JCM Validation Report Form

A. Summary of validation

A.1. General Information

Title of the project	1.6MW Solar PV Power Plant Project in Jakabaring Sport City
Reference number	ID018
Third-party entity (TPE)	TPE-ID-003 Japan Quality Assurance Organization
Project participant contracting the TPE	Sharp Energy Solutions Corporation
Date of completion of this report	26/10/2018

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 Republic of Indonesia, in line with Indonesia's procedures.	☒
Local stakeholder	The project participants have completed a local stakeholder consultation process and that due steps were taken to engage	☒

Item	Validation requirements	No CAR or CL remaining
consultation	stakeholders and solicit comments for the proposed project unless a local stakeholder consultation has been conducted under an environmental impact assessment.	
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: Asada First name: Sumio

Title: Senior Executive

Specimen signature:

[redacted]

Date: 26/10/2018

B. Validation team and other experts

	Name	Company	Function*	Scheme competence*	Technical competence*	On-site visit
Mr. ☐ Ms. ☒	Sachiko Hashizume	JQA	Team Leader	☒	Authorized	☐
Mr. ☒ Ms. ☐	Koichiro Tanabe	JQA	Team Member	☒	Authorized	☐
Mr. ☒ Ms. ☐	Irhan Febijanto	External individual	Team Member	☒	-	☒
Mr. ☒ Ms. ☐	Tadashi Yoshida	External individual	Internal reviewer	☒	Authorized	☐

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>

A series of the JCM approved forms, including Project Design Document (hereinafter referred to as "PDD") form, was checked against the JCM Guidelines for developing Project Design Document and Monitoring Report (hereinafter referred to as "JCM Guidelines"): JCM_ID_GL_PDD_MR_ver03.0.

Regarding the PDD version 01.1, dated 28/02/2018 (as the second draft), a CAR was raised and resolved as the following section.

<Findings>

CAR01

The PDD version 01.1 was published for the invitation of the public comments on 01/09/2018. It was not completed using the latest version of the PDD forms.

Resolution by the PPs

The PPs provided the revised PDD using the latest form, "JCM_ID_F_PDD_ver02.0". The validation team confirmed that the PDD was completed using the latest version of the PDD forms appropriate to the type of project

and in line with the PDD and Monitoring Guidelines.

Therefore, this issue is closed.

<Conclusion based on reporting requirements>

The validation team confirms that the PDD is completed using the valid form of the JCM PDD form and drafted in accordance with the JCM Guidelines for developing PDD. The issue raised by the team have been fully resolved, which resulted in a revision of the PDD.

C.2. Project description

<Means of validation>

The purpose of the proposed JCM project is to reduce CO_2 emission emitted by the fuel fossil-based power generation plants connected to the Sumatera interconnection grid system through the installation of the 1.6MW solar power plant in Jakabaring Sports City of Palembang, South Sumatra, Indonesia. The solar power plant uses solar radiation to generate electricity and supply the generated electricity to the Sumatera interconnection grid system through Jakabaring sub-station located 3.5 km from the power plant site. The technology of solar power plant is proposed and installed by Sharp Energy Solutions Corporation (hereinafter referred to as Sharp). The power plant uses 5,248 units of polycrystalline silicon photovoltaic (PV) modules, type of ND-AH315 with a power conversion efficiency of 16.23 %. By using the solar PV power plant, CO_2 emission emitted from the Sumatera interconnection grid system will be reduced, which total reduction amount of 11,693 t-CO_2e for thirteen years (2018-2030).

The proposed JCM project is implemented by Perusahaan Daerah Pertambangan Dan Energi (hereinafter referred to as PDPDE) from Indonesian side and Sharp from Japan side. The starting date for the project is 01/04/2018, which is the day for starting to monitor data collected. The expected operational lifetime of the proposed JCM project is seventeen years, which is determined based on the legal durable years list stipulated in the Regulation of the Japanese Ministry of Finance No.15/1965 concerning the equipment life time. The proposed JCM project was partially supported by the Japanese Ministry of the Environment through the financing programme for JCM model projects, which provided financial support of less than half of the initial investment for the projects in order to facilitate GHG emission reduction project in Indonesia and to acquire JCM credits. Regarding the technology transfer, Sharp provides training for operation and maintenance before the starting date of operation and will continue to do so throughout project operation period.

The validation team conducted the desk review of the PDD and the supporting documents, also conducted an on-site assessment, on 27/02/2018, to validate the requirements about accuracy and completeness of the project description. The details of the persons interviewed, and documents reviewed are provided in the Section E of this report.

<Findings>

No issues were identified to the requirement.

<Conclusion based on reporting requirements>

It is confirmed that the project description of the PDD is reasonable and appropriate.

C.3. Application of approved methodology(ies)

<Means of validation>

The project applied the approved methodology of JCM_ID_AM013_ver01.0, "Installation of Solar PV System". The methodology is approved by the Joint Committee on 04/12/2017 and valid at the time of the validation.

The validation team assessed whether the selected methodology was applicable to the proposed JCM project. Applicability of the proposed JCM project was checked against three eligibility criteria stipulated in the approved methodology. The steps taken to validate each eligibility criterion and the conclusion about its applicability to the proposed JCM project are summarized as below.

Criterion 1: The project newly installs solar PV system(s).

Project information in the PDD: The project installs 1.6MW green-field solar power plant in Jakabaring Sports City, Palembang, South Sumatra, Indonesia.

Assessment and conclusion: The evidence which submitted by PP to prove the criterion 1 is a catalogue of solar PV panel ND-AH315, only. The validation team assessed the evidence and concluded that the evidence is not enough to prove the newly installation of solar PV module. Therefore, a CL was raised. PP is requested to provide additional supporting documents.

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).

Project information in the PDD: The PV modules installed in the project have been certified for IEC 61215, IEC 61730-1 and IEC 61730-2.

Assessment and conclusion: It is confirmed through review the relevant document of SHARP 315W ND-AH315 that PV modules is certified for design qualification of IEC 61215, and safety qualification of IEC 61730-1 and IEC 61730-2. Therefore, the validation team concludes that the Criterion 2 is satisfied.

Criterion 3: The equipment to monitor output power of the solar PV system(s) and irradiance is installed at the project site.

Project information in the PDD: Electricity meter and pyranometer have been installed at the project site to monitor output power and irradiance respectively.

Assessment and conclusion: It is confirmed through the interview with PP and on-site assessment that one electricity meter of Power Logic PM5560 made by Schneider, used to monitor output power and to calculate the amount of CO_2 reduction is installed in the Jakabaring sub-station, and two pyranometers CMP 6 model made by Kipp & Zonen to monitor irradiance are mounted on the side of solar panel close together. Therefore, the validation team concludes that the Criterion 3 is satisfied.

<Findings>

CL01

More information on the PV panel installed is requested.

Resolution by the PPs

The PP provided the sequences of photos which shows the situation of power plant site construction taken on 17/05/2017 until dated on 16/01/2018. The photos show the PV panel is newly installed, and the power plant site is developed from the green field area. The validation team concludes that the photos show the progress of construction a series of situational changes of the power plant site correctly. Therefore, this issue is closed.

<Conclusion based on reporting requirements>

The validation team reached the conclusion that the relevant information contained in the PDD is in compliance with the eligibility criterion listed in the approved methodology applied. The issue raised by the validation team was fully clarified.

C.4. Emission sources and calculation of emission reductions

<Means of validation>

The proposed project aims to reduce CO_2 emission emitted by fossil fuel-based power plants which are connected to the Sumatra interconnection grid system by a development of solar PV power generation. The electricity generated is supplied to the grid, and replace the electricity generated from fossil fuel-based power plants. The solar PV power generation is proposed and installed by Sharp.

The capacity of a PV panel under the standard test condition (P_{MS}) is 315 W. A quantity of panels (*n)* are 5,248 panels. The maximum power of PV modules installed in the proposed JCM project (P_{AS}) is 1,653.12 kW (= 0.315 kW/panel x 5,248 panels). In order to estimate generated electricity of the PV power generation system in the proposed JCM project, an estimation method of JIS 8907:2005 (Estimation method of generating energy by PV power system) is used, and it is shown by the equation (1), below. The generated electricity which supplied to the grid (net generated electricity) is shown by the equation (2). Monthly generated electricity is calculated using equation (3).

$$EG_{PM} = H_S \times K_{PT} \times K_{HS} \times \mu_{DD} \times K_{PD} \times P_{AS} \quad \text{.....(1)}$$

$$EG_N = EG_{PM} - EG_{SP} \quad \text{.....(2)}$$

$$EG_M = EG_N \times d \quad \text{.....(3)}$$

Where,

EG_{PM}	:	Estimated generated electricity amount per day（kWh/d）
EG_N	:	Net electricity amount（kWh/d)
EG_{SP}	:	Self-power consumption（kWh/d)
EG_M	:	Estimated generated electricity amount per month (kWh/d)
H_S	:	Monthly averaged daily effective solar irradiation (value at the site: kWh/m^2/d）
K_{PT}	:	Cell temperature factor（in the absence of loss=1.0)
K_{HS}	:	Shading factor（in the absence of loss=1.0)
K_{PD}	:	Other losses (in the absence of losses=1.0))
μ_{DD}	:	Energy efficiency of DC Conditioner
d	:	actual effective day in a month

The validation team confirmed that a calculation table, which was submitted by the PPs for showing the parameters, was properly developed and the estimation results of electricity generated by the project of solar PV power system in a year were appropriate.

Reference emission (RE_p) is calculated ex-ante by multiplying the quantity of net

electricity generation of solar PV power generation (EG_p) by CO_2 emission factor for the Sumatra interconnection grid system (EF_{grid}) during a given time, p. The equation (4) shows the calculation of reference emissions. CO_2 emission factor for the Sumatra interconnection grid system (EF_{grid}) is 0.477 tCO_2/MWh determined in the MPS-MSS of JCM_ID_AM013_ver01.0

$RE = EG_{i,p} \times EF_{grid}$……..……...(4)

Where,

RE_p : Reference emission (tCO_2)
EF_{grid} : CO_2 emission factor for the Sumatra interconnection grid system (tCO_2/MWh)

The validation team checked the calculation result of equation (4) and confirmed that the estimated RE_p is calculated to be 917 tCO_2 annually. Since the Project Emission is not generated by this proposed JCM project, the annual amount of CO_2 is the same as the annual amount of *RE*. Thus, the annual amount of *ERs* is estimated to be 917 tCO_2 and the sum of *ERs* for the period of 2018 – 2030 is 11,693 tCO_2.

The own consumption electricity is supplied from the solar PV power generation during daytime and supplied from the grid system at night. There is no fossil fuel consumption used for an own consumption electricity.

It is confirmed through the review of the relevant documents and the on-site assessment that all CO_2 emission source specified by the applied methodology are identified, and the reference emissions, project emissions and emission reductions in the PDD and Monitoring Plan Sheet are correctly calculated, in accordance with the methodology JCM_ID_AM013_ver01.0

<Findings>

No issues were identified to the requirement.

<Conclusion based on reporting requirements>

The validation team has reached the conclusion through the validation that the selected emission sources and GHG types are justified for the JCM project. The validation team has assessed values for project-specific parameters to be fixed ex ante in the MPS and intermediate processes to derive the values. As a result, these are considered reasonable in the context of the proposed JCM project.

C.5. Environmental impact assessment

<Means of validation>

The purpose of the proposed JCM project is to reduce CO_2 emission through the installation of the 1.6MW solar power plant in Jakabaring Sports City of Palembang, South Sumatra, Indonesia.

The PDD states that an Environmental Impact Assessment (hereinafter referred to as EIA) is not required. According to Decree of the Mayor of Palembang City No.:03/2013 concerning Environmental Permit, the development of Solar Power Generation with a capacity from 1(one) MW and 10(ten) MW must prepare Environmental Management Efforts and Environment Monitoring Efforts (hereinafter referred to as UKL/UPL). Therefore, PDPDE proposed the environmental permit to local government of Palembang City, and the Environmental Permit have been granted through the Decree of Head of Environment and Hygiene Agency of Palembang City, No.:32/KPTS-IL/DHLK/2017 concerning Environmental Permit for Solar Power Generation with capacity of 2 MW conducted by Perusahaan Daerah Pertambangan dan Energi (PDPDE), Sumatera Selatan Province, dated 07/07/2017.

<Findings>

No issues were identified to the requirement.

<Conclusion based on reporting requirements>

The validation team has concluded through the documents and the interviews with the PP that PP has submitted UKL/UPL of the proposed JCM project in accordance with the EIA regulation in Indonesia, and the Environmental Permit has been granted dated 07/07/2017.

C.6. Local stakeholder consultation

<Means of validation>

PPs conducted the stakeholder consultation on 21/11/2017 at Griya Agung (South Sumatera Governor Palace), Jl. Demang Lebar Daun No. 9, Ilir Barat I, Palembang 30137, South Sumatera, Indonesia.

The invitation letter was distributed to the stakeholders on 10/11/2017. The participants are listed as follows:

- Representative of Coordinating Ministry of Economic Affairs

- Representative of Government of South Sumatera
- Representative of Department of Public Works Bina Marga, South Sumatera Province
- Representative of Department of Energy and Mineral Resources, South Sumatera Province
- Representative of Economic Bureau, South Sumatera Province
- Representative of Legal and Human Rights Bureau, South Sumatera Province
- Representative of Department of Investment and One Stop Integrated Service, South Sumatera Province
- Representative of Local Financial and Asset Management Agency (BPKAD), South Sumatera Province
- Representative of Industrial Research and Standardization (Baristand), Palembang City
- Representative of Training and Development Bureau (BPP), Palembang City
- Representative of Department of Public Works (PUPR), Palembang City
- Representative of State Electricity Company South Sumatera Region
- Representative of PT Jakabaring Sport City (JSC)
- Representative of Special Economic Zone Tanjung Api-Api

The local stakeholders provided positive comments for the proposed JCM project. There is no negative issue that require action to be taken by the PPs. It is confirmed through the review of the relevant documents and the interview with the PPs during the on-site assessment that the stakeholder consultation process was appropriately conducted to collect stakeholder's opinion. The summary of the comments received in the consultation and due account of all comments taken by the PPs are fully described in PDD.

<Findings>

No issues were identified to the requirement.

<Conclusion based on reporting requirements>

The validation team has concluded that the implementation of the local stakeholder consultation of the proposed JCM project is adequate.

C.7. Monitoring

<Means of validation>

The Monitoring Plan consists of the Monitoring Plan Sheet and Monitoring Structure Sheet, which comply with the Approved Methodology of JCM_ID_AM013_ver01.0. There is one parameter "the quantity of the electricity generated by the project solar PV system *i* during the period *p* ($EG_{i,p}$)", which is measured by kWh meter installed in the Jakabaring substation. The measured data is stored in two locations. The first location is the SHARP server in Japan, where the data is transmitted via internet connection. The second location is the PDPDE server in the inverter house.

The generated electricity is monitored continuously, and the data recorded is double-checked by a responsible staff monthly to prevent a missing data. In the end of every month the total generated electricity is recorded. The factory calibration for kWh meter is carried out by Schneider Electric in accordance with Schneider Electric's verification procedures on 06/09/2017. The calibration interval will be planned according to Standard Operation Procedure proposed by PDPDE for every 10 years and it will be conducted by third party. Based on the Regulation of the Minister of Trade of the Republic of Indonesia, Number: 08/M-DAG/PER/3/2010 concerning Measuring, Dosing, Weighing Instrument and their Accessories Required to be Calibrated and Recalibrated, the digital kWh meter should be calibrated and recalibrated. The recalibration interval is regulated according to the Regulation of the Minister of Trade of the Republic of Indonesia, Number: 95/M-DAG/PER/11/2015 concerning Regulatory Changes of the Minister of Trade of the Republic of Indonesia, Number: 69/M-DAG/PER/10/2012. The digital kWh meter should be calibrated with the maximum interval for every 10 years or when the valid calibration mark is broken.

The main kWh meter is installed in Jakabaring sub-station with the type of Power Logic PM5560 made by Schneider. Also, there are eight kWh meters which embedded in each unit from eight switchgears used for the kWh meter backup installed in the inverter house. Besides, there are two kWh meters with the same type which are used for selling electricity installed in Jakabaring substation.

Two Pyranometers of CMP 6 model made by Kipp & Zonen are used for monitoring irradiance which is installed close together at the site.

The roles and responsibility of the personnel are described in the Monitoring Structure Sheet in accordance with the requirements of the applied methodology.

<Findings>

No issues were identified to the requirement.

<Conclusion based on reporting requirements>

The validation team has concluded that Monitoring Plan of the proposed JCM project complies with the requirements of the methodology and/or PDD and Monitoring Guidelines, and the project participants have ability to implement the described Monitoring Plan, including Monitoring Structure.

C.8. Modalities of Communication

<Means of validation>

The MoC was submitted to JQA for review in the latest form at the time of validation. The MoC was signed by the authorized representatives of all the PPs with the contact details.

JQA has assessed the personal identities including specimen signatures and employment status of the authorized signatories directly through the interview with PPs during the on-site assessment.

It is confirmed that all corporate and personal details including specimen signatures and the information in the MoC are valid and accurate as requested in the JCM Guidelines for Validation and Verification.

<Findings>

No issues were identified to the requirement.

<Conclusion based on reporting requirements>

The validation team has concluded that the MoC complies with all relevant forms and requirements. The issue raised by the team has been fully clarified.

C.9. Avoidance of double registration

<Means of validation>

The representative of focal point entity in MoC, Mr. SATO Tatsuya, Senior Executive Director of Sharp Energy Solutions Corporation declares in the MoC that the proposed JCM project is not registered under any other international climate mitigation mechanism other than the JCM.

It is confirmed through the check of publicly available information of Clean Development Mechanism (CDM), Verified Carbon Standard (VCS), etc. that the proposed JCM project is not registered under other international climate mitigation

mechanisms in terms of the name of entities, applied technology, scale, and the location. Thus, it can be concluded that the proposed JCM project will not result in double counting of GHG emission reductions.

<Findings>

No issue was raised to the requirement.

<Conclusion based on reporting requirements>

The validation team confirms that the proposed JCM project is not registered under the other international climate mitigation mechanisms and hence will not result in double accounting of GHG emission reductions.

C.10. Start of operation

<Means of validation>

The starting date of the proposed JCM project is set as 01/04/2018 in the PDD. It is confirmed through the review of relevant documents, the on-site assessment, and the interview with the PPs that the operation of the proposed JCM project is planned to start one month after the commissioning completed, and the selling electricity contract issued.

<Findings>

No issue was raised to the requirement.

<Conclusion based on reporting requirements>

The validation team confirms through the review of relevant documents and the on-site assessment that the starting date of the proposed JCM project operation has been set appropriately as required by the Guideline of the JCM project.

C.11. Other issues

<Means of validation>

No issue was identified as relevant element not covered above

<Findings>

Not applicable.

<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 01/09/2018 to 30/09/2018, indicated in the following view page of the proposed JCM project:

- https://www.jcm.go.jp/id-jp/projects/51

As a result, no comment has been received.

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

Not applicable

E. List of interviewees and documents received

E.1. List of interviewees

1. Sharp Energy Solutions Corporation
   - FUKAHORI Shoko, Supervisor, Global New Business Promotion Division, Project Business Unit
   - YAGI Tetsuro, Supervisor, System Development Design Division,
   - Project Business Unit
   - WIJAYA Benny, Interpreter
2. Perusahaan Daerah Pertambangan dan Energi
   - Iramsyah, Manager Operating and Monitoring
   - Rosyidi IWAN, Corporate Business Development Manager

3. Mitsubishi UFJ Morgan Stanley.
   - SHINCHI Kikuko, Senior Consultant, Clean Energy Finance Division
   - RISNAULI Ricky, Senior Consultant, Clean Energy Finance Division

E.2. List of documents received

1. Project Design Document, for publication

(JCM_ID_F_PDD_ver01.1_Jakabaring.docx)

2. Monitoring Plan Sheet and Monitoring Structure Sheet, for publication (JCM_ID_AM013_ver01.0_Jakabaring.xlsx)
3. Modalities of communications statement (JCM_ID_F_MoC_ver01.0_Jakabaring.pdf)
4. JCM Approved Methodology ID_AM001 (JCM_ID_AM013_ver01.0.pdf)
5. Monitoring Plan Sheet of JCM Approved Methodology ID_AM001 (JCM_ID_AM013_ver01.0.xlsx)
6. JCM Glossary of Terms (JCM_ID_Glossary_ver02.0)
7. JCM Project Cycle Procedure (JCM_ID_PCP_ver05.0.pdf)
8. JCM Modalities of Communication Statement Form (JCM_ID_F_MoC_ver01.0.pdf)
9. JCM Guidelines for Developing Project Design Document and Monitoring Report (JCM_ID_GL_PDD_MR_ver03.0.pdf)
10. JCM Project Design Document Form (JCM_ID_F_PDD_ver02.0.docx)
11. JCM Guidelines for Validation and Verification (JCM_ID_GL_VV_ver01.0.pdf)
12. JCM Validation Report Form (JCM_ID_F_Val_Rep_ver01.0.docx)
13. Company profile of PDPDE
14. Company profile of Sharp Energy Solutions Corporation
15. PLN Letter used for an explanation about the starting date 0f 01/04/2018
16. Legal durable years list stipulated in the Regulation of the Ministry of Finance, Japan No.15/1965 used for the evidence of the proposed JCM project's equipment life time.
17. Short report of the training implementation and two books of guidance used in the training, "Solar Inverter Installation & Operation Manual" and "SCADA PV + End User Guide"
18. Photos of the power plant site situation dated on 17/05/2017 until the situation dated on and 16/01/2018.
19. Solar PV panel ND-AH315 Catalogue which indicates design qualifications (IEC 61215, IEC 61646 or IEC 62108) and safety qualification (IEC 61730-1 and IEC 61730-2).
20. Specification of kWh meter Power Logic PM5560 made by Schneider, Pyranometer of CMP 6 model made by Kipp & Zonen, Specification of 3-Phase Solar Inverter and Monitoring Lay out.
21. List of the equipment which are described in section C.2. of the PDD
22. Excel sheet to calculate CO_2 emission reduction.

23. Ministry of Environment Decree No: 05/2012 and Head of Palembang City Decree No: 03/2013 used to prove the existence of requirement for UKL (Environmental Monitoring Effort/Scheme) or UPL (Environmental Management Effort/Scheme) in Indonesia.
24. the Decree of Head of Environment and Hygiene Agency of Palembang City, No.:32/KPTS-IL/DHLK/2017 concerning Environmental Permit for Solar Power Generation with capacity of 2 MW conducted by Perusahaan Daerah Pertambangan dan Energi, Sumatera Selatan Province, dated on 07/07/2017
25. Local Stakeholder Consultation Documents, including invitation letter, list of attendees, and Minute of Meeting
26. Presentation materials for the local stakeholder consultation
27. Specification of kWh meter Power Logic PM5560 made by Schneider
28. Factory Calibration Certificate for kWh meter Power Logic PM5560 dated on 06/09/2017
29. Project Design Document, for registration (JCM_ID_F_PDD_ver02.0_r5.docx)
30. Explanation material related to a change of the kWh Meter installation location to Jakabaring substation.

F. References

1. Ministry of Environment Decree No: 05/2012 concerning About Types of Business Plan and / or Activities Requiring Has the Environmental Impact Assessment
2. Mayor of Palembang City Decree No: 03/2013 concerning Environmental Permit.
3. Decree of Head of Environment and Hygiene Agency of Palembang City, No.:32/KPTS-IL/DHLK/2017 concerning Environmental Permit for Solar Power Generation with capacity of 2 MW conducted by Perusahaan Daerah Pertambangan dan Energi, Sumatera Selatan Province, and dated 07/07/2017.

Annex Certificates or curricula vitae of TPE's validation team members, technical experts and internal technical reviewers

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 4.6. Other manufacturing industries	-
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	-

Statement of competence

Name: Mr. Koichiro Tanabe

Qualified and authorized by Japan Quality Assurance Organization.

Function

	Date of qualification
Validator	-
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	-
TA 4.6. Other manufacturing industries	2014/12/22
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: Dr. Irhan Febijanto

Qualified and authorized by Japan Quality Assurance Organization.

Function

	Date of qualification
Validator (JCM project only)	2017/8/21
Verifier (JCM project only)	2017/8/21
Team leader	-

Technical area within sectoral scopes

	Date of qualification
TA 1.1. Thermal energy generation	2014/12/22
TA 1.2. Renewables	-
TA 3.1. Energy demand	2014/12/22
TA 4.1. Cement and lime production	-
TA 4.6. Other manufacturing industries	-
TA 5.1. Chemical industry	-
TA 10.1. Fugitive emissions from oil and gas	-
TA 13.1. Solid waste and wastewater	-
TA 14.1. Afforestation and reforestation	-

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 4.6. Other manufacturing industries	2014/12/22
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	-