JCM Proposed Methodology Form

Cover sheet of the Proposed Methodology Form

Form for submitting the proposed methodology

Host Country	Socialist Republic of Viet Nam
Name of the methodology proponents submitting this form	Marubeni Corporation
Sectoral scope(s) to which the Proposed Methodology applies	11. Fugitive emissions from production and consumption of halocarbons and sulphur hexafluoride
Title of the proposed methodology, and version number	Introduction of HFCs destruction facilities in Viet Nam
List of documents to be attached to this form (please check):	☐The attached draft JCM-PDD: ☐Additional information
Date of completion	31/03/2022

History of the proposed methodology

Version	Date	Contents revised
1.0	31/03/2022	First edition

A. Title of the methodology

Introduction of HFCs destruction facilities in Viet Nam

B. Terms and definitions

Terms	Definitions
HFCs destruction facility	HFCs destruction facility is a facility with equipment capable of decomposing HFCs into CO_2 and other compounds. HFCs destruction facility is classified into the following two cases. - Case 1: HFCs destruction facility is only used for decomposition of HFCs; and - Case 2: HFCs are decomposed in a co-firing destruction facility
Destruction efficiency of HFCs	Destruction efficiency of HFCs is the ratio of emissions of HFCs from discharge ports and amount of HFCs input to destruction equipment. Destruction efficiency of HFCs is calculated by the formula: $Destruction\ efficiency\ of\ HFCs\ (\%) = \left(1 - \frac{Emission\ amount\ of\ HFCs\ from\ discharge\ ports}{Amount\ of\ HFCs\ input\ to\ destruction\ equipment}\right) \times 100$

C. Summary of the methodology

Items	Summary
GHG emission reduction measures	GHG emission reductions by destructing HFCs which have otherwise been released to the atmosphere.
Calculation of reference emissions	GHG emissions when HFCs are released to the atmosphere without being destructed.
Calculation of project emissions	GHG emissions from energy consumption by HFCs destruction facilities. Since the energy consumption for collecting HFCs is negligibly small, it is not considered for the project emissions.
Monitoring parameters	● The amount of HFCs input to destruction equipment ● Electricity consumption by HFCs destruction facilities ● Fuel consumption by HFCs destruction facilities

D. Eligibility criteria

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

Criterion 1	HFCs destruction facility introduced meets any of the following conditions. (1) The destruction efficiency of HFCs is 99% or more, and the content of HFCs in the gas discharged from discharge ports (openings of chimneys and other facilities provided to discharge exhaust gas from the facility into the atmosphere) is 1 ppm or less. (2) The destruction efficiency of HFCs is 99.9% or more, and the content of HFCs in the gas discharged from the discharge ports is 15 ppm or less. In case 2 of co-firing destruction facility such as waste incineration facility, the above conditions are met without additional fossil fuel input for destructing HFCs, which may be justified by demonstrating that the incinerator or combustion chamber/furnace where HFCs are fed into can maintain the internal temperature sufficient for HFCs destruction.
Criterion 2	The concentration and destruction efficiency of HFCs in exhaust gas are measured at least once a year, and they meet any of the conditions of the concentration and destruction efficiency selected to apply to the project in Criterion 1.
Criterion 3	A plan for prevention of releasing HFCs during the project HFCs collection and destruction process is prepared. Execution of this plan is checked at the time of verification, in order to confirm that HFCs are prevented from being released to the air.

E. Emission Sources and GHG types

Reference emissions	
Emission sources	GHG types
Atmospheric emissions of HFCs	HFCs
Project emissions	
Emission sources	GHG types
GHG emissions from electricity consumption by destruction facilities	CO_2
GHG emissions from fossil fuel consumption by destruction facilities	CO_2

F. Establishment and calculation of reference emissions

F.1. Establishment of reference emissions

Reference emissions are GHG emissions when HFCs are released to the atmosphere without being destructed.
Reference emissions are calculated by using the amount of HFCs which are destructed, Global Warning Potential (GWP), destruction efficiency, and correction factor (90%).

The amount of destructed HFCs is conservatively calculated by using the correction factor to ensure the net emission reductions.
The default value of destruction efficiency η_{PJ} is also conservatively set as 0.99.

F.2. Calculation of reference emissions

$$RE_p = \sum_i \sum_k \left(Q_{PJ,i,k,p} \times GWP_k \times \eta_{PJ,default} \times 0.9 \right)$$

RE_p	Reference emissions during the period p [tCO_2/p]
$Q_{PJ,i,k,p}$	The amount of HFC k which is destructed at project destruction facility i during the period p [t-HFC k / p]
GWP_k	GWP of HFC k [tCO_2 / t-HFC k]
$\eta_{PJ,default}$	The destruction efficiency of HFCs at project destruction facility [-]
i	Identification number of destruction facilities
k	Identification number of types of HFCs

G. Calculation of project emissions

Case 1) In case that the project HFCs destruction facility is only used for decomposition of HFCs;

$$PE_p = PE_{elec,p} + PE_{fuel,p}$$

$$PE_{elec,p} = \sum_i \left(EC_{PJ,i,p} \times EF_{elec} \right)$$

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

PE_p	Project emissions during the period p [tCO_2/p]
$PE_{elec,p}$	Project emissions from electricity consumption during the period p [tCO_2/p]
$PE_{fuel,p}$	Project emissions from fossil fuel consumption during the period p [tCO_2/p]
$EC_{PJ,i,p}$	Electricity consumption by project destruction facility i during the period p [MWh/p]
$FC_{PJ,i,j,p}$	The amount of fuel type j consumed by project destruction facility i during the period p [mass or volume unit/p]
EF_{elec}	CO_2 emission factor for consumed electricity [tCO_2/MWh]
$NCV_{PJ,i,j}$	Net calorific value of fuel type j consumed by project destruction facility i [GJ/mass or volume unit]
$EF_{fuel,i,j}$	CO_2 emission factor of fuel type j consumed by project destruction facility i [tCO_2/GJ]
i	Identification number of destruction facilities
j	Identification number of fuel type

$EC_{PJ,i,p}$ and $FC_{PJ,i,j,p}$ are electricity and fuel consumption by the main equipment and auxiliary equipment consisting of the HFCs destruction facility. They also include the energy consumption supplied from external sources.

Case 2) HFCs are decomposed in a co-firing destruction facility;

$$PE_p = 0$$

PE_p	Project emissions during the period p [tCO_2/p]

H. Calculation of emissions reductions

$$\boldsymbol{ER_p = RE_p - PE_p}$$

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
EF_{elec}	CO_2 emission factor for consumed electricity [tCO_2/MWh] When project facilities consume only grid electricity or captive electricity, the project participant applies the CO_2 emission factor respectively. When project facilities may consume both grid electricity and captive electricity, the project participant applies the CO_2 emission factor with upper value. **[CO_2 emission factor]** For grid electricity: The most recent value available from the source stated in this table at the time of validation For captive electricity, it is determined based on the following options: a) Calculated from its power generation efficiency ($\eta_{elec,CG}$ [%]) obtained from manufacturer's specification. The power generation efficiency based on lower heating value (LHV) of the captive power generation system from the manufacturer's specification is applied; $$\mathrm{EF_{elec}} = 3.6 \times \frac{100}{\eta_{\mathrm{elec,CG}}} \times \mathrm{EF_{fuel,CG}}$$ b) Calculated from measured data The power generation efficiency calculated from monitored data of the amount of fuel	[Grid electricity] Department of Climate change (DCC) unless otherwise instructed by the Joint Committee. [Captive electricity] For the option a) Specification of the captive power generation system provided by the manufacturer ($\eta_{elec,CG}$ [%]). CO_2 emission factor of the fossil fuel type used in the captive power generation system ($EF_{fuel,CG}$ [tCO_2/GJ]) For the option b) Generated and supplied electricity by the captive power generation system ($EG_{PJ,CG,p}$ [MWh/p]). Fuel amount consumed by the captive power generation system ($FC_{PJ,CG,p}$ [mass or volume/p]). Net calorific value ($NCV_{fuel,CG}$ [GJ/mass or volume]) and CO_2 emission factor ($EF_{fuel,CG}$ [tCO_2/GJ]) of the fuel consumed by the captive power generation system in order of preference: 1) values provided by the fuel

	input for power generation ($FC_{PJ,CG,p}$) and the amount of electricity generated ($EG_{PJ,CG,p}$) during the monitoring period *p* is applied. The measurement is conducted with the monitoring equipment to which calibration certificate is issued by an entity accredited under national/international standards; $EF_{elec} = FC_{PJ,CG,p} \times NCV_{fuel,CG} \times EF_{fuel,CG} \times \frac{1}{EG_{PJ,CG,p}}$ Where: $NCV_{fuel,CG}$: Net calorific value of fuel consumed by the captive power generation system [GJ/mass or volume] **c)** Conservative default value: A value of 1.3 tCO_2/MWh may be applied.	supplier; 2) measurement by the project participants; 3) regional or national default values; 4) IPCC default values provided in tables 1.2 and 1.4 of Ch.1 Vol.2 of 2006 IPCC Guidelines on National GHG Inventories. Upper value is applied. For the option **c)** CDM methodological tool "TOOL 05: Baseline, project and/or leakage emissions from electricity consumption and monitoring of electricity generation, version 03.0"
$NCV_{PJ,i,j}$	Net calorific value of fuel type *j* consumed by project destruction facility *i* [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. Upper value is applied.
$EF_{fuel,i,j}$	CO_2 emission factor of fuel type *j* consumed by project destruction facility *i* [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.
GWP_k	GWP of HFC k [tCO_2 / t-HFC k] GWP of mixed refrigerant, which is not listed on Appendix 8.A of the IPCC Fifth Assessment Report (AR5), can be calculated based on the ratio of composed HFCs.	IPCC default value provided in Appendix 8.A: Lifetimes, Radiative Efficiencies and Metric Values of the Synthesis Report (SYR) of the IPCC Fifth Assessment Report (AR5), Chapter 8 Anthropogenic and Natural Radiative Forcing. The value of GWP_{100} is applied.
$\eta_{PJ,default}$	The destruction efficiency of HFCs at project destruction facility [-] The default value $\eta_{PJ,default}$ is set as 0.99 As described in Criteria 1, the destruction efficiency of HFC is more than 99%. Therefore, it is conservatively set as 99%.	Default value in the methodology