JCM Proposed Methodology Form

Cover sheet of the Proposed Methodology Form	

Form for submitting the proposed methodology

Host Country	Viet Nam
Name of the methodology proponents submitting this form	Sapporo Breweries Limited
Sectoral scope(s) to which the Proposed Methodology applies	3. Energy Demand
Title of the proposed methodology, and version number	Energy Saving by Introduction of High Efficiency Boiler, ver.01.0
List of documents to be attached to this form (please check):	☐ The attached draft JCM-PDD: ☒ Additional information
Date of completion	03/09/2019

History of the proposed methodology

Version	Date	Contents revised
01.0	03/09/2019	First Edition

A. Title of the methodology

Energy Saving by Introduction of High Efficiency Boiler, ver.01.0

B. Terms and definitions

Terms	Definitions
Boiler efficiency	Boiler efficiency is the ratio of the total absorption heating value of outlet steam/hot water to the total heating value provided by a fuel.

C. Summary of the methodology

Items	Summary
GHG emission reduction measures	This methodology involves the installation of high efficiency boiler. Compared with the reference boiler, the boilers to be installed have higher boiler efficiency and less fuel consumption. This methodology may also involve the fuel switching from the fuel with higher GHG emission factor to one with lower GHG emission factor. Thus those measures above will contribute to the GHG emission reductions.
Calculation of reference emissions	Reference emissions are calculated from the amount of fuel consumption of the project boiler, net calorific value of fuel used by the project boiler, CO_2 emission factor of fuel consumed by the reference boiler, and the ratio of efficiency of the project/reference boiler. Conservative estimation of reference emissions is made by selecting lower CO_2 emission factor from IPCC guideline with regard to the fuel used in the reference boiler.
Calculation of project emissions	Project emissions are calculated from monitored fuel consumption and emission factor of the fuel of the project boiler.
Monitoring parameters	- The amount of fuel consumption

D. Eligibility criteria

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

Criterion 1	The boiler efficiency of the project boiler is higher than that of the reference boiler.
Criterion 2	In case there is fuel switching, it can be demonstrated that the change of fuel from the fuel with higher GHG emissions factor to one with lower GHG emission factor takes place.

E. Emission Sources and GHG types

Reference emissions	
Emission sources	GHG types
Fuel consumption by reference boiler	CO_2
Project emissions	
Emission sources	GHG types
Fuel consumption by project boiler	CO_2

F. Establishment and calculation of reference emissions

F.1. Establishment of reference emissions

Reference emissions are calculated based on the efficiency of project boiler and reference boiler.

In Vietnam, various types of fuel including coal, oil and natural gas are used for boilers. The efficiency of the boiler currently dominant in the Vietnamese market is conservatively set as 92%. This default value is the efficiency of the boiler whose fuel is natural gas, as the efficiency of natural gas boiler is higher than those of coal and oil boilers.

The efficiency of reference boiler, which is applied to calculate reference emissions in this methodology, is the efficiency of the boiler currently dominant in the Vietnamese market (set as default valued of 92%) or the existing boiler to be replaced, whichever is the higher. This ensures conservativeness of calculation, and hence net emission reductions.

F.2. Calculation of reference emissions

$$RE_p = \sum_i \sum_j \left(FC_{PJ,i,j,p} \times NCV_{PJ,i,j} \times EF_{RE} \times \frac{\eta_{PJ,i}}{\eta_{RE}} \right)$$

RE_p : Reference emissions during the period p [tCO$_2$/p]

$FC_{PJ,i,j,p}$: The amount of fuel consumption of project boiler i for the fuel type j during the period p [mass or volume unit/p]

$NCV_{PJ,i,j}$: Net calorific value of fuel consumed by project boiler i for the fuel type j [GJ/mass or volume unit]

EF_{RE} : CO$_2$ emission factor of fuel consumed by reference boiler [tCO$_2$/GJ]

$\eta_{PJ,i}$: Boiler efficiency of project boiler i [-]

η_{RE} : Boiler efficiency of reference boiler [-]

G. Calculation of project emissions

$$PE_p = \sum_i \sum_j \left(FC_{PJ,i,j,p} \times NCV_{PJ,i,j} \times EF_{PJ,i,j} \right)$$

PE_p : Project emissions during the period p [tCO$_2$/p]

$FC_{PJ,i,j,p}$: The amount of fuel consumption of project boiler i for the fuel type j during the period p [mass or volume unit/p]

$NCV_{PJ,i,j}$: Net calorific value of fuel consumed by project boiler i for the fuel type j [GJ/mass or volume unit]

$EF_{PJ,i,j}$: CO$_2$ emission factor of fuel consumed by project boiler i for the fuel type j [tCO$_2$/GJ]

H. Calculation of emissions reductions

$$ER_p = RE_p - PE_p$$

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
$NCV_{PJ,i,j}$	Net calorific value of fuel consumed by project boiler i for the fuel type j [GJ/mass or volume unit]	In the order of preference: a) values provided by fuel supplier; b) measurement by the project participants; c) regional or national default values; or d) IPCC default values provided in table 1.2 of Ch.1 Vol.2 of 2006 IPCC Guidelines on National GHG Inventories. Lower value is applied.
$EF_{PJ,i,j}$	CO_2 emission factor of fuel consumed by the project boiler i for the fuel type j [tCO$_2$/GJ]	In the order of preference: a) values provided by fuel supplier; b) measurement by the project participants; c) regional or national default values; or d) IPCC default values provided in table 1.4 of Ch.1 Vol.2 of 2006 IPCC Guidelines on National GHG Inventories. Upper value is applied.
EF_{RE}	CO_2 emission factor of fuel consumed by the reference boiler [tCO$_2$/GJ] In case the project boiler replaces the existing boiler, CO_2 emission factor of the fuel consumed by the existing or planned boiler is applied. Otherwise, the value of the fuel used by the project boiler i is applied. In case the fuel for the reference boiler and for the project boiler are the same, the same value as EF$_{PJ}$ is applied.	In the order of preference: a) values provided by fuel supplier; b) measurement by the project participants; c) regional or national default values; or d) IPCC default values provided in table 1.4 of Ch.1 Vol.2 of 2006 IPCC Guidelines on National GHG Inventories. Lower value is applied.
$\eta_{PJ,i}$	Boiler efficiency of project boiler i [-]	Specifications of the project boiler or factory test data of the project boiler by

		the manufacturer
η_{RE}	Boiler efficiency of reference boiler [-] The boiler efficiency of the boiler currently dominant in the Vietnamese market or the existing boiler to be replaced, whichever is the higher. The boiler efficiency of boiler currently dominated in Vietnamese market is set as 0.92.	The default value is derived from the result of survey on boiler efficiency In case the reference boiler is the boiler currently dominated in Vietnamese market: value of default efficiency of thermal applications by new natural gas fired boiler, provided in Table 1 of appendix of CDM methodological tool "TOOL09: Determining the baseline efficiency of thermal or electric energy generation systems ver02.0" In case the reference boiler is the existing boiler to be replaced: specifications of the reference boiler