Joint Crediting Mechanism Approved Methodology MN_AM002
"Replacement and Installation of High Efficiency Heat Only Boiler (HOB) for Hot Water Supply Systems"

A. Title of the methodology

Replacement and Installation of High Efficiency Heat Only Boiler (HOB) for Hot Water Supply systems (Ver. 1.0)

B. Terms and definitions

Terms	Definitions
HOB	The HOB is defined as a boiler to supply hot water.

C. Summary of the methodology

Items	Summary
GHG emission reduction measures	This project involves the installation of new HOB for hot water supply system and the replacement of existing coal-fired HOB. The boiler efficiency of the reference HOB is typically lower than that of the project HOB. Therefore, the project activity leads to the reduction of coal consumption, resulting in lower emission of GHGs as well as air pollutants.
Calculation of reference emissions	Reference emissions are calculated by the net heat quantity supplied by the project HOB, boiler efficiency of the reference HOB and CO_2 emission factor of coal.
Calculation of project emissions	The sources of project emissions are coal consumption and electricity consumption of project HOB. Project emissions are calculated by the net heat quantity supplied by the project HOB, boiler efficiency of the project HOB and CO_2 emission factor of coal. In addition, project emissions due to auxiliary electricity consumption are included, on the basis of electricity consumption and CO_2 emission factor of the grid.

Monitoring parameters	● Net heat quantity supplied by the project HOB ● Total hours of the project HOB operation during the monitoring period

D. Eligibility criteria

This methodology is applicable to projects that satisfy all of the following criteria.

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.

E. Emission Sources and GHG types

Reference emissions	
Emission sources	GHG types
Coal consumption of reference HOB	CO_2
Project emissions	
Emission sources	GHG types
Coal consumption of project HOB	CO_2
Electricity consumption of project HOB	CO_2

F. Establishment and calculation of reference emissions

F.1. Establishment of reference emissions

In Mongolia, without financial assistance, it is expected that the existing conventional type HOB continues to be used, or the vertical type HOB is easy to be introduced because of its low price and easy operation. Those types have high diffusion rate in Mongolia. The coal, major fuel for HOB, is loaded into a fixed fire gate by manual operation in those HOBs resulting in low

boiler efficiency. The vertical type HOB has higher boiler efficiency than the existing conventional type HOB.
It should also be emphasized that catalog efficiency of boiler whose capacity ranges from 0.10 MW to 3.15 MW is no less than 75% since 2001, which is required by the Mongolian national standard, MNS 5043:2001.
In this methodology, it is assumed that the vertical type HOB with catalog efficiency of no less than 75% will normally be introduced and/or continue to be used to provide hot water, therefore, it is defined as the reference HOB. "Boiler efficiency of the reference HOB" is set as a default value to calculate reference emissions, and its value is set in a conservative manner to achieve net emission reductions.

F.2. Calculation of reference emissions

Reference emissions are calculated by the amount of the reference coal consumption and CO_2 emission factor. The amount of coal consumption in the reference scenario is calculated by dividing "net heat quantity supplied by the project HOB" by "boiler efficiency of the reference HOB". This is because the net heat quantity of the reference HOB is equal to the net heat quantity of the project HOB. Both "CO_2 emission factor" and "boiler efficiency of the reference HOB" are set as default values. "Net heat quantity supplied by the project HOB" is a monitoring parameter. Therefore, the reference emissions are calculated as follows.

$$RE_p = PH_p / \eta_{RE,HOB} \times EF_{CO2,coal}$$

Where;

RE_p	: Reference emissions during the period p [tCO_2/p]
PH_p	: Net heat quantity supplied by the project HOB during the period p [GJ/p]
$\eta_{RE,HOB}$	: Boiler efficiency of the reference HOB [-]
$EF_{CO2,coal}$	: CO_2 emission factor of coal [tCO_2/GJ]

Although the reference HOB may use electricity, it is not included to ensure conservativeness.

G. Calculation of project emissions

Project emissions are calculated by "the amount of the project coal consumption" and "CO_2 emission factor". The amount of project coal consumption is calculated by dividing "net heat quantity supplied by the project HOB" by "boiler efficiency of the project HOB". Both "CO_2 emission factor" and "boiler efficiency of the project HOB" are set as default values. "Net heat

quantity supplied by the project HOB" is a monitoring parameter.
Additionally, electricity consumption of the project HOB is calculated in a conservative manner.
Therefore, the project emissions are calculated as follows.

$PE_p = PH_p/\eta_{PJ,HOB} \times EF_{CO2,coal} + EC_p \times EF_{CO2,grid}$

Where;

PE_p : Project emissions during the period *p* [tCO_2/p]
PH_p : Net heat quantity supplied by the project HOB during the period *p* [GJ/p]
$\eta_{PJ,HOB}$: Boiler efficiency of the project HOB [-]
$EF_{CO2,coal}$: CO_2 emission factor of coal [tCO_2/GJ]
EC_p : Electricity consumption of the project HOB during the period *p* [MWh/p]
$EF_{CO2,grid}$: CO_2 emission factor of the grid electricity consumed by the project HOB [tCO_2/MWh]

$EC_p = RPC_{PJ,HOB} \div 1000 \times HMP_p$

Where;

EC_p : Electricity consumption of the project HOB during the period *p* [MWh/p]
$RPC_{PJ,HOB}$: Rated power consumption of the project HOB [kW]
HMP_p : Total hours of the project HOB operation during the monitoring period *p* [h/p]

H. Calculation of emissions reductions

Emission reductions are calculated from reference emissions and project emissions.

$ER_p = RE_p - PE_p$

Where;

ER_p : Emission reductions during the period *p* [tCO_2/p]
RE_p : Reference emissions during the period *p* [tCO_2/p]
PE_p : Project emissions during the period *p* [tCO_2/p]

I. Data and parameters fixed *ex ante*

The source of each data and parameter fixed *ex ante* is listed as below.

Parameter	Description of data	Source
$\eta_{RE,HOB}$	Boiler efficiency of the reference HOB	Actual measured values.

	calculated from published information and measured data: Default value of 53.3% is applied.	
$\eta_{PJ,HOB}$	Boiler efficiency of the project HOB calculated from published information and measured data: Default value of 61.0% is applied.	Actual measured values.
$EF_{CO2,coal}$	CO_2 emission factor of coal	Default emission factor applied to lignite fuel according to "2006 IPCC Guidelines for National Greenhouse Gas Inventory". Lower value of the default carbon content is applied in line with the CDM methodological tool " Tool to calculate baseline, project and/or leakage emissions from electricity consumption (Version 01)".
$EF_{CO2,\mathrm{grid}}$	CO_2 emission factor of the grid electricity consumed by the project HOB	The most recent value available at the time of validation is applied and fixed for the monitoring period thereafter. The data is sourced from CDM Mongolia unless otherwise instructed by the Joint Committee.
$\mathrm{RPC}_{PJ,HOB}$	Rated power consumption of the project HOB	Catalog value provided by the manufacturer of the project HOB

Note 1:
"http://www.cdm-mongolia.com/index.php?option=com_content&view=article&id=75&Itemid=95&lang=en"

History of the document

Version	Date	Contents revised
01.0	28 January 2015	Electronic decision by the Joint Committee Initial approval.