JCM Verification Report Form

A. Summary of verification

A.1. General Information

Title of the project	Installation of 12.7MW Solar Power Plant for Power Supply In Ulaanbaatar Suburb
Reference number	MN003
Monitoring period	26/08/2017 - 31/05/2018
Date of completion of the monitoring report	30/10/2018
Third-party entity (TPE)	Japan Management Association (JMA)
Project participant contracting the TPE	FARMDO CORPORATION
Date of completion of this report	31/10/2018

A.2 Conclusion of verification and level of assurance

Overall verification opinion	☒ Positive ☐ Negative
☒ Unqualified opinion	Based on the process and procedure conducted, *Japan Management Association* (TPE's name) provides reasonable assurance that the emission reductions for *Installation of 12.7MW Solar Power Plant for Power Supply In Ulaanbaatar Suburb* (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 implementation with	The TPE determines the conformity of the actual project and its operation with the eligibility criteria of	☒

Item	Verification requirements	No CAR or CL remaining
the eligibility criteria of the applied methodology	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: Inoue First name: Tadashi

Title: Senior Executive of GHG Certification Center, JMA

Specimen signature: [redacted] Date: 31/10/2018

B. Verification team and other experts

	Name	Company	Function*	Scheme competence*	Technical competence*	On-site visit
Mr. ☒ Ms. ☐	Motoyuki Matsumoto	JMA	Team Leader	☒	Technical competence qualified	☒
Mr. ☒ Ms. ☐	Toshiaki Takeda	JMA	Team Member	☒	Technical competence qualified	☐
Mr. ☒ Ms. ☐	Kenji Suzuki	JMA	Internal Reviewer	☒	Technical competence qualified	☐
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>

Approved methodology “Installation of Solar PV System, Ver. 02.0 (Ref.2)” was applied to the JCM project. Verification team assessed the compliance of the project implementation and operation with the eligibility criteria of the applied methodology.

Verification team conducted the assessment of the project implementation and operation for the monitoring period (from 26 Aug.2017 to 31 May.2018) to confirm the compliance with the eligibility criteria of the applied methodology (Ref.2).

- Document review was conducted using the checklist based on the “JCM Guidelines for Validation and Verification (Ref.13)”.
- Follow-up interviews and on-site visit were conducted on 23-24 Aug. 2018.

Each criterion of the applied methodology was checked as follows by document review and on-site assessment.

Criterion 1:

The equipment for solar PV system described in the revised PDD was confirmed by on-site assessment, checking "Specification of equipment (Ref.3-1-1)", and interviews with project participants (PPs). Verification team confirmed that a new solar PV system was installed at the project site and the proposed project satisfied the eligibility criterion 1.

Criterion 2:
Criterion 2 was checked with "Specification of solar PV system (Ref. 3-1-1)" and "Certificate for design qualifications (IEC 61215) and safety qualification (IEC 61730-1 and IEC 61730-2) (Ref.3-5)". Verification team confirmed that the solar PV modules installed have obtained design qualifications (IEC 61215) and safety qualification (IEC 61730-1 and IEC 61730-2), and the proposed project satisfied the eligibility criterion 2.

Criterion 3:
The equipment to monitor the output power of solar PV system and irradiance was checked through on-site assessment. An eelectrical power meter of solar PV system was checked by on-site inspection and "Specification of electrical power meter (Ref.3-1-2)". Also, a pyranometer was checked by on-site inspection, "Specification of pyranometer (Ref.3-1-3)",and "Specification of remote monitoring service for solar PV system (Ref.3-2-1)".
Verification team confirmed that the equipment to monitor output power of the solar PV system and irradiance was installed at the proposed project site. During the monitoring period, the date was checked by the operator. The proposed project satisfied the eligibility criterion 3.

<Findings>

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

No CAR, CL, or FAR was raised for this section.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

Verification team assessed the application of approved methodology of the JCM project with the supporting documents and on-site visit.
Verification team confirmed the compliance of the project implementation and operation 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>

PPs implemented the project separated with 1st phase and 2nd phase for installing modules additionally. PPs installed totally 12.7MW output modules, exceeded the 2.3 MW output modules stipulated in the registered PDD. Also, contact person of the PP was changed.

The electrical power meter for the monitoring point was not changed, and both EIA and LSC were carried out assuming the future capacity increase by the implementation of 2nd phase.
Therefore, installing the modules additionally including the equipment is applied as post registration change.
Verification team checked that physical features of the project in the revised PDD were in place and that PPs operated the project for the monitoring period as per the revised PDD.

A.1, 2:Title of the JCM project and general description
Verification team confirmed that explanation of how the proposed project reduces greenhouse gas emissions was not changed in the revised PDD from the registered PDD.

The physical features of the project in the revised PDD were checked by the on-site assessment and "Specification of equipment (Ref.3-1-1～3)".
CAR1 was raised for the inconsistency of the number of installed PV modules between the revised PDD and references.

A.3: Location of project
Location was confirmed by GPS through on-site assessment of the proposed project site and interviews with PPs.

A.4:Name of project participants
The contact person described in the "Modalities of communications (MoC) (Ref.8-1)" was changed. PPs revised MoC (Ref.8-2) and submitted. Verification team confirmed by interviews, on-site assessment and checking the revised MoC and "Organization structure of PPs (Ref.3-1-6)".

Also, Monitoring structure was checked by interviews with people described in the Monitoring Structure Sheet of the revised PDD. In addition, verification team confirmed the implementation of QA/QC procedure (Ref.12) in line with the revised PDD and the applied methodology requirements.

A.5: Duration
In the validation, operational life time of the project was confirmed by the "Limited Power Output Warranty (Ref.3-3-1) and "Power Purchase Agreement (Ref.3-1-4)". PPs submitted the Limited Power Output Warranty of the additional modules as well as that of the modules installed in 1st phase. Verification team confirmed the warranty period is the same as the period

of reference checked at the validation and Power Purchase Agreement is not revised.

CL1 and CAR2 were raised to check the “Starting date of project operation”.

A.6: Contribution from Japan
Financial support by the Ministry of the Environment, Japan was confirmed by checking “Grant decisions for JCM project (Ref.3-4)”.

<Findings>

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

CAR1
The number of installed modules was not consistent between the references: PV module delivery reports by the supplier, the single line diagrams, and the installed module listed by the PP (Ref.3-1-1)”.

⇒Summary of Response and Verification team Conclusion：
PPs submitted the delivery completion reports additionally, corrected the single line diagrams, and revised the PDD.
Verification team confirmed that those references are consistent and the PDD was revised appropriately. CAR1 was closed.

CL1
Please submit the documents or records as the evidence of “Starting date of project operation”

⇒Summary of Response and Verification team Conclusion：
PPs submitted the following references for "Starting date of project operation".
Ref.3-3-2 1) Certification issued by National Dispatching Center
Ref.3-3-2 2) Application for the electricity supply to the National Dispatching Center.
Ref.3-3-2 3) Permission issued by National Commission of Ministry of Energy

CAR2
Among the relevant evidences submitted by the PPs, there is inconsistency of “Starting date of project operation” against the PDD, therefore, CAR2 was raised.

⇒Summary of Response and Verification team Conclusion：
PPs revised the PDD in accordance with the references (Ref.3-3-2). Verification team confirmed that operation of the project started from 26 August 2017 as specified in the revised PDD. CL1 and CAR2 were closed.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

Verification team identified that the PPs increased the project capacity, and this applies to a post registration change.

Through the references of project technical specifications, implementation records, and physical observation during the site visit, verification team assessed that the post registration change would not prevent the use of applied methodology, as the PPs changed only the project capacity and kept the eligibility criteria specified in the applied methodology.

In addition, it was confirmed that operational and management structure described in the Monitoring Structure Sheet of the revised PDD was conducted during the monitoring period. The monitoring has been carried out in accordance with the monitoring plan contained in the revised PDD.

Verification team confirmed that the project was operated during the monitoring period in accordance with the revised PDD.

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

<Means of verification>

Compliance of calibration frequency of the electrical power meter was checked against the applied methodology and the revised PDD.

In the monitoring plan of the registered PDD, the calibration frequency was specified in accordance with the corresponding agency of Mongolia, which is not revised in the revised PDD for the post registration change.

Validation team confirmed with the test report (Ref.6) that the electricity meter was certified and valid for 8years, and fully covers this monitoring period.

Also, verification team confirmed that electrical power meter was not changed as the post registration change and the calibration or replacement of electricity meter was not required during this monitoring period, in accordance with the monitoring plan of the registered PDD.

<Findings>

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

No CAR, CL, or FAR was raised for this section.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

Verification team confirmed that the electricity meter for monitoring point No.(1) was valid and

calibration or replacement was not required during this monitoring period in accordance with the monitoring plan of the registered PDD.

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

<Means of verification>

Monitoring Report was checked as follows through document review and on-site assessment to confirm the data and calculation of GHG emission reductions. Monitoring Report was checked against the description of Monitoring Plan Sheet, the revised PDD and the applied methodology.

Parameters used for calculations were checked with the following table.

・Parameters monitored ex post (Table 1 of Monitoring Report Sheet) :

Monitored values of electrical power meter (Monitoring point No. (1)) were checked with the following table.

・Project specific parameters fixed ex ante (Table 2 of Monitoring Report Sheet) :

CO2 emission factor used for the calculation was checked with the revised PDD and the approved methodology.

Verification team verified the reported emission reductions of "Monitoring Report (Ref.7) by comparing the source data (Ref.11-2-1, 11-2-2) and CO2 emission factor of the approved methodology. It was checked through CL2.

The comparison of actual CO2 emission reductions with estimates (Ref.11-1-1) was checked by verification team. Total amount of the electricity generated actually was higher than that of estimated value. CL3 was raised for checking those differences.

Parameters	Monitored values	Method to check values in the monitoring report with sources
ΣEGi,p	11,144 MWh	The data used was taken from the electrical power meter, which was installed at the project site. CL2 was raised to check the source data of this monitoring period. As a result of raising CL2, the source data (Ref.11-2-1, 11-2-2) of monitored value (11,144 MWh) was checked during on-site assessment.

<Findings>

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

CL2

Please submit the source data of monitoring point No. (1) (measured record of electricity meter) for the monitoring period (Ref.7).

⇒Summary of Response and Verification team Conclusion：

CL2

PPs submitted the measuring records of electricity meter (Ref.11-2-1) as the source data, double check records (Ref.11-2-2) and invoices issued by the power company (Ref.11-2-3). Verification team checked the measuring records and double check data, and confirmed those records are consistent and used as the data for monitored values. Invoices are issued by means of reading the electrical power meter installed at the substation. Amount of the electricity written in the invoices were agreed with the PPs and the power company based on the power purchase agreement. Verification team also confirmed the consistency between the measuring records and invoices.

CL2 was closed.

CL3

Compared with the actual generated volume of electricity and the estimates, the actual volume was 43% higher than the estimates. Please submit the reason why the actual generated power during the monitoring period was higher than the estimates in the registered PDD.

⇒Summary of Response and Verification team Conclusion：

PPs explained that irradiance measured during the monitoring period is higher than that of estimates used for the calculation of estimated power generation. PP submitted the records of total irradiance measured by PPs (Ref.11-1-2).

Verification team checked “Reference regarding estimated solar PV output (Ref.11-1-1)”, and compared with the total irradiance records (Ref.11-1-2). Compared with the measured data and values for estimates, the measuring data of irradiance showed approximately 20% higher than the value of estimates. Electricity generated by this project was checked through CL2. Therefore, this variation of power generation is due to the conservative value adopted for the estimates. And irradiance at the validation contains the uncertainty, because the value of irradiance was not adopted for the measuring records at the project site. CL3 was closed.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

Verification team confirmed that the appropriate Monitoring Report Sheet of the applied methodology was used for Monitoring Report.

CO2 emission reductions during monitoring period are higher than the estimated value in the PDD. This was checked and its background was confirmed by raising CL3.
A complete set of source data of monitoring point No. (1) (measured data of electrical power meter) for the monitoring period was prepared by PPs and checked by verification team. Also, it was confirmed that the appropriate emission factor (0.797 for the reference CO2 emission factor) was used in accordance with the approved methodology.
Verification team confirmed that the calculation of CO2 emission reductions was conducted appropriately in accordance with the approved methodology.

C.5. Assessment of avoidance of double registration

<Means of verification>

The following websites of CDM and VCS were checked whether the projects with similar technology and location had been registered.
1) Website of UNFCCC (Project Search for CDM)
2) Website of IGES (IGES CDM Project Database)
3) Website of Verified Carbon Standard
Also, the written confirmation that the project was not registered under other international climate mitigation mechanisms was submitted and checked through CL5.

<Findings>

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

CL5
For the post registration change, please submit the written confirmation that the project is not registered under other international climate mitigation mechanisms.
⇒Summary of Response and Verification team Conclusion：
Written confirmation (Ref.8-3) that the project was not registered under other international climate mitigation mechanisms was submitted.
CL5 was closed.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

Verification team confirmed that the project was not registered under other international climate mitigation mechanisms.

C.6. Post registration changes

<Means of verification>

Please refer to section C.2.

<Findings>

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

Please refer to section C.2. **<Conclusion based on reporting requirements>** *Please state conclusion based on reporting requirements.* Please refer to section C.2.

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

There is no remaining issue.

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			
2017	1,909.9	0	1,909
2018	6,971.8	0	6,971
2019			
2020			
2021			
2022			
2023			
2024			
2025			
2026			
2027			
2028			
2029			
2030			
Total (tCO_2e)			8,880

F. List of interviewees and documents received

F.1. List of interviewees

FARMDO CORPORATION:

Mr.S.Endo

Ms.N.Adachi

Everyday Farm LLC:

Mr.R.Jigjid

Mr.R.Munkhbayasgalan

Mr.B.Gantulga

Mr.G.Telmen

D・RECS Co.Ltd.
Mr.K. Kozai

F.2. List of documents received

1-1：Project Design Document for JCM project " " (Registration date: 26/05/2017)
1-2：Revised Project Design Document for JCM project(Ver10.0 30/10/2018)
2：Approved Methodology "Installation of Solar PV System, Ver. 02.0 "
3：Reference relating to PDD chapter A,B,C
3-1-1：Specification of solar PV system:
1) Specification of solar PV module (27 Nov.2015, 27 Jinko Solar Japan K.K.) and Delivery completion report (28 Sep.2016, Hitachi Systems, Ltd.)、
2) Specification of solar PV module (08 July 2016, Jinko Solar Japan K.K.) and Delivery completion report (10 Mar.2017,31 Mar 2018, Hitachi Systems, Ltd.)
3) Specification of solar PV module (27 Jan 2016, Jinko Solar Japan K.K.) and Delivery completion report (31 Mar 2018, Hitachi Systems, Ltd.)
4) Specification of solar PV module (23 Sep 2016, Jinko Solar Japan K.K.) and Delivery completion report (31 Mar 2018, Hitachi Systems, Ltd.)
5) Specification of solar PV module (13 Sep 2016, Jinko Solar Japan K.K.) and Delivery completion report (31 May 2018, Hitachi Systems, Ltd.)
6) Single line diagram (18 Aug.2016)
7) Single line diagram (3 Oct.2018)
8) Specification of power conditioner (MV Power Station 2000SC, SMA Solar Technology (www.SMA-Solar.com))
3-1-2：Specification of electrical power meter for monitoring point No.1：
A1800 ALPHA® meter style numbers (elster (www.elster.com))
3-1-3：Specification of pyranometer of the solar PV system:
(Delta OHM)
3-1-4：This Electric Power Purchase Agreement
(8 Jun.2016, National Dispatching Center Limited Liability Company and Everyday farm LLC)
3-1-6：Organization structure of PPs
1) Organization structure of Everyday Farm LLC (5 Jan.2017)
2) Organization structure of Bridge LLC (Sep.2016)
3-2-1：Specification of remote monitoring service for solar PV system (12 Dec 2016, Hitachi

Systems, Ltd.)
3-3-1：Reference of "Expected operational lifetime of project":
1) Limited Warranty for Solar PV module (Warranty period of Limited Power Output Warranty (25years)) (27 Sep 2016, 7 Feb 2017, 22 Mar 2017, 12 Feb 2018 28 Jul 2017, 5 Aug 2017, Jinko Solar Japan K.K.)
2) SMA manufacturer's Warranty (SMA Solar Technology)
3-3-2 Reference of "Starting date of project operation"
1) Certification issued by National Dispatching Center
2) Application for the electricity supply to the National Dispatching Center.
3) Permission issued by National Commission of Ministry of Energy
3-4-1：Grant decisions for carbon dioxide emission control measures business subsidies 2015-2017 fiscal year, Issued by Global Environment Centre Foundation, 1 Apr. 2016
3-4-2：Grant decisions for carbon dioxide emission control measures business subsidies 2015-2017 fiscal year, Issued by Global Environment Centre Foundation, 11 Oct. 2016
3-5：Certificate for design qualifications (IEC 61215) and safety qualification (IEC 61730-1 and IEC 61730-2):
Test Report (12/11/2015,1/7/2016, 7/7/2016, 12/10/2016, 7/12/2016, 24/4/2017, TÜ V)
4：Reference of "EIA"
4-1：Evaluation result of Environmental impact assessment report (17 Nov.2015, Ministry of Environmental, Green Development and Tourism of Mongolia)
4-2：Environmental impact assessment report (2015, Everyday Farm LLC)
5：Local stakeholder consultation (3-4 Oct.2016) Meeting memo
6：Certification of test report of Electricity meter (11Nov.2015, Mongolian Agency for Standardization and Metrology)
7：Monitoring report (30/10/2018)
8：Modalities of communications
8-1：JCM Modalities of Communications Statement Form (Submitted on 7 Feb.2017)
8-2：JCM Modalities of Communications Statement Form ANNEX 1 (Date of Submission :29 Oct 2018)
8-3：Written confirmation from FARMDO CORPORATION (Declaration from Mr.Masayuki Iwai on 22 Oct. 2018)
11：Reference relating to Monitoring Plan Sheet
11-1-1：Reference regarding estimated solar PV output:
11-1-2：Records of irradiance measured by PPs
11-2-1：Records of measured data of electricity meter
11-2-2：Double check records implemented by PPs
11-2-3：Agreed Power Sale Data：Generated Power Sales Agreement per every month

between the National Dispatching Center and PPs

12：Monitoring Flow (Prepared by FARMDO CORPORATION, Revised on 3 Mar.2017)

13 : Joint Crediting Mechanism Guidelines for Validation and Verification (JCM_MN_GL_VV_ver01.0)

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 Competence
for Validation/Verification team

GHG Certification Center
Japan Management Association

Scheme:

The Joint Crediting Mechanism (JCM)

Project Title:

Installation of 12.7MW Solar Power Plant for Power Supply In Ulaanbaatar Suburb

Validation or Verification:

Verification

Name	Qualification*1	Leader/Member/ Technical expert/ Technical Reviewer(TR)	Qualification of Technical area (Renewables)*2	JCM scheme competence
Mr. Motoyuki Matsumoto	Lead Validator/ Verifier	Leader	☑	☑
Mr. Toshiaki Takeda	Lead Validator/ Verifier	Member	☑	☑
Competence of Validation Team	-	-	☑	☑

*1Qualification in accordance with "JMACC's Procedures for Contract and Evaluation of Validators/Verifiers and Technical Experts (GA-110)"

*2Competence Requirement in accordance with Competence for Technical area sheet (GA-110-08)

Date 27 June, 2018

[redacted]

Kenji Suzuki
Director of Validation & Verification Dept.
GHG Certification Center
Japan Management Association

Certificate of Competence for Technical Review team

GHG Certification Center
Japan Management Association

Scheme:

The Joint Crediting Mechanism (JCM)

Project Title:

Installation of 12.7MW Solar Power Plant for Power Supply In Ulaanbaatar Suburb

Validation or Verification:

Verification

Name	Qualification[*1]	Leader/Member/ Technical expert/ Technical Reviewer(TR)	Qualification of Technical area (Renewables)[*2]	JCM scheme competence
Mr. Kenji Suzuki	Lead Validator/ Verifier	Technical Reviewer	☑	☑
Competence of Technical Review Team	-	-	☑	☑

[*1]Qualification in accordance with "JMACC's Procedures for Contract and Evaluation of Validators/Verifiers and Technical Experts (GA-110)"

[*2]Competence Requirement in accordance with Competence for Technical area sheet (GA-110-08)

Date 27 July. 2018

[redacted]

Kenji Suzuki
Director of Validation & Verification Dept.
GHG Certification Center
Japan Management Association