Bureau Veritas India Pvt. Ltd.	Internal Reviewer	☒	Authorised	☐
Mr. ☐ Ms. ☐				☐		☐

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>

C.1

The TPE has reviewed the compliance of project implementation and operation with the applied methodology "JCM_TH_AM001" version 1. The project applicability was checked against all the eligibility criteria of the applied methodology. The comparison between project information versus the description of each eligibility criteria along with assessment & conclusion, can be summarized as follows;

Criterion 1

“The project installs solar PV system(s).”

Assessment & conclusion

The TPE has assessed the Monitoring Sheet along with the supporting document through the

desk review and site visit at project site, located at industrial reservoir pond of Kabinburi industrial zone, on 18/01/2023 to verify the requirements about accuracy and completeness of the project description to the criteria as per the applied methodology.

The TPE conducted assessment to confirm physical of the Solar PV system which are type and capacity of equipment by investigate equipment's nameplate and equipment specification document, along with operational of those equipment by investigate system monitor at control room of solar PV plant and operational records.

During site visit, the TPE could investigated installation and operation of the following equipment:

Solar PV panel - Brand "ECONESS ENERGY" Model "EN156P-72" Capacity 320 W per unit, totally 16,000 units

Inverter - Brand "Schneider Electric" Model "Conext CL-60E" Capacity 60 kW per unit, totally 75 units

Energy Meter - Brand "EDMI Genius" Model "MK6E" Sr. No. 251341832

Pyranometer - Brand "EKO" Model "MS-40C" Sr. No. S20064261

The TPE found above equipment are installed at the project site and could function properly. Therefore, the TPE could confirm that the proposed project still maintain solar PV system installation as per Criterion 1.

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."

Assessment & conclusion

The TPE conducted site visit at project location which are Solar PV system located at industrial reservoir pond of Kabinburi Industrial Zone and Fujikura Electronics Thailand Co., Ltd.'s industrial plant located at Kabinburi Industrial Zone, who is an electricity user of the project.

The TPE could investigated an electricity transition system from the Solar PV system located at industrial reservoir pond of Kabinburi Industrial Zone connected to Fujikura Electronics Thailand Co., Ltd.'s industrial plant via internal grid of Kabinburi Industrial Zone. The monthly invoices of TBS Co., Ltd. (during February 2020 to December 2021) to charge electricity cost Fujikura Electronics Thailand Co., Ltd were reviewed by the TPE to confirm electricity supply to the project site.

Therefore, the TPE could confirm that the solar PV system of the proposed project are connected to the internal power grids of the project sites (factory) for displacing grid electricity at the project sites as per Criterion 2.

Criterion 3

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

Assessment & conclusion

During site visit, the TPE could investigated installation and operation of the Solar PV panel - Brand “ECONESS ENERGY” Model “EN156P-72” which obtained the design qualifications (IEC 61215) and safety qualification (IEC 61730-1 and IEC 61730-2), according to TUV NORD CERT GmbH dated 24/05/2019 and valid until 06/11/2023.

Therefore, the TPE could confirm that the PV module of the proposed project obtained a certification of design qualifications (IEC 61215, IEC 61646 or IEC 62108) and safety qualification (IEC 61730-1 and IEC 61730-2) as per Criterion 3.

Criterion 4

“The equipment used to monitor output power of the solar PV system(s) and irradiance is installed at the project site.”

Assessment & conclusion

During site visit, the TPE could investigated installation and operation of Energy Meter Brand “EDMI Genius” Model “MK6E” Sr. No. 251341832 and Pyranometer - Brand “EKO” Model “MS-40C” Sr. No. S20064261 at the site. The TPE found above equipment are installed at the project site and could function properly. The record of electricity production and irradiance data at site during monitoring period (February 2020 to December 2021) stored in monitoring program “TSB- Solar Monitoring System” were reviewed by the TPE.

Therefore, the TPE could confirm that the proposed project maintain the equipment used to monitor output power of the solar PV system(s) and irradiance is installed at the project site as per Criterion 4.

<Findings>

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

<CL02>

Reference to the Monitoring Reports, The PPs are requested to provide a supporting evidence of the following;

- Evidence of electricity sale to customer during 2020-2021
- Record of solar irradiance data during 2020-2021
- Evidence of main equipment replacement (PV panel, inverter, transformer, energy meter etc.), if any

#1 Response under <CL2>

<Comments from PPs>

The PPs has shown following record & evidence during onsite verification;

- Monthly invoice to Fugikura Company (indicate amount of electricity sale to client) during 2020-2021
- Solar Irradiance record on PC
- Document “Panel and Inverter Change Record” of 2020-2021

<Assessment from the TPE>

The TPE considered the submitted evidences and found the following;

- Record of solar radiance during monitoring period which in line with eligibility criteria of the referred methodology.
- Record of main equipment replacement which could confirm the newly installed Panels are the same brand and model as per the registered PDD.

Anyway, the TPE found amount of electricity sale during February 2020 at monthly invoice to Fugikura Electronics Thailand Co., Ltd. is not consistence with the amount used in the Monitoring Sheet. Therefore, CL#2 still open.

#2 Response under <CL02>

<Comments from PPs>

The PP submitted the revised electricity production sheet and revised Monitoring Sheet.

<Assessment from the TPE>

The TPE reviewed the revised electricity production sheet and revised Monitoring Sheet, file name “1-1_Monthly electricity production_v2.xlsx” and “JCM_TSB_TH014_MRS_2020_v2.xlsx” accordingly. The TPE found that the value used for calculation is in accordance with the supporting evidence. Therefore, the CL#2 is closed.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The TPE confirm that the project has been implement and operated in accordance with the eligibility of the applied methodology.

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

<Means of verification>

As per the registered PDD, The purpose of the proposed JCM project is to reduce CO2 emission by install the Solar PV system to produce clean electricity to neary factory, in order to displace grid electricity which mostly derived from fossil-fuel based thermal power plants.

The proposed JCM project involves installation of 5MW Floating solar farm equipment utilizing industrial Reservoir pond inside of Kabinburi Industrial Zone. The electricity produced by the project is supplied to a Factory in Kabinburi Industrial Zone to displace grid electricity.

The TPE assessed the project implementation by document review which is electricity supply record and site visit to at project location, industrial reservoir pond of Kabinburi industrial zone, on 18/01/2023 to verify the requirements about accuracy and completeness of the project description to the registered PDD.

During site visit, the TPE could investigated installation and operation of the main equipment which are solar PV Panel, inverter and energy meter (detail are as per Section C.1). The monthly invoices of TBS Co., Ltd. (during February 2020 to December 2021) to charge electricity cost Fujikura Electronics Thailand Co., Ltd. were reviewed by the TPE to confirm electricity supply to the project site.

The PV Panel Change Record, Inverter Change Record and Transformer Change Record, issued by TSB Co., Ltd. were reviewed by the TPE, in order to confirm any change to the propose project. The TPE found PV panel change due to panel broke by damage on 23/08/2021 and 08/08/2021, but the same type of PV panel with the same panel capacity were installed to replace the broken panels.

Therefore, the TPE could confirm that the proposed project still maintain system installation and continue to operate the system during monitoring period (February 2020 to December 2021) in accordance with the registered PDD.

<Findings>

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

No issue was raised to the requirement.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The TPE confirm that the project has been implement and operated in accordance with the registered PDD and no revision was requested during this monitoring period.

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

<Means of verification>

The monitoring parameter "Total quantity of the electricity generated in the project during the period p" (EGi,p) is monitored by reading the energy meter which is installed at Fujikura Electronics Thailand Co., Ltd.. The monitoring frequency is every month. And then an electricity charge to Fujikura Electronics Thailand Co., Ltd. will be invoiced based on these amount of electricity supply on monthly basis.

As per the registered Monitoring Plan Sheet, energy meter shall be calibrated or replaced in accordance with the Provincial Electricity Authority of Thailand (PEA). Therefore, the energy meter calibration was done by PEA on 20/06/2019 and 9/11/2022. The calibration certificates were reviewed by the TPE and found result of meters calibration are accepted within an accuracy range.

<Findings>

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

<CL01>

Reference to the Monitoring Reports, the project participant (PPs) are requested to provide specification, accuracy class, calibration or verification record of the electricity meters in order to confirm that accuracy level of the meter are in line with value specified in Monitoring Plan.

<Comments from PPs>

The PPs submitted 2 calibration certificates, done on 20/06/2019 and 09/11/2022 respectively.

<Assessment from the TPE>

The TPE considered the calibration certificates and found the accuracy class, calibration record and the test result are accepted by PEA which is line with the Monitoring plan. Therefore verifier accept the submit evidence with no further question and CL01#1 is closed.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The TPE confirm that the monitoring system applied to the monitoring parameter is accurate and complete as per the registered Monitoring Plan and no correction is required to the measured values during the monitoring period.

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

<Means of verification>

The TPE could confirm by reviewed the Monitoring Spreadsheet of monitoring period during 1 February 2020 to 31 December 2021, file name "JCM_TSB_TH014_MRS_2020_v2.xlsx" "JCM_TSB_TH014_MRS_2021.xlsx" that the Monitoring Report is developed using the

registered Monitoring Plan Sheet, accurate and complete as per the applied methodology. Regarding the monitoring data, the PPs applied Monitoring Option C which is "based on the actual measurement using measuring equipment (data used: measured values)". Then TPE crosschecked the monitoring data with the electricity production record provided by the PPs, file name "1-1 Monthly electricity production.xlsx" "1-2 Monitoring records 2020.pdf" and "1-3 Monitoring records 2021.pdf" and also crosschecked with the monthly invoices of TBS Co., Ltd. (during February 2020 to December 2021) to charge electricity cost Fujikura Electronics Thailand Co., Ltd. and found that the monitoring data is accurate, compare to the electricity production record and TSB's invoice.

Regarding the baseline emission calculation, project emission calculation and emission reduction calculation shown in the Monitoring Report are in accordance within the registered Monitoring Plan Sheet and in accordance with the applied methodology. Which are;

Reference Emission (REp);

$$REp = E_{Gi,p} \times E_{Fre}$$

Project Emission (PEp);

$$PEp = 0$$

Emission Reduction (ERp);

$$ERp = REp - PEp$$

While the default which is Reference CO2 emission factor of grid and/or captive electricity (EFre) = 0.319 tCO2/MWh is correctly applied as per the registered Monitoring Plan Sheet.

Parameters	Monitored values	Method to check values in the monitoring report with sources
E _{Gi,p}	6,325.51 MWh/year	The TPE crosschecked the value in monitoring report with electricity production record done by the PP and the electricity invoice to Fujikura Electronics Thailand Co., Ltd.

<Findings>

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

No issue was raised to the requirement.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The TPE confirmed the appropriate Monitoring Report Sheet of the applied methodology has been used. The TPE confirmed monitoring data is complete and monitoring action is taken in line with the registered Monitoring Plan sheet. While assumption, emission factor, formula and default values have been justified and these are in accordance with the applied methodology.

C.5. Assessment of avoidance of double registration

<Means of verification>

The PPs declared during verification that the proposed project is not registered under any other international climate mitigation mechanism other than the JCM. It is also confirmed by the TPE that it has checked publicly available sources of information which are CDM, Verra, T-VER websites that the proposed project is not registered under any other international climate mitigation mechanisms, in terms of the name of entity, applied technology, scale and location. Thus, it can be concluded that the proposed project will not result in double counting of GHG emission reductions.

<Findings>

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

No issue was raised to the requirement.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The TPE concludes that the proposed project is not registered under any other international climate mitigation mechanism. Therefore, the proposed project will not result in double counting of GHG emission reductions.

C.6. Post registration changes

<Means of verification>

The TPE assessed the project document & record review along with site visit (Detail are as per C.1 and C.2) and confirmed that there is no post registration change from the registered PDD or applied methodology.

<Findings>

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

No issue was raised to the requirement

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The TPE confirm through the overall verification that there is no post registration change from the registered PDD or 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 there is no previous veification 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)
2013				
2014				
2015				
2016				
2017				
2018				
2019				
2020				
2021		2,017	0	2,017
2022				
2023				
2024				
2025				
2026				
2027				
2028				
2029				
2030				
Total (tCO ₂ e)				2,017

F. List of interviewees and documents received

F.1. List of interviewees

1. Mr. Yoichi Kaburagi (General Manager, TSB Co., Ltd.)
2. Mr. Hisao Kakibuchi (Site Manager, TSB Co., Ltd.)
3. Mr. Somsak Sriouabu (Project Engineer, TSB Co., Ltd.)
4. Mr. Anucha Kongnak (Project Technician, TSB Co., Ltd.)
3. Mr. Yusuke Hamanaka (Consultant)

F.2. List of documents received

1. Monitoring Spreadsheet of monitoring period during 1 February 2020 to 31 December 2021, file name "JCM_TSB_TH014_MRS_2020_v2.xlsx" Version 2 and "JCM_TSB_TH014_MRS_2021.xlsx" Version 1
2. Electricity Production Record, file name "1-1 Monthly electricity production.xlsx" and 1-2 Monitoring records 2020.pdf and 1-3 Monitoring records 2021.pdf and 2020 FEB Selling Electricity.pdf
3. PV Panel Change Record, Inverter Change Record and Transformer Change Record, issued by TSB Co., Ltd.
4. Energy Meter Calibration Certificate issued by Provincial Electricity Authority
5. Electricity Charge Invoice to Fugikura Thailand, issued by TSB Co., Ltd.

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.

1) Role of each team member;

Chanyawut Engsuwan (Team Leader)

- Desk review
- Verification site visit
- Review all finding under verification process to provide verification opinion
- Prepare verification report

Tadpong Ratanasoponchai (Team Member)

- Desk review
- Review all finding under verification process to provide verification opinion

Dr Chumphol Sriprapakorn (Internal Reviewer)

- Conduct internal review to ensure quality of verification process (QC)

2) CV of team member;

Extraction of "SF41VERIFIER CODE ALLOCATION, CLIMATE CHANGE VERIFIERS"

NAME: Chanyawut Engsuwan

POSITION: Team Leader

EDUCATION: B. Eng. M. Eng

RELEVANT EXPERIENCE: 5 Years in GHG verification/validation

QUALIFICATION: CDM, ISO14064, ACA, IRCA ISO 9001, IRCA ISO14001, IRCA ISO45001, ISCC EU, ISCC Plus

TECHNICAL AREA:

Energy Industries

Mining and mineral production

Energy distribution

Metal production in dustry

Energy demand

Manufacturing industries

Waste handling and disposal

Construction

Agricultural

Transport

NAME: Tadpong Ratanasoponchai

POSITION: Team Member

EDUCATION: B. Eng. M. Sc.

RELEVANT EXPERIENCE: 4 Years in GHG verification/validation

QUALIFICATION: ISO14064, IRCA ISO 9001

TECHNICAL AREA:

Energy Industries

Energy demand

Manufacturing industries

Waste handling and disposal

Transport

NAME: Dr Chumpol Sriprapakorn

POSITION: Internal Reviewer

EDUCATION: B. Sc. M. Sc, Ph. D.

RELEVANT EXPERIENCE: 10 Years in GHG verification/validation

QUALIFICATION: CDM, ISO14064, ACA, IRCA ISO 9001, IRCA ISO14001

TECHNICAL AREA:

Energy Industries

Mining and mineral production

Metal production in dustry

Manufacturing industries

Waste handling and disposal