JCM Verification Report Form

A. Summary of verification

A.1. General Information

Title of the project	Installation of high-efficiency Heat Only Boilers in 118th School of Ulaanbaatar City, Mongolia
Reference number	MN001
Monitoring period	20/09/2015 - 15/05/2016
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 of Mongolia* (TPE's name) provides reasonable assurance that the emission reductions for *"Installation of high-efficiency Heat Only Boilers in 118th School of Ulaanbaatar City"* (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. ☒	T.Burte	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	Mon energy Co.,Ltd	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 verification team has verified project implementation and operation compliance with the eligibility criteria of the applied methodology since projects date of start, through the Document review and Follow up actions (on site visit assessment) with Evidences: Ref.01, Ref.04, Ref.05, Ref.06, Ref.07 and Ref.20.

The project implemented by the Suuri Keikaku Co.,Ltd of Japan and Anu Service Co.,Ltd of Mongolia (hereinafter called "the PP"). Two new high-efficient Heat Only Boilers of CARBOROBOT C300 type were installed and commissioned within framework of JCM Project implementation. The project operation was started on 1st October 2014.

The applied methodology "Replacement and Installation of high-efficient Heat Only Boiler for Hot Water Supply Systems" (MN_AM002) was approved in 28 Jan 2015, by the Joint Committee of JCM between Mongolia and Japan. 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.
After the desk review, the on-site assessment was conducted on 22 July 2016.
The assessment results regarding the eligibility criteria are summarized as below:
1. The HOB CARBOROBOT C300, which installed and operated at the project site, are coal-fired heat only boilers for hot water supply system, it complied with Criterion #1 of the Applied methodology,
2. Capacity of the HOB is 300kW, it complied with Criterion #2,
3. As a result of project implementation, two new HOB's were installed, it complied with Criterion #3,
4. The operation and maintenance manual in Mongolian has provided by Suuri- Keikaky Co.,Ltd, it complied with Criterion #4,
5. Catalog value of Boiler Efficiency of the project HOB is 85-90%, which complied with Criterion # 5,
6. The project HOB has the function to feed coal on the stoker uniformly and is equipped with dust collector, which complied with Criterion # 6 of the Applied methodology,
Verification team determined that the project HOBs are in place and they used for heating supply up to present, through the on-site assessment.

<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 impllementation 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 Jan 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 was 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 the Evidences: Ref.02, Ref.03, Ref.05, Ref.07, Ref.08, Ref.16, Ref.17, Ref.18, Ref.19 and Ref.20-25,

1. Physical features of the project was checked through the on-site visit on 22 July 2015 and two HOBs of CARBOROBOT C300 type, with serial number of 2014 580 and 2014 585 were in place as per registered PDD. The School #118 and Kindergarten # 209 have been supplied with a heat energy produced by the project HOBs, since October 2014.

2. The monitoring was based on the actual measurement using equipments or "Monitoring Option C" was performed, according to the registered PDD.

3. Measuring equipment of the parameters to be monitored is the Heatmeter, The Heatmeter consists from 1 flow sensor, 2 temperature sensors, calculation unit with display and datalogger according to the registered PDD. Verification team confirmed the existence of two Heat meters Multical- 602C type, with serial numbers of 69710720 and 69710721, which were installed at the monitoring points as per the registered PDD or Monitoring plan.

4. Parameters 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 heatmeter, recording of measured values (data) were 4 times per hour in the datalogger and data input in the computer's database was daily.Total hours of project HOB operation was identified by the monitoring period. Thus the measurement's 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, with officers of Anu Service Co.Ltd and review on MoC submitted to the JC by the Project participant 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 was raised

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The 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>

The NREC 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.09, Ref.10, Ref.11, Ref.12, Ref.16, Ref.17, Ref.18 and Ref.20

1. The parameters were measured by the Heatmeter, Multical-602 C. Verification team determined that the Heat meters were calibrated on 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 of Chairman of the Mongolian Agency for Standardization and Metrology, 2014), and "Letter of the MASM for recognition of producer's initial calibration of the heat meter Multical 602C". However the installation of the Heatmeter, which is used for heating service, required to be under control of State Authorized Inspection Entity, according to the related standard of Mongolia, thus the Verification team raised CAR01 and CAR02 on this issue.

2. The NREC verification team assessed the measured values in the database of the Project participant (Anu Service Co., Ltd), the File of printed values 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 comfirmed absense of missed data values 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.

CAR 01- Absence of inspection seal by the State Authorized Inspection Entity on the installation point of the Heatmeter, according to the standard "MNS 6241:2011 Heat meters. General requirements for installation, commissioning, operational monitoring and maintenance",

CAR 01 was closed out, the required inspection and sealing of the Heat meter's installation was made by the Ulaanbaatar Heating Network Company's representative on 28 July 2016, with Ref.18

CAR 02- Required 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 (Anu Service Co.Ltd) has submitted the required Report, with Ref.18.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

The NREC verification team confirms compliance of the calibration frequency of the

monitoring equipment with related requirements of Law and Standards of Mongolia, also the team confirms no additional requirement for the correction of measured values.

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

<Means of verification>

The NREC verification team assessed data and calculation of GHG emission reductions through Document review and Follow-up actions (on-site visit and interviews) with Evidences: Ref.08, Ref.13, Ref.16, Ref.17, Ref.19, Ref.20, Ref.21-24 and Ref.26

1. Monitoring period

The verification team determined the monitoring period was from 20 September 2015 till 15 May 2016, the measuring equipments were installed on 25 June 2015 and the customers started receive heat supply from 20 September 2015 till 15 May 2016. The monitoring period has been divided into 2 parts, in order to specify annual Emission reductions, as below:

The 1st period between 20 September 2015 and 31December 2015;

The 2nd period between 01 January 2016 and 15 May 2016;

2. Data assessment

The “Heat energy” or the total heat quantity produced by project HOB is measured by the Heatmeter as following: the boiler 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 computer of PP, as it showed in Ref.16.

The data was checked through review of the database of the PP (Anu Service Co.,Ltd), 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, which can be observed by the Fireman and other responsible officers. Direct transmission of data from data logger of the Heat meter to the office of PP through the internet was available from 30 December 2015, but the transmission system started to function without interrupt in 02 March 2016, after complete adjustment of technical issues. The received data were exported into Excel sheet in the database of PC and were stored, set of 24 hrs data has been transferred to the office of Suuri Keikaku Co.,Ltd in Tokyo, every day.

The 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

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

Ex-ante parameters used for calculation are:

RPC p=1.2 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 HOB)

η = 0.610 - (Boiler-efficiency of Project HOB)

4. Verified amount of ER

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

1) 18 tCO2 for the period from 20 September 2015 till 31 December 2015, it is the ERs for the 2015 FY;

2) 32 tCO2 for the period from 01 January 2016 till 15 May 2016, it 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	1183 GJ/ per the 2015, 1929 GJ/ per first half of 2016,	Reported value was checked against the Monitoring database and other means as below: 1. Assessment of the measured values in the database of PP, 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" and and interview with the related persons, consumers,
HMPp	4944 hrs/ per	1. Assessment of the measured values in the database of

	the 2015, 6528 hrs/per first half of 2016,	the PP , 2. Assessment of information of the Heating supply contracts, "Journal of Fireman", "Logbook of Consumer's opinion" 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.

The 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>

The 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.14,

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.

CL01- Project Participant was requested to submit Written confirmation for avoidance of double registration of the project in other climate mitigation mechanisms.

CL01 was closed up, bacause Anu Service Co.,Ltd has submitted the requested Confirmation Letter, witt Ref.14.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

NREC Verification team confirmed that the project had 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.15 and Ref.20.

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 issues were raised.

<Conclusion based on reporting requirements>

Please state conclusion based on reporting requirements.

NREC Verification team confirmed that the project has not 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 FAR was 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	202	183	18
2016	329	296	32 (ERs for the First half of 2016)
2017			
2018			
2019			
2020			
2021			
2022			
2023			
2024			
2025			
2026			
2027			
2028			
2029			
2030			
Total (tCO_2e)	531	479	50

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, interviewed on 21 July 2016,
2. Ts. Munkhtor, Director of School#118, Ulaaanbaatar city, Interviewed in 22 July 2016,
3. D.Bideriya, Fireman, Anu Service Co.,Ltd, interviewed in 22 July 2016,
4. D.Gantsetseg, Engineer, Anu Service Co.,Ltd, interviewed in 21 July 2016,
5. T.Narankhuu, Senior Engineer, Anu Service Co.,Ltd 26 July 2016,

F.2. List of documents received

Reference documents:

1. JCM Approved Methodology MN_AM002 “Replacement and Installation of High-Efficient Heat Only Boilers for Hot Water Supply Systems”
2. PDD version 02.0, 19/06/2015“Installation of high-efficiency Heat Only Boilers in 118th School of Ulaanbaatar City “
3/1. JCM_MN_AM002_ver01.0_MN001_YR2015
3/2. JCM_MN_AM002_ver01.0_MN001_YR2016FirstHalf
4. HOB- Operation and Maintenance Manual [Confidential]
5. Heating supply contract, 118th School of Ulaanbaatar city, 15/09/2014
6. Technical specification of HOB CARBOROBOT 300C
7. JCM_MN_F_MoC_SUR_118th School, 15/05/2015
8. Heating supply contract, 118th School of Ulaanbaatar city, 2015-2016
9. Calibration Certificate of Heat meter -Multical 602C, 24/02/2015,
10. List of measuring instruments subject compulsory metrological control, Order # A/384, by Chairman of MASM,
11. Letter of the MASM for recognition of producer’s initial calibration of the Heat meter Multical 602C ,
12. Standard MNS 6241:2011 “Heat meters. General requirements for the installation, commissioning, operational monitoring and maintenance “
13. Logbook of Consumer’s opinion”
14. Confirmation letter for avoidance of double registration of the project
15. Confirmation letter for no post registration changes of the project
16. Data sheet 15/05/2016
17. Report for installation of the Heat meters
18. Report for inspection of the Heat meter's installation
19. Contract with ITZ company for installation of data transmission system
20. Report for On-site assessment 22/07/2016.
21. Minute of interview, F.Kuwahara, Job Manager of the Project, Suuri-KeikakuCo.,Ltd
22. Minute of interview with Ts. Munkhtor, Director of 118th school, Ulaanbaatar
23. Minute of interview with D. Bideriya, Fireman of 118th HOB, Anu Service Co.,Ltd
24. Minute of interview with D.Gantsetseg, Engineer of Anu Service Co., Ltd
25. Minute of interview with T.Narankhuu, Senior Engineer of Anu Service Co.,Ltd
26. Multical 602-Technical Description

27.	Data sheet of 31 December 2015

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: Installation of high-efficiency Heat only Boilers in 118th School of Ulaanbaatar City

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
Burte Tumenjargal	Team Member
Batzaya Terbish	Technical Reviewer
Landannorov Jigmed	Technical Expert

Altangerel Baldorj [redacted]

Director, National Renewable Energy Centre, Mongolia

18.07.2016