JCM Verification Report Form

A. Summary of verification

A.1. General Information

Title of the project	Introduction of Solar PV System at shopping mall in Ho Chi Minh
Reference number	VN007
Monitoring period	01/07/2016 – 31/10/2018
Date of completion of the monitoring report	05/09/2019
Third-party entity (TPE)	Lloyd's Register Quality Assurance Limited (LRQA)
Project participant contracting the TPE	AEON RETAIL CO., LTD.
Date of completion of this report	06/09/2019

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 *Introduction of Solar PV System at shopping mall in Ho Chi Minh* (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 signature: [redacted]		Date: 06/09/2019

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. ☐	Nguyen Tri Thang	LRQA Ltd.	Host country expert	☐	N/A	☒
Mr. ☒ Ms. ☐	Stewart Niu	LRQA China	Internal reviewer	☒	N/A	☐
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>

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_VN_AM007_ver01.0 Introduction of 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 newly installs solar PV system(s).

Justification in the PDD: The solar PV systems are newly installed on to the rooftops of shopping mall in Ho Chi Minh.

Steps taken for assessment: The verification team assessed the project documentation,

technical specification of the project solar PV system, the inspection report, certificate of warranty and conducted physical on site assessment.
Conclusion: The verification team confirmed that the project newly installed rooftop solar PV system including the solar PV modules and inverters at the shopping mall, and the criterion is met by the project.

Criterion 2: The PV modules are certified for design qualifications (IEC 61215, IEC 61646 or IEC 62108) and safety qualification (IEC 61730-1 and IEC 61730-2).
Justification in the PDD: The PV module installed in the project have been certified for IEC61215, IEC61730-1, IEC61730-2.
Steps taken for assessment: Document review was conducted on the technical specification, certificates of design qualifications and safety qualification, and the on-site visit and interviews were conducted at the project site.
Conclusion: Based on the verification processes taken, the verification team confirmed that the PV modules of the project solar PV system have obtained the certificates in compliance with the international standards IEC61215, IEC61730-1, and IEC61730-2. The criterion was therefore satisfied.

Criterion 3: The equipment to monitor output power of the solar PV system(s) and irradiance is installed at the project site.
Justification in the PDD: Electricity meters and pyranometer have been installed at the project site to monitor output power and irradiance respectively.
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 site. 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 366.18 kW grid-connected solar PV system on the roofs of car parking area and bicycle parking area of shopping mall in Ho Chi Minh, Viet Nam. The solar PV system is connected to an internal grid which is connected to both the national grid and captive power generators. The solar PV systems replace electricity mostly derived from fossil fuels and contributes to GHG emission reductions in Viet Nam. All electricity generated by the solar PV system is self-consumed and not fed into the grid. A remote monitoring system to monitor the performance of the system is also installed. The project solar PV system applies poly crystal PV module made by Next Energy & Resources Co., Ltd. The project has been implemented by AEON VIETNAM CO., LTD. from the Socialist Republic of Viet Nam, and AEON RETAIL CO., LTD. from Japan (the PPs). The start date of project operation is on 01/07/2016 and the expected operational lifetime of the project is for 9 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) consisting 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 EC_i,p the quantity of the electricity consumed from 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. CAR 1 and CAR 2 were raised as the resolution details 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 MRS was not completed with the specific information relevant to the monitoring period:

1) Monitoring option in Table 1,

2) Source of data in Table 1,

3) Measurement methods and procedures in Table 1, in particular, description of measuring equipment used, including the details on accuracy level and calibration information (frequency, date of calibration and validity).

Nature of responses provided by the PPs: The PPs provided the revised MR and supporting documents for calibration of electricity meter.

Assessment of the responses: The description of monitoring option and source of data was corrected and information of the measuring equipment including the accuracy level and calibration information was added in Table 1 of the revised MRS.

The CAR was closed.

Grade / Ref: CAR 2

Nature of the issue raised: Implementation of the monitoring procedures needed to be demonstrated in line with the requirements:

1) to keep and archive data monitored and required for verification and issuance electronically for two years after the final issuance of credits,

2) to keep relevant information of assigned personnel in accordance with the Monitoring Structure Sheet, and

3) to control the pyranometer and monitored irradiance data (ref. FAR01 of validation).

Nature of responses provided by the PPs: The PPs provided the revised monitoring procedures and the supporting documents of the implementation.

Assessment of the responses: The validation team reviewed the revised monitoring procedures with the supporting documents and confirmed:

1) The PPs clarified the requirements on keeping data monitored and required for verification and issuance for specified period in the revised monitoring procedures,

2) The PPs provided relevant organisation chart showing the assigned personnel in accordance with the MSS, and

3) The PPs control the pyranometer and utilise the monitored data of irradiance to check the data of electricity generation.

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) EC_i,p applies the monitoring Option C and the monitoring of the parameter uses electricity meter as the measuring equipment. The electricity meter is calibrated on a regular interval to the recommendation of the manufacturer. The first electricity meter S/N 215329464 was calibrated on 23/06/2016 prior to the installation and start of project operation on 01/07/2016 that was valid until 30/06/2018. The meter was replaced in June 2018 by the second electricity meter S/N 217181903 that was calibrated on 11/06/2018 prior to the installation that calibration is valid until 30/06/2020. There was no delayed calibration and 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 this 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 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 system at the shopping mall and emission source is consumption of grid electricity and captive electricity in the reference scenario. PEs is not applicable for generation of electricity from solar PV system in accordance with the applied methodology.

The REs are determined as a product of total electricity consumption and the default reference CO2 emission factor of the applied methodology for the case the project PV system is connected to an internal grid which is connected to both the national grid and a captive power generator at 0.333 tCO2/MWh.

The GHG emission reductions during the monitoring period (each for year 2016, 2017 and 2018) are calculated as: ERp = REp - PEp = REs = Σi EC_i,p x EF_RE,i

From 01/07/2016 to 31/12/2016

188.52 x 0.333 tCO2/MWh = 62.78 tCO2e.

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

367.22 x 0.333 tCO2/MWh = 122.28 tCO2e.

From 01/01/2018 to 31/10/2018

325.66 x 0.333 tCO2/MWh = 108.44 tCO2e.

Achieved electricity generation in first monitoring period of 28 months (884 days) is 881.4 MWh in total, that is 363.93 MWh (881.4 MWh x 365/884) in a year and 96.5% of ex-ante estimation in the registered PDD of 377.04 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
EC_i,p (2016)	188.52 MWh/p	Assessment was conducted based on records of monthly meter readings and on site assessment.
EC_i,p (2017)	367.22 MWh/p	Assessment was conducted based on records of monthly meter readings and on site assessment.
EC_i,p	325.66 MWh/p	Assessment was conducted based on records of monthly

(2018)		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 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 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

FAR 01 was issued in the validation that required the PPs to establish the operation and maintenance management system of the installed pyranometer for monitoring/recording irradiance data. The PPs were requested to address the requirement in CAR 2 as the resolution detailed in the above Section C.2. The PPs revised the monitoring procedures and demonstrated how the irradiance data monitored is used to check the data of electricity generation. Thus the verification team confirmed that the FAR 01 issued in the validation was closed.

E. Verified amount of emission reductions achieved

Year	Verified Reference Emissions (tCO_2e)	Verified Project Emissions (tCO_2e)	Verified Emission Reductions (tCO_2e)
2013			
2014			
2015			
2016	62.8	0	62
2017	122.3	0	122
2018	108.4	0	108
2019			
2020			
Total (tCO_2e)			292

F. List of interviewees and documents received

F.1. List of interviewees

AEON VIETNAM CO., LTD.

Masaomi SAKAGAMI, General Manager

AEON DELIGHT (VIETNAM) CO., LTD.

Morito WATANABE, Operations Senior Manager

Next Energy & Resources Co., Ltd.

Toshiyuki TAKANO, Senior Manager

Anh Thy Joint Stock Company

Kumiko TANAKA, Manager

F.2. List of documents received

Category A documents (documents prepared by the PP)

- Monitoring report dated 12/11/2018
- Revised Monitoring report submitted on 05/03/2019, 27/08/2019 and 05/09/2019
- Electricity meter reading logbook
- Brochure of EDMI Mk6N including technical specification

- Certificate of verification for electricity meter Mk6N S/N 215329464 dated 23/06/2016 (valid until 30/06/2018)
- Certificate of verification for electricity meter Mk6N S/N 217181903 dated 11/06/2018 (valid until 30/06/2020)
- Ministry of Science and Technology Circular No. 23/2013/TT-BKHCN on Group 2 Measuring Instruments
- PV Module Specification
- Installation Guide for inverters including technical data
- Construction overall schedule
- PCS Test Report
- PV Module Inspection Report
- EPS Room BFL Floor layout plan
- Inverter layout BF PCS12-16
- Electrical Room & Transformer Yard Layout
- Inverter rack image PCS1-11
- PV System Panel Layout
- PCS guarantee certificate
- Certificate of warranty for PV module
- 320 kW Photovoltaic Power Generation System Inspection Report dated 25/06/2016
- PV System Skelton Diagram
- TUV Nord Certificate for IEC61215, IEC 61730-1 and IEC61730-2 dated 29/10/2018
- Solajit Product Specification
- Silicon Irradiance Sensor information
- External Temperature Sensor
- Solar System Cleaning Work
- Written confirmation on no double registration
- Revised monitoring procedures dated 20/05/2019 and 07/08/2019
- Revised organization chart for monitoring and management
- Comparison of irradiance data with output electricity data

Category B documents (other documents referenced)
- Registered PDD Version 01.0 dated 08/11/2017 and the Monitoring spreadsheet
- Validation report for the project dated 21/02/2018
- JCM_VN_AM007_ver01.0 Installation of Solar PV System, Ver 01.0
- Additional Information to the Proposed Methodology Additional information on calculating the conservative emission factor for Viet Nam
- JCM Project Cycle Procedure JCM_VN_PCP_ver02.0

- JCM Guidelines for Validation and Verification JCM_VN_GL_VV_ver01.0
- JCM Guidelines for Developing PDD and MR JCM_VN_GL_PDD_MR_ver02.0
- JCM Glossary of Terms JCM_VN_Glossary_ver01.0
- JCM Verification Report Form JCM_VN_F_Vrf_Rep_ver02.0
- Approved Small Scale CDM Methodology AMS I.D. Version 18.0 Grid connected renewable electricity generation
- Approved CDM Methodological Tool to calculate the Emission Factor for an electricity system
- Proposed and registered projects under CDM, VCS, Gold Standard, and the other international schemes
- The Ministry of Science and Technology Circular No. 23/2013/TT-BKHCN on Group 2 Measuring Instruments dated 26/09/2013
- Decision No.02/2007/QD-BCN Issuing the provisions required technical equipment for electricity meters counting the power plant, the Ministry of Industry, 09/01/2007
- DLVN 07:2012 Alternating current induction watt-hour meters Verification procedures, 2012
- DLVN 39:2012 Alternating current static watt-hour meters Verification procedures, 2012
- TCVN 7589-11:2007 (IEC 62053-11:2003) Electricity metering equipment (a.c.) – Particular requirements – Part 11: Electromechanical meter for active energy (classes 0.5, 1 and 2)

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: Introduction of Solar PV System at shopping mall in Ho Chi Minh (Ref# VN007)
Verification for the first monitoring period: 01/07/2016 – 31/10/2018

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
Nguyen Tri Thang	Host Country Expert
Stewart Niu	Technical Reviewer

Signed by

Michiaki Chiba
Climate Change Manager – Asia & Pacific
03/12/2018