JCM Validation Report Form

A. Summary of validation

A.1. General Information

Title of the project	Introduction of 3.4MW Rooftop Solar Power System to Air-conditioning Parts Factories
Reference number	TH005
Third-party entity (TPE)	Lloyd's Register Quality Assurance Limited (LRQA)
Project participant contracting the TPE	Sharp Energy Solutions Corporation
Date of completion of this report	26/07/2018

A.2 Conclusion of validation

Overall validation opinion	☒ Positive ☐ Negative

A.3. Overview of final validation conclusion

Only when all of the checkboxes are checked, overall validation opinion is positive.

Item	Validation requirements	No CAR or CL remaining
Project design document form	The TPE determines whether the PDD was completed using the latest version of the PDD forms appropriate to the type of project and drafted in line with the Guidelines for Developing the Joint Crediting Mechanism (JCM) Project Design Document, Monitoring Plan and Monitoring Report.	☒
Project description	The description of the proposed JCM project in the PDD is accurate, complete, and provides comprehension of the proposed JCM project.	☒
Application of approved JCM methodology (ies)	The project is eligible for applying applied methodology and that the applied version is valid at the time of submission of the proposed JCM project for validation.	☒
Emission sources and calculation of emission reductions	All relevant GHG emission sources covered in the methodology are addressed for the purpose of calculating project emissions and reference emissions for the proposed JCM project.	☒
	The values for project specific parameters to be fixed *ex ante* listed in the Monitoring Plan Sheet are appropriate, if applicable.	☒
Environmental impact assessment	The project participants conducted an environmental impact assessment, if required by the Kingdom of Thailand, in line with Thai procedures.	☒
Local stakeholder consultation	The project participants have completed a local stakeholder consultation process and that due steps were taken to engage stakeholders and solicit comments for the proposed	☒

Item	Validation requirements	No CAR or CL remaining
	project.	
Monitoring	The description of the Monitoring Plan (Monitoring Plan Sheet and Monitoring Structure Sheet) is based on the approved methodology and/or Guidelines for Developing the Joint Crediting Mechanism (JCM) Project Design Document, Monitoring Plan, and Monitoring Report. The monitoring points for measurement are appropriate, as well as whether the types of equipment to be installed are appropriate if necessary.	☒
Public inputs	All inputs on the PDD of the proposed JCM project submitted in line with the Project Cycle Procedure are taken into due account by the project participants.	☒
Modalities of communications	The corporate identity of all project participants and a focal point, as well as the personal identities, including specimen signatures and employment status, of their authorized signatories are included in the MoC.	☒
	The MoC has been correctly completed and duly authorized.	☒
Avoidance of double registration	The proposed JCM project is not registered under other international climate mitigation mechanisms.	☒
Start of operation	The start of the operating date of the proposed JCM project does not predate January 1, 2013.	☒

Authorised signatory:	Mr. ☒ Ms. ☐
Last name: Chiba	First name: Michiaki
Title: Climate Change Manager - Asia & Pacific	
Specimen signature: [redacted]	Date: 26/07/2018

B. Validation 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. ☒	Mookrin Sutuntaphida	LRQA Thailand	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 validation, findings, and conclusion based on reporting requirements

C.1. Project design document form

<Means of validation>

The initial version of PDD was checked and confirmed as complete against the JCM Guidelines for Developing Project Design Document (PDD) and Monitoring Report (MR) No. JCM_TH_GL_PDD_MR_ver02.0. A valid form of the JCM PDD Form as of the time of commencement of the public comment period No. JCM_TH_F_PDD_ver02.0 was used. The completeness was also checked for the revised PDD Version 2.0 dated 30/03/2018 and Version 3.0 dated 24/04/2018 submitted by the PPs for resolution of validation findings as below mentioned.

The details of the persons interviewed and the documents reviewed are shown in the Section E 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 validation team confirmed that the PDD was completed using the valid form of the JCM PDD Form and in accordance with the JCM Guidelines for Developing PDD and MR.

C.2. Project description

<Means of validation>

The project is to introduce 3.4 MW rooftop solar power systems at 6 air-conditioning parts factories of subsidiaries of SNC Former Public Co., Ltd. (SNC) in Rayong Province, Thailand.

Four factory buildings (SPEC1, SPEC2, SPEC3 and SPEC4) belong to SNC Pyongsan Evolution Company Limited (SPEC) and rest two factory buildings (SCAN2 and SCAN3) belong to SNC Creativity Anthology Company Limited (SCAN). Infinity Parts Co., Ltd. (IPC) and Ultimate Parts Company Limited (UMP) are subsidiaries of SPEC that operate using a part of the factory buildings and consume a part of solar power generated by the project.

The electricity produced by the project solar power systems is supplied to the 6 factories displacing grid electricity generated using fossil fuels and reduces GHG emissions in Thailand.

The project solar power systems employ the crystalline silicon photovoltaic (PV) modules of Sharp Corporation, Japan (ND-AH315 and ND-RA260).

The project is implemented by SNC and Sharp Energy Solutions Corporation.

The start date of project operation is on 01/12/2017 and the expected operational lifetime of the project is for 10 years. The PPs referred to the Statutory useful life for the calculation of depreciation and amortization for machinery and equipment issued by Japan's Ministry of Finance for the basis of the expected operational lifetime of the project solar power systems indicated as for 10 years (the other facilities for metal products manufacturing industries), while the period of depreciation applied by SNC is for 25 years based on the expected lifetime of solar power system and the industrial practices. The project solar power systems applying the state-of-art design of the Japanese leading manufacturer will have a longer operational lifetime with sound operation and maintenance activities, but the PPs selected shorter lifetime specified by the applicable regulations. That is conservative and considered acceptable as it fulfils the duration of the crediting period.

The project receives financial support for JCM model projects from the Ministry of the Environment, Japan. The PP from Japan contributes in transfer of technology on the advanced and efficient solar power system.

The validation team assessed the PDD and the supporting documents, interviewed the PPs to validate the requirements concerning accuracy and completeness of the project description.

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

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

<Findings>

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

Grade / Ref: CL 1

Nature of the issue raised: The PPs were requested to clarify whether the project consists of a single solar power system or solar power systems, to complete the Monitoring Spreadsheet as appropriate for whether it is a single system or systems, and to provide supporting evidence for figures/factors used to estimate electricity generation by the project solar power system/systems.
Nature of responses provided by the PPs: The PPs revised the Monitoring Spreadsheet and provided data sources for estimated electricity generation.
Assessment of the responses: The solar power systems consist of the systems installed on the roof top of 6 factory buildings and the estimated electricity generation by the solar power systems is separately indicated in the MPS (input_separate) sheet of the revised Monitoring Spreadsheet.
The PPs provided the data sources for estimated electricity generation by the project solar power system/systems for confirmation by the validation team.
The CL was closed.
<Conclusion based on reporting requirements>
Please state conclusion based on reporting requirements.
The validation team assessed the project description provided in the PDD with the supporting documents to the requirements on the accuracy and completeness. The validation team confirmed that the proposed JCM project in the PDD is described in accurate and complete manners that is understandable the nature of the proposed project activity.

C.3. Application of approved methodology(ies)

<Means of validation>
The project applied the approved methodology JCM_TH_AM001_ver01.0 "Installation of Solar PV System" Ver 01.0.
LRQA assessed if the selected methodology is applicable to the proposed project. The project applicability was checked against each eligibility criterion in the selected approved methodology. The steps taken to validate each eligibility criterion and the conclusions about its applicability to the proposed project are summarised as below.

Criterion 1: The project installs solar PV system(s).
Justification in the PDD: The solar PV systems are installed on to the rooftops of factories in Rayong Province.
Steps taken for assessment: Document review was conducted on the project documentation, technical specification, the test and commissioning report, and the on-site visit and interviews were conducted at the project site.
Conclusion: Based on the validation processes taken, the validation team confirmed that the

project installed rooftop solar PV systems at the factories of SNC subsidiaries and the criterion is met.

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 systems are connected to the internal power grids of the project sites (each of factories) for displacing grid electricity at the project sites.
Steps taken for assessment: Document review was conducted on the electricity diagram, and the on-site visit and interviews were conducted at the project sites.
Conclusion: Based on the validation processes taken, the validation team confirmed that the project solar PV systems are connected to the internal electricity supply systems of the factories of SNC subsidiaries. The electricity supply systems of SNC subsidiaries are connected to the public power grid system and no captive electricity is used in the project sites. The project was confirmed to displace consumption of grid electricity. The systems to prevent reverse power flow from the project solar PV systems to the public power grid systems have been installed and the electricity generated by the project solar PV systems is only consumed at the project sites. The criterion is met by the proposed 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 PV modules installed in the project have been certified for IEC 61215, IEC 61730-1 and IEC 61730-2).
Steps taken for assessment: Document review was conducted on the technical specification, certificates of design qualifications and safety qualification, the test and commissioning report, and the on-site visit and interviews were conducted at the project site.
Conclusion: Based on the validation processes taken, the validation 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 as appropriate. The criterion was therefore fulfilled.

Criterion 4: 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 pyranometers have been installed at the project sites to monitor output power and irradiance respectively.
Steps taken for assessment: Document review was conducted on the technical specification, the test and commissioning report, and the on-site visit and interviews were conducted at the project site.

Conclusion: Based on the validation processes taken, the validation team confirmed that the monitoring equipment has been installed for output power of the solar PV systems as well as irradiance at the project sites. Thus the criterion was confirmed as satisfied by the project.

<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 validation team confirmed that the project applied the valid version of the approved methodology and the applicability was demonstrated to the eligibility criteria as appropriate.

C.4. Emission sources and calculation of emission reductions

<Means of validation>

The project supplies electricity generated by 3.4 MW solar power systems installed on the rooftop of factory buildings for the self-consumption and displaces electricity purchased from the public power grid system.

The source of GHG emissions is consumption of grid electricity and CO2 emissions in the reference scenario are considered to determine the reference emissions (REs), while the project emissions (PEs) are assumed to be zero for the solar PV system in accordance with the applied methodology. The annual electricity generation of the project is estimated ex-ante at 3,698.10 MWh. The default CO2 emission factor for the PV system connected to the national grid of 0.319 t-CO2/MWh is applied. The annual GHG emission reductions (ERs) are calculated using the estimated annual electricity generation of the project: ERs = REs – PEs = 3,698.10 MWh x 0.319 – 0 = 1,179 t-CO2e. The project started operation from 01/12/2017 and the ERs in the first year and the last year are estimated as: 1,179 x 1/12 = 98 tCO2e and 1,179 x 11/12 = 1,081 tCO2e respectively.

The validation team assessed the documented evidence and confirmed that all the relevant GHG emission sources covered in the applied methodology are addressed, and the steps taken and the equations applied to calculate REs for the proposed project comply with the requirements of the approved methodology.

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

<Findings>

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

Please refer to CL1 and its resolution in the above Section C.2.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The validation team confirmed that:
- The methodology was applied correctly to calculate PEs and REs and no other significant emission source was identified that would be affected and reasonably attributed by implementation of the proposed project but not addressed by the applied methodology;
- The choice of whether an emission source or gas is to be included where the applied methodology allows was reasonably justified by the PPs;
- The Monitoring Plan Sheet (MPS) was not altered and the fields were filled in as required so that all estimates of the REs could be replicated using the data and parameter values provided in the PDD;
- The values for the project specific parameters fixed ex ante listed in the MPS were appropriate with all the data sources and assumptions and the calculations were correct to the proposed JCM project;
- All assumptions and data used by the PPs were listed in the PDD, including their references and sources; and
- All values used in the PDD were considered reasonable in the context of the proposed JCM project.

C.5. Environmental impact assessment

<Means of validation>

The proposed project is to install 3.4 MW rooftop solar power systems at the existing factory buildings and an environmental impact assessment is not required by laws of the host country. The validation team assessed the applicable legal requirements in the host country using its local sources/expertise and confirmed that an environmental impact assessment is not required to be conducted for implementation of the project.

The details of the persons interviewed and documents reviewed are provided in the Section E 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 validation team confirmed by assessing the relevant documents and using the local sources/expertise that the project does not need an environmental impacts assessment to be conducted to meet the legal requirement of the host country and the PDD satisfies the requirements of the JCM.

C.6. Local stakeholder consultation

<Means of validation>

The PPs identified the government of the host country, staff of SNC and local residents as the main local stakeholders and held a consultation meeting. Representatives of the local stakeholders attended the meeting provided comments mainly related to the implementation of the project and no negative issue was raised through the process.

Through the processes taken, CL 2 was raised as the resolution detailed below.

The details of the persons interviewed and documents reviewed are provided in the Section E of this report.

<Findings>

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

Grade / Ref: CL 2

Nature of the issue raised: The PPs were requested to clarify why PDD E.2. did not include all the comments received from the local stakeholders and how due account has been taken of those comments.

Nature of responses provided by the PPs: The PPs reviewed and corrected the PDD.

Assessment of the responses: The PPs revised the PDD and added the comments as relevant.

The CL was closed.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The validation team confirmed that the PPs have invited comments to the proposed project from the relevant local stakeholders, the summary of the comments received is provided in the PDD in a complete manner and the PPs have taken due account of all the comments received from the local stakeholders as the processes described in the PDD.

C.7. Monitoring

<Means of validation>

The MP consisting of the MPS and Monitoring Structure Sheet (MSS) is based on the approved methodology.

The electricity generated by the project solar power systems is directly and continuously measured. The reading is taken by electricity meters and inverter cluster controllers installed to measure electricity generation from the solar power systems on the roof of respective factory buildings.

The electricity meters are designed to comply with requirements of IEC 62053-22 and the accuracy class is 0.2s.

The roles and responsibilities of the persons are described in the MSS in accordance with the requirements of the applied methodology. The reading results of electricity meters are monthly recorded, checked by the QA/QC team, Deputy Project Manager and Project Manager.

The validation team confirmed that the MP complied with the requirements in the approved methodology and that the PPs will be able to apply the MP following the monitoring arrangements described in it. CAR 1 and CAR 2 were issued that the details of resolution are as described below.

The details of the persons interviewed and the documents reviewed are shown in the Section E 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 figure of the PDD C.2. and the Monitoring Plan did not describe as relevant to the project:

1) The monitoring point,

2) Whether the reading from electricity meters or inverters is recorded manually or electronically,

3) The quality and accuracy controls applied to electricity meters or inverters, and

4) The roles and responsibility of monitoring personnel for maintaining and control of measuring instruments at the monitoring point.

Nature of responses provided by the PPs: The PPs submitted the revised PDD and MPS with supporting documents.

Assessment of the responses:

1) The electricity meters and inverters are marked as the monitoring point in the revised PDD.

2) The revised PDD and MPS confirm the readings are taken from both electricity meters and inverters and the records are kept manually and electronically.

3) The revised PDD and MPS confirm that the data of the main monitoring from the inverters is checked by the same of the secondary monitoring using the electricity meters. Accuracy class of the electricity meters is 0.2s and those are calibrated every 5 years following manufacturer’s recommendation. The initial calibration was conducted for total 8 electricity meters on 30/11/2016 and 02/12/2016.

4) QA/QC assigned from SPEC is responsible for maintaining and control of measuring instruments at the monitoring point in the revised MSS.

The CAR was closed.

Grade / Ref: CAR 2

Nature of the issue raised: The PPs should confirm how the PPs ensure that data monitored and required for verification and issuance be kept and archived electronically for two years after the final issuance of credits.

Nature of responses provided by the PPs: The PPs revised the "(i) Measurement methods and

procedures, MPS(input)" of Monitoring Spreadsheet.
Assessment of the responses: The PPs revised the MPS and confirmed that data monitored and required for verification and issuance be kept and archived electronically for two years after the final issuance of credits.
The CAR was closed.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The validation team confirmed that the MP was described in compliance with the requirements of the approved methodology and the Guidelines for developing PDD and MR, and the PPs have demonstrated feasibility of the monitoring structure and their ability to implement the MP.

C.8. Modalities of Communication

<Means of validation>

The MoC was submitted to LRQA in the form JCM_TH_F_MoC_ver01.0. The MoC nominates Sharp Energy Solutions Corporation as the focal point and was signed by the authorized representatives of all the PPs with the contact details. The form used is the latest one as of the time of validation. The validation team assessed the personal identities including specimen signatures and employment status of the authorized signatories through directly checking the evidence for corporate and personal identity of the PPs and their authorised signatories. The validation team also confirmed through reviewing the corporate information of the PPs and by meeting the persons representing the PPs that the information provided in the MoC is correct.
CAR 3 was issued that the details of resolution are as described below.
The details of the persons interviewed and the documents reviewed are shown in the Section E of this report.

<Findings>

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

Grade / Ref: CAR 3
Nature of the issue raised: The MoC submitted by the PPs was not completed with the date of submission and the dates for signing by the signatories. The last and first names of signatories should be filled in the correct locations in the Section 2.
Nature of responses provided by the PPs: The PPs submitted the MoC dated 30/11/2017 and subsequently the revised MoC dated 24/04/2018 following the change in name of the focal point entity for review by the validation team.
Assessment of the responses: The validation team reviewed the MoC resubmitted by the PPs and the subsequent revised MoC, and confirmed the date of submission and the dates for signing by the signatories have been filled.
The CAR was closed.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The validation team confirmed that the MoC was completed using the latest form after assessment conducted on relevance of the MoC in compliance with the requirements of the JCM Guidelines.

C.9. Avoidance of double registration

<Means of validation>

The validation team assessed and confirmed relevance of the written confirmation in the MoC from the PPs that the proposed JCM project was 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 E 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 validation team confirmed that the proposed JCM project was not registered under the other international climate mitigation mechanisms.

C.10. Start of operation

<Means of validation>

The start date for the operation of the proposed JCM project is indicated in the PDD as 01/12/2017.

The validation team confirmed correctness/relevance of the information by reviewing the supporting evidence, including but not limited to assessing of the contracts and commissioning report, and that the date is not before 01/01/2013 as required to be eligible as a JCM project.

<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 validation team confirmed that the start date of operation of the proposed JCM project is 01/12/2017 and not before 01/01/2013 as required to be eligible as a JCM project.

C.11. Other issues

<Means of validation>

No issue was identified as relevant element not covered above.

<Findings>

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

Not applicable

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

Not applicable

D. Information on public inputs

D.1. Summary of public inputs

In line with the JCM Project Cycle Procedure, the PDD is to be made publicly available for 30 days to invite public comments. The PDD was made publicly available in line with the requirements of the procedure for the period of 28/03/2018 to 26/04/2018 as per https://www.jcm.go.jp/th-jp/projects/48.

D.2. Summary of how inputs received have been taken into account by the project participants

No comment was received during the above period to receive public inputs.

Thus no action was required to be taken by the PPs to satisfy the JCM requirement.

E. List of interviewees and documents received

E.1. List of interviewees

SNC Pyongsan Evolution Company Limited (SPEC)

Somchai Ngamkitcharoenlap, Managing Director Sharp Corporation Hiroya Ota, Supervisor, Global Sales and Marketing Division, Engineering Business Unit, Energy Solution Business Unit (Global New Business Promotion Division, Project Business Unit, Sharp Energy Solutions Corporation) Sharp Solar Solution Asia Co., Ltd. Yoswaris Dulpinitpattana, General Manager, Operation and Maintenance Somporn Chongkolwanichsuk, Electrical Engineer, Project Engineering Mongkol Boonpan, Maintenance Engineer Tharatan Pimulchat, Assistant Engineer

E.2. List of documents received

Category A documents (documents prepared by the PP) - PDD Version 1.0 dated 26/03/2018 with the monitoring spreadsheet - PDD Version 2.0 dated 30/03/2018 with the monitoring spreadsheet - PDD Version 3.0 dated 24/04/2018 - MoC and the draft revision dated 30/11/2017 - Revised MoC dated 24/04/2018 (Change in the focal point entity) - Solar Rooftop System Overview, photograph and layout - Specification of main equipment - SNC Former Public Company Limited, Annual Report 2015 - JCM project implementation plan - Evidence for authorization of signatories for the MoC, including those for the revised MoC and change in the focal point entity - Consortium agreement - Project implementation schedule - PEA grid connection permission - EPC Contract for design, engineer, procure, construct, test and commissioning dated 19/09/2016 - DC Cable Route and Cable Raceway - Aluminum Rail Plan of Mounting Structure - Single Line Diagram VAC and VDC Distribution Board - Communication Diagram

- Monitoring Diagram
- EDMI Mk6E Advanced Three Phase Electronic Revenue Meter Specifications
- KIPP & ZONEN Pyranometers Specifications
- Commissioning report for 3.432 MWp dc PV Solar Roof System in SNC PYONGSAN EVOLUTION CO., LTD (Rayong Province,Thailand) Date: 25 to 28 April 2017, Sharp Solar Solution Asia Co., Ltd.
- Estimation of solar power generation
- Useful lifetime based on the act of Japan's Ministry of Finance for calculation of useful lifetime for depreciation and amortization
- Depreciation period of solar power generation system
- Certificate of IEC 61215, IEC 61730-1 and IEC 61730-2 issued by TUV Rheinland dated 18/08/2016
- Certificate of IEC 61215, IEC 61730-1 and IEC 61730-2 issued by VDE Testing and Certification Institute dated 31/10/2013
- Relaying and Metering Diagram SPEC1
- Relaying and Metering Diagram SPEC2
- Relaying and Metering Diagram SPEC3
- Relaying and Metering Diagram SPEC4
- Relaying and Metering Diagram SCAN2
- Relaying and Metering Diagram SCAN3
- Photograph of diesel generator
- Thai Government Gazette No. 130
- Guidance for Environmental Code of Practice
- ERC exemption permission letter
- Introduction by Sharp Corporation for stakeholders consultation meeting, November 2017
- Records of local stakeholders consultation meeting
- Technical information – Measurement accuracy for PV Inverter Sunny Boy and Sunny Mini Central, SMA
- Manufacturer's recommendation for calibration frequency of electricity meter
- Irradiation data from Meteonorm
- Simulation results for estimated electricity generation

Category B documents (other documents referenced)
- JCM_TH_AM001_ver01.0 Installation of Solar PV System
- Additional Information to the Proposed Methodology "Installation of Solar PV System"
- JCM Project Cycle Procedure JCM_TH_PCP_ver02.0
- JCM Guidelines for Validation and Verification JCM_TH_GL_VV_ver01.0

- JCM Guidelines for Developing PDD and MR JCM_TH_GL_PDD_MR_ver02.0
- JCM Glossary of Terms JCM_TH_Glossary_ver01.0
- JCM PDD Form JCM_TH_F_PDD_ver02.0
- JCM MoC Statement Form JCM_TH_F_MoC_ver01.0
- JCM Validation Report Form JCM_TH_F_Val_Rep_ver01.0
- SNC Former Public Company Limited, Annual Report 2016
- Registered PDD of JCM project ref No. TH001 Introduction of Solar PV Systems on Rooftops of Factory and Office Building
- Validation report of registered JCM project ref No. TH001 Introduction of Solar PV Systems on Rooftops of Factory and Office Building
- 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
- IEC 62053-22:2003, Electricity metering equipment (ac) - Particular requirements. Part 22: Static meters for active energy (classes 0,2 S and 0,5 S)
- APLMF Economy Report Thailand, Central Bureau of Weights and Measures
- Weights and Measures Act B.E. 2542 (1999)

Annex Certificates or curricula vitae of TPE's validation 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: Validation for Introduction of 3.4MW Rooftop Solar Power System to Air-conditioning Parts Factories

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

Name of Person	Assigned Roles
Michiaki Chiba	Team Leader
Mookrin Sutuntaphida	Host Country Expert
Stewart Niu	Technical Reviewer

Signed by

Michiaki Chiba
Climate Change Manager – Asia & Pacific
07/02/2018