JCM Verification Report Form

A. Summary of verification

A.1. General Information

Title of the project	Centralization of heat supply system by installation of high-efficiency Heat Only Boilers in Bornuur soum
Reference number	MN002
Monitoring period	15/09/2015 - 02/05/2016
Date of completion of the monitoring report	23/09/2016
Third-party entity (TPE)	National Renewable Energy Center, Mongolia
Project participant contracting the TPE	Suuri Keikaku Co.,Ltd, Japan
Date of completion of this report	23/09/2016

A.2 Conclusion of verification and level of assurance

Overall verification opinion	☒ Positive ☐ Negative
☒ Unqualified opinion	Based on the process and procedure conducted, *National Renewable Energy Center Mongolia* (TPE's name) provides reasonable assurance that the emission reductions for *"Centralizationof heat supply system by installation of high-efficiency Heat Only Boilers in Bornuur soum"* (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> N/A

A.3. Overview of the verification results

Item	Verification requirements	No CAR or CL remaining
The project implementation with the eligibility criteria of the applied methodology	The TPE determines the conformity of the actual project and its operation with the eligibility criteria of the applied methodology.	☒
The project implementation against the registered PDD or any approved revised PDD	The TPE assesses the status of the actual project and its operation with the registered/validated PDD or any approved revised PDD.	☒
Calibration frequency and correction of measured values with related requirements	If monitoring Option C is selected, the TPE determines whether the measuring equipments have been properly calibrated in line with the monitoring plan and whether measured values are properly corrected, where necessary, to calculate emission reductions in line with the PDD and Monitoring Guidelines.	☒
Data and calculation of GHG emission reductions	The TPE assesses the data and calculations of GHG emission reductions achieved by/resulting from the project by the application of the selected approved methodology.	☒
Avoidance of double registration	The TPE determines whether the project is not registered under other international climate mitigation mechanisms.	☒
Post registration changes	The TPE determines whether there are post registration changes from the registered PDD and/or methodology which prevent the use of the applied methodology.	☒

Authorised signatory:	Mr. ☒ Ms. ☐
Last name: Baldorj	First name: Altangerel
Title: Director	
Specimen signature: [redacted]	Date: 23/09/2016

B. Verification team and other experts

	Name	Company	Function*	Scheme competence*	Technical competence*	On-site visit
Mr. ☐ Ms. ☒	M.Natsag-badam	NREC	Team leader	☒	Sectoral scope 1,2,3	☒
Mr. ☐ Ms. ☒	B.Myagmar naran	NREC	Team member	☒	Sectoral scope 1,2,3	☒
Mr. ☒ Ms. ☐	T.Batzaya	NREC	Internal reviewer	☒	Sectoral scope 1,2,3	☐
Mr. ☒ Ms. ☐	J.Landan-norov		Technical expert	☒	Sectoral scope 1,2,3	☐

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>

The NREC Verification team has verfied whether the project implementation and operation complied with the eligibility criteria of the applied methodology after the starting date of of the project operation, through the Document review and Follow up actions (on site visit and interview) with Evidences: Ref.01, Ref.02, Ref.04, Ref.05 Ref.19 and Ref.18, attached to this report.

Project has been implemented by Suuri Keikaku Co.,Ltd of Japan (hereinafter called "the Japanese PP") and Anu Service Co.,Ltd of Mongolia (hereinafter called "the Mongolian PP"). The installation of high-efficiency Heat Only Boilers - EKOEFECT, pipe laying work, electrical construction and boiler building construction works were completed within framework of the JCM project and the project operation has started in 27th September 2014.

The Eligibilty criteria of the applied methodology is as below:

Criterion 1; Technology to be employed in this methodology is coal-fired heat only boiler(HOB) for hot water supply system.

Criterion 2; Capacity of the project HOB ranges from 0.10 MW to 1.00MW.

Criterion 3; The project activity involves the installation of new HOB and/or the replacement of the existing coal-fired HOB.
Criterion 4; The project HOB is equipped with an operation and maintenance manual.
Criterion 5; The catalog value of the boiler efficiency for the project HOB is 80% or higher.
Criterion 6;The project HOB has the function to feed coal on the stoker uniformly and is equipped with a dust collector.

The assessment results summarized as below:

1. The HOB EKOEFECT 600, which is installed and operated at the project site is the coal-fired heat only boiler for hot water supply system, it complies with Criterion #1, of the Applied methodology,
2. Capacity of the this HOB is 600 kW, complies with Criterion #2,
3. As a result of project implementation, 7 small, old, inefficient boilers have been replaced with two new high - efficient HOB, with a sufficient capacity, it complies with the Criterion #3,
4. The project HOB is equipped with an operation and maintenance manual prepared by Suuri Keikaku Co.,Ltd and translated into Mongolian language, complies with Criterion #4,
5. Catalog value of Boiler Efficiency of project HOB is 80-90%, complies with Criterion # 5,
6. The project HOB has the function to feed coal on the stoker uniformly and is equipped with a dust collector, complies with Criterion # 6, of the Applied methodology,

After the desk review, the on-site assessment was conducted on 25 July 2016.
Verification team determined that the project HOBs are in place and are used for heating service till now.

<Findings>

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

No issue was raised to the requirement

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

NREC Verification team confirmed fully compliance of the project implementation and operation with the Eligibility criteria of the applied methodology "Replacement and Installation of high- efficient Heat Only Boiler for Hot Water Supply Systems" (MN_AM002), approved in 28 January 2015, under the scheme of JCM between Mongolia and Japan.

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

<Means of verification>

NREC Verification team assessed whether the project implementation complied with the registered PDD or any approved, revised PDD through Document review on registered PDD

and Follow-up actions (on-site visit and interviews) with Evidences: Ref.02, Ref.03, Ref.04, Ref 06 and Ref.18, attached to this report

1. Physical features of the project were checked through the on-site visit in 25 July 2016 and two HOBs of EKOEFECT 600 type, with serial numbers of 2013/141 and 2013/142 were in place as per the registered PDD. The consumers of the Bornuur Soum center have been supplied with a heat energy produced by the Project HOB, since September 2014,

The monitoring of the project was started in 15 September 2015 . The monitoring based on the actual measurement using equipments or "Monitoring Option C" was performed, according to the registered PDD.

2. Measuring equipment of the parameters is the Heat meter. The Heat meter consists of 1 flow sensor, 2 temperature sensors, calculation unit with display and datalogger, according to the registered PDD and Monitoring Plan. Verification team confirmed the existence of Heat meters- Multical 602C, with serial number of 69710727 and 69710728, which were installed at the monitoring point as described in the registered PDD.

3. Parameters to be monitored ex-post are the net heat quantity supplied by the project HOB during the monitoring period - PHp and total hours of project HOB operation during the monitoring period - HMPp. Verification team determined that the measuring of the heat quantity was continuously done by the heat meter, recording of measured value (data) were 4 times per hour in the datalogger and data input in the computer's database. Total hours of project HOB operation was identified by the monitoring period. The monitoring option, measurements method and procedure were performed appropriately in line with the registered PDD.

4. Monitoring Structure of Project participants was identified through an interview with the Job Manager of the Project, with the Engineers of Anu Service.,Ltd and review on MoC submitted to the JC by the PP at validation stage, and are as below:

1) Mr. Tabata Toru- Project Manager
2) Mr. Kuwahara Fumihiko-Job Manager
3) Mr. T.Narankhuu- Senior engineer
4) Mrs. D.Gantsetseg-Civil engineer and QA/QC team officer

<Findings>

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

No issues were raised

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

NREC Verification team confirmed that the Project implementation was in accordance with the registered PDD during the monitoring period and no change was found from the registered PDD.

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

<Means of verification>

NREC Verification team assessed whether the calibration frequency and correction of measured values comply with the related requirements through Document review and Follow-up actions (on-site visit and interviews) with Evidences: Ref.08, Ref.09, Ref.10, Ref.11, Ref.12, Ref.15, Ref.16, Ref.18 and Ref.25

1. The parameter was measured by the Heat meter Multical-602C. Heat meters were installed by the Engineers of Anu Service Co.,Ltd which has the permission for installation of heat meters. Verification team determined that the Heat meters were calibrated in 24 February 2015 by the Kamstrup A/S Laboratory of Denmark. The validity period of this verification is till end of 2019, according to the "List of measuring instruments subject compulsory metrological control", Order #A/384_2014, by the Chairman of the Mongolian Agency for Standardization and Metrology (MASM), 2014 and "Letter for Recognition of initial calibration of the Heatmeter Multical 602C, 20 March 2015" by the MASM. The installation of the Heatmeter, which is used for heating service, required to be under control of State Authorized Entity according to the related standard of Mongolia. Thus the Verification team raised CAR01 and CAR02 on this issue.

2. NREC Verification team assessed the measured values in the database of the Project Participant (Anu Service Co.,Ltd), and determined that, the set of measured data were within acceptable range including heat energy, flow rate, hot water temperatures in the pipes, outdoor and indoor temperatures and confirmed absence of missed data during the monitoring period, thus the correction of measured values was not required.

<Findings>

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

CAR01- There was no Inspection seal for installation of the Heat meter, by the State Authorized Entity, as the external inspection, according to the standard MNS 6241:2011.Heat meters. General requirements for the installation, commisioning, operational monitoring and maintenance.

CAR 01 was closed out, because the required inspection and sealing of the Heat meter's installation was made by the Ulaanbaatar Heating Network Company's representative on15 August 2016, with Ref.25

CAR 02 - Requested to submit Report for inspection and sealing of the Heat meter's installation as the documentation of the inspection.

CAR 02 was closed out, the PP has submitted the required Report, with Ref.25

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.
NREC Verification team comfirmed that the calibration frequency of monitoring equipment complied with related requirements of the "Law on Guarantee the Uniformity of Measurement" also the team confirms that the correction of measured values was not required.\

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

<Means of verification>
NREC Verification team assessed data and calculation of GHG emisssions reductions through Document review and Follow-up actions (on-site visit and interviews) with Evidences: Ref.02, Ref.03, Ref.07, Ref.12, Ref.15-18 and Ref.26.

1.Monitoring period

Verification team determined that the monitoring period was from 15 September 2015 till 02 May 2016, because measuring equipments were installed in 05 September 2015 and the customers have received a heat supply from 15 September 2015 till 02 May 2016. The Monitoring period has been divided into 2 parts, in order to specify the annual Emission reductions .

The 1st monitoring period is between 15 September 2015 and 31 December 2015

The 2nd monitoring period is between 01 January 2016 and 02 May 2016

2.Data assessment

The parameter “Heat energy” or the total heat quantity produced by project HOB is measured by the Heat meter as following: the parameters measured in every 15 minutes and recorded in the data logger, built in the heat meter. This value is the sum of value of current measurement and the values of previous measurements, thus the Data logger calculates and records the total heat quantity produced by the HOB from the start of monitoring, to the moment of particular measurement, which took in every 15 minutes. Then the data was transferred to the database of Mongolian PP's computer as it showed in Ref.15.

The data was checked through review of the database of the PP, Journal of HOB Manager and Fairman. Measured and recorded parameters in the datalogger of Heat meter are: Meter Number, Readout date & time,Heat energy (GJ),Volume of water, Hour counter (hrs),Current flow temperature, Current return temperature, Power (MW), Current flow rate(m3/h). The Datalogger's display shows measured values and it has been observed by the HOB's Manager regularly.

Direct data transmission from data logger of the Heat meter to the office of Mongolian PP through the internet was available from 30 December 2015, but the transmission system started to function properly, without interrupt on 02 March 2016, after complete adjustment of the

system. The received data were exported into Excel sheet in the database of PC and were stored, set of 24 hrs data has been transfered to the database of Suuri keikaku Co.,Ltd in Tokyo, Japan, every day.

Verification team determined that, the measuring and data recording of the monitored parameters was continuous, without interrupt due to the heat meter's data logger with a battery and no data missing and no abnormal values was found.

3. Calculation of GHG Emission Reductions

Verification team verified the corresponding Monitoring Report sheet and calculation formulas of the GHG emission reductions of the applied methodology and determined that, they were used correctly. The ex-ante parameters used in the calculation were correct, without any errors and omissions and misrepresentations.

Ex-ante parameters used for calculation are:

RPC p = 2.3 kW (Rated power consumption of the project HOB),

EF CO2, grid =1.1030 tCO2/MWh (CO2 Emission factor of the Grid electricity consumed by project HOB),

Default values used for calculation are:

EF CO2, coal = 0.0909 tCO/GJ (CO2 Emission factor of Coal used in HOB),

η = 0.533 - (Boiler Efficiency of Reference the HOB)

η = 0.610 - (Boiler Efficiency of project HOB)

4. Verified amount of Emission Reductions

The verified amount of Emission reductions achieved during this monitoring period are:

1) 50 tCO2 for the period between 15 Sept 2015 and 31 December 2015,

2) 57 tCO2 for the period between 01 Jan 2016 and 02 May 2016,

Thus the 50 tCO2 is the ERs for the 2015 FY and 57 tCO2 is the ERs for the First half of 2016 FY.

5. Monitored values provided in the Monitoring report has been checked as listed below:

Parameters	Monitored values	Method to check values in the monitoring report with sources
PHp	2948 GJ/per the 1st period , 3357 GJ/ per the 2nd period	Reported value was checked agaisnt the Monitored data and other means as below: 1. Assessment of the measured values in the data logger of the Heat meter. 2. Comparison of the measured values in the Heat meter's display, that were installed at hot water pipe of each HOB and at the main outgoing hot water pipe,

		3. Assessment of information of the "Logbook of Consumer's opinion", "Journal of HOB Manager". "Observation report of the heatmeters" and interview with the related persons, consumers,
HMPp	5184 hrs/ per the 1st period, 5904 hrs/ per the 2nd period	1. Assessment of measured values in the database of the PP , 2. Assessment of information of the Heating supply contracts, "Journal of Fireman", "Logbook of Consumer's opinion"," Observation report of heat meters" and interview with the related persons and consumer's representative, about HOB operation,

<Findings>

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

No issues were raised.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

NREC Verification team confirmed the fair representation of reported values of GHG emission reductions in the monitoring report and has no material errors.

C.5. Assessment of avoidance of double registration

<Means of verification>

Verification team checked whether the JCM project has not been registered under other international climate mitigation mechanisms through document review and website review with Evidence : Ref. 13,

Project participant was submitted the declaration letter for avoidance of double registration of the project in other international climate mitigation mechanisms in the Modalities of Communication Statement, to the Join Committee at the validation stage and another written confirmation to the TPE at verification stage and Verification team cross-checked it through the review on websites of Clean Development Mechanism (CDM), Verified Carbon Standard Association (VCSA) and Gold Standard Foundation (GSF) and determined that no project with similar technology had registered in an international climate mitigation mechanisms, from Mongolia.

<Findings>

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

CAR 03- Project participant was requested to submit Written confirmation for avoidance of

double registration of the project in other international climate mitigation mechanisms.
CAR 03 was closed up, bacause Anu Service.,Ltd has submitted the requested Confirmation Letter, with Ref.13.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

NREC Verification team confirmed that, the registered project has not registered under other international climate mitigation mechanisms.

C.6. Post registration changes

<Means of verification>

NREC assessed whether the Project has been changed from the registered PDD through Document review and Follow-up action (on-site visit and interviews) with Evidence: Ref.02, Ref.14 and Ref.18

Verification team idenfied that the Project has not changed after it's registration through the review on PDD, written confirmation of the PP and on site assessment.

<Findings>

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

No issue was raised.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

NREC Verification team confirmed that the project had not been changed from the registered PDD and Methodology.

D. Assessment of response to remaining issues

An assessment of response to the remaining issues including FARs from the validation and/or previous verification period, if appropriate

This is the 1st verification opportunity of the project, and no FARs were raised during the validation of the project.

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	503	452	50
2016	573	515	57 (ERs achieved for the first half of 2016)
2017			
2018			
2019			
2020			
2021			
2022			
2023			
2024			
2025			
2026			
2027			
2028			
2029			
2030			
Total (tCO_2e)	1076	967	107

F. List of interviewees and documents received

F.1. List of interviewees

1. Kuwahara Fumihiko, Job Manager of the Project, Suuri Keikaku Co.,Ltd , Japan,
2. B.Tumendelger, Physician of Hospital of the Bornuur sum,Tuv aimag,
3. D.Batbayar, Fireman at Bornuur HOB, Anu Service Co.,Ltd,
4. D.Gantsetseg, Engineer , Anu Service Co.,Ltd,
5. T.Narankhuu, Senior engineer, Anu Service Co.,Ltd,

F.2. List of documents received

1.	Bornuur_JCM Approved Methodology MN_AM002 "Replacement and Installation of High-Efficiency Heat Only Boilers for Hot Water Supply Systems"
2.	Bornuur,PDD version 03.0, 27/06/2015 " Centraization of heat supply system by Installation of high-efficiency Heat Only Boilers in Bor nuur soum " MN002
3/1.	JCM_MN_AM002_ver01.0_MN002_YR2015
3/2.	JCM_MN_AM002_ver01.0_MN002_YR2016_First Half
4.	Bornuur, Heating supply contract of Hospital of Bornuur soum, 22/09/2014
5.	Bornuur, Technical specification of HOB -EKOEFEKT 600
6.	Bornuur, JCM_MN_F_MoC_ver01.0_MN002, 15/05/2015
7.	Bornuur, Heating service contract between Anu Service Co.,Ltd and Governor's Office, 2015-2016
8.	Bornuur, Calibration Certificate of Heat meter
9.	Bornuur, Letter for recognition of producer's initial calibration of the Heat meter
10.	Bornuur,List of measuring instruments subject compulsory metrological control, Order # A/384, by Chairman of MASM,
11.	Bornuur, Standard MNS 6241:2011 "Heat meters. General requirements for the installation, commissioning, operational monitoring and maintenance "
12.	Bornuur, Logbook of Consumer's opinion"
13.	Bornuur, Confirmation letter of avoidance of double registration in other climate mitigation mechanisms, Anu Service Co.,Ltd,
14.	Bornuur, Confirmation letter for no post registration changes of the project, Anu Service Co.,Ltd
15.	Bornuur, Data sheet, 02/05/2016
16.	Bornuur, Report for installation of Heat meter,
17.	Bornuur, Contract with ITZ company, for installation of data transmission system,
18.	Bornuur, Report of On-site assessment, 25/07/2016,
19.	Bornuur, [confidential] Maintenance Manual_EKOEFECT
20.	Bornuur, Minute of interview, Mr.F.Kuwahara, Job Manager of the Project, Suuri-Keikaku Co,.Ltd,
21.	Bornuur, Minute of interview, Mr.D.Batbayar, Bornuur HOB Manager, Anu Service Co.,Ltd,
22.	Bornuur, Minute of interview, B.Tumendelger, Physician of Hospital,
23.	Bornuur, Minute of interview, Ms.D.Gantsetseg, Engineer of Anu Service Co.,Ltd
24.	Bornuur, Minute of interview , T.Narankhuu, Senior engineer, Anu Service Co.,Ltd,

25. Bornuur, Report for Inspection of Heat meter's installation
26. Bornuur, Multical 602,Technical Description
27. Bornuur, Observation report of the heat meters, 2015-2016

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.

National Renewable Energy Centre of Mongolia

Certificate of Appointment

Title of Project: Centralization of heat supply system by installation of high-efficiency Heat Only Boilers in Bornuur soum

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

Name of person:	**Assigned Roles**
Natsagbadam Myatraaz	Team Leader
Myagmarnaran Bat-erdene	Team Member
Batzaya Terbish	Technical Reviewer
Landannorov Jigmed	Technical Expert

Altangerel Baldorj [redacted]

Director, National Renewable Energy Centre, Mongolia

18.07.2016