

JCM Proposed Methodology Form

Cover sheet of the Proposed Methodology Form

Form for submitting the proposed methodology

Host Country	Republic of Moldova
Name of the methodology proponents submitting this form	SDG Impact Japan Inc.
Sectoral scope(s) to which the Proposed Methodology applies	1. Energy industries (renewable / non-renewable sources) 13. Waste handling and disposal
Title of the proposed methodology, and version number	Electricity generation and avoidance of methane emissions through capture and utilization of landfill gas (LFG), ver. 01.0
List of documents to be attached to this form (please check):	☐ The attached draft JCM-PDD: ☒ Additional information
Date of completion	15/10/2026

History of the proposed methodology

Version	Date	Contents revised
Ver 01.0	15/10/2026	

A. Title of the methodology

Electricity generation and avoidance of methane emissions through capture and utilization of landfill gas (LFG)

B. Terms and definitions

Terms	Definitions
Landfill gas (LFG)	A gas generated by the decomposition of organic waste under anaerobic conditions in landfills, primarily composed of methane (CH ₄), carbon dioxide (CO ₂) and trace gases.
Municipal solid waste (MSW)	A heterogeneous mix of different solid waste types, usually collected by municipalities or other local authorities. MSW includes household waste, garden/park waste and commercial/institutional waste.
Solid waste disposal site (SWDS)	Designated areas intended as the final storage place for solid waste.

C. Summary of the methodology

Items	Summary
<i>GHG emission reduction measures</i>	This GHG emission reduction method applies to the project that aims to reduce methane emissions by capturing landfill gas, and burning the captured gas for electricity generation to displace electricity which is currently generated from fossil fuels in a grid or captive power generator.
<i>Calculation of reference emissions</i>	• Reference emissions are calculated separately for the methane component and the electricity generation component. • For the methane component, reference emissions are calculated based on the amount of methane in landfill gas that is actually captured and sent to the flare and/or electricity generator under the project activity, and net of any methane that would have been captured and

	destroyed in the baseline due to legal, contractual, safety, odour-control or other requirements. • For the electricity generation component, reference emissions are calculated based on the quantity of grid electricity displaced by the project facility, multiplied by the applicable electricity emission factor. • For the purpose of conservatively setting JCM reference emissions below business-as-usual (BaU) emissions and contributing to the host country's Nationally Determined Contributions (NDC), a discount factor is applied to the creditable methane component, and a conservative default emission factor is adopted for the electricity component.
<i>Calculation of project emissions</i>	• Methane (CH₄) emissions from unburned methane released during the combustion of landfill gas: Calculated as the sum of methane slip from the flare and the generator. Methane slip is calculated as the amount of landfill gas sent to each combustion device multiplied by the measured CH₄ fraction, converted to CH₄ mass, and multiplied by the respective unburned fraction (1 – destruction efficiency). The resulting methane emissions are converted to CO₂e using the applicable global warming potential of methane. • CO₂ emissions from electricity used to operate the project facility: Calculated as the total quantity of electricity used to operate the project facility, including electricity supplied from the project generator, multiplied by the emission factor for grid electricity. • CO₂ emissions from auxiliary fossil fuel consumption by the project facility: Calculated as the quantity of auxiliary fossil fuel consumed by the project facility multiplied by the net calorific value of the fuel and the applicable CO₂ emission factor of the fuel.
<i>Monitoring parameters</i>	• Quantity of electricity generated by the project facility

	during the period p [MWh/p] - Quantity of electricity consumed by the project facility during the period p, including electricity supplied from the project generator and electricity imported from the grid [MWh/p] - Quantity of auxiliary fossil fuel consumed during the period p [t/p] - Volume of landfill gas injected into the flare stack during the period p [m³/p] - Volume of landfill gas sent to the electricity generator during the period p [m³/p] - Methane concentration in landfill gas during the period p [volume fraction] - Generator operating hours during the period p [hours/p]
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D. Eligibility criteria

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

Criterion 1	The project installs a new landfill gas (LFG) collection and utilization system at a solid waste disposal site (SWDS) where LFG has not been recovered.
Criterion 2	Collected gas is treated (e.g. through moisture and impurity removal) before being used in generators or flares to ensure proper combustion.
Criterion 3	The project includes electricity generation from the captured landfill gas by using an on-site generator.
Criterion 4	The project is equipped with monitoring arrangements capable of measuring and recording, as applicable, LFG flow rate, CH ₄ concentration, electricity generation, electricity consumption, auxiliary fossil fuel consumption, and generator operating hours, in accordance with the monitoring plan.

E. Emission Sources and GHG types

Reference emissions	
Emission sources	GHG types
Methane in LFG that would have been released from the SWDS in the absence of the project activity	CH ₄

Electricity generation displaced by electricity generated from captured LFG	CO ₂
Project emissions	
Emission sources	GHG types
Electricity/fossil fuel consumption by the electric generation equipment	CO ₂
Methane release due to incomplete combustion	CH ₄

F. Establishment and calculation of reference emissions

F.1. Establishment of reference emissions

In the Republic of Moldova, municipal solid waste (MSW) has traditionally been disposed of at solid waste disposal sites (SWDS) without landfill gas (LFG) recovery. Under the business-as-usual (BaU) scenario, methane (CH₄) generated from the anaerobic decomposition of MSW is released to the atmosphere.

The project also generates electricity by using captured LFG and thereby displaces grid electricity. Accordingly, reference emissions are defined as the sum of (i) reference CH₄ emissions associated with monitored methane in captured LFG that would have been released in the absence of the project activity, net of any baseline methane destruction, and (ii) reference CO₂ emissions from displaced grid electricity.

Reference emissions are established in accordance with the JCM principle that they shall be set below BaU emissions and in a manner that contributes to the achievement of the host country's latest NDC (NDC 3.0). The relevant NDC 3.0 indicators for the Republic of Moldova and the resulting reference-scenario assumptions used to derive the discount factors are presented in the attached Additional Information.

Therefore, a conservative discount factor is applied to the creditable methane-related reference emissions, and a conservative default emission factor is adopted for the electricity-related reference emissions in this methodology.

For the methane-related reference emissions, a conservative discount factor DF_{CH_4} of 0.87 is applied. Accordingly, 13% of the creditable methane mitigation outcome calculated from monitored methane in captured LFG is conservatively treated as a non-creditable contribution to the Republic of Moldova's NDC, while the remaining 87% is treated as creditable under the JCM.

For the electricity-related reference emissions, conservatism is ensured by adopting a conservative default grid emission factor ($EF_{elec,RE}$) that is set below the observed grid emission factor ($EF_{elec,PE}$, fixed ex ante in Section I) by applying a discount factor of 0.90, and is fixed for the monitoring period thereafter. Accordingly, 10% of the estimated electricity-related mitigation outcome is conservatively treated as a non-creditable contribution to the NDC, while

the remaining 90% is treated as creditable under the JCM.

The detailed derivation of the discount factors of 0.87 and 0.90, together with the basis for the conservative default grid emission factor, is provided in the attached Additional Information (JCM_MD_F_PM_ADD1) and is therefore not repeated here.

For this project, no landfill gas capture or destruction system exists at the SWDS in the baseline; therefore the baseline methane captured or destroyed $F_{CH4,BL,p}$ is set to zero ($F_{CH4,BL,p} = 0$) for the entire crediting period.

The IPCC's first order decay (FOD) model is not used for *ex post* calculation of creditable reference CH₄ emissions. It may be used for *ex ante* estimation of LFG generation potential and for plausibility checks of the expected methane generation from the SWDS.

F.2. Calculation of reference emissions

$$RE_p = RE_{CH4,p} + RE_{elec,p}$$

Where:

- RE_p = Reference emissions during the period p [tCO₂e/p]
- $RE_{CH4,p}$ = Reference emissions from the methane component during the period p [tCO₂e/p]
- $RE_{elec,p}$ = Reference emissions from displaced grid electricity during the period p [tCO₂e/p]

$$RE_{CH4,p} = \{DF_{CH4} \times [F_{CH4,PJ,capt,p} - F_{CH4,BL,p}]\} \times GWP_{CH4}$$

Where:

- $RE_{CH4,p}$ = Reference emissions from the methane component during the period p [tCO₂e/p]
- DF_{CH4} = Conservative discount factor for the methane component [dimensionless]
- $F_{CH4,PJ,capt,p}$ = Amount of methane in LFG that is actually captured and sent to the flare and/or electricity generator under the project activity during the period p [tCH₄/p]
- $F_{CH4,BL,p}$ = Amount of methane in LFG that would have been captured and destroyed in the baseline during the period p due to legal, contractual, permitting, safety, odour-control or other requirements, or by any existing LFG capture and destruction system [tCH₄/p]
- GWP_{CH4} = Global Warming Potential of methane [tCO₂e/tCH₄]

$$F_{CH4,PJ,capt,p} = F_{CH4,flare,p} + F_{CH4,engine,p}$$

$$F_{CH4,flare,p} = Q_{LFGflare,p} \times W_{CH4,p} \times \rho_{CH4}$$

$$F_{CH4,engine,p} = Q_{LFGengine,p} \times W_{CH4,p} \times \rho_{CH4}$$

Where:

- $F_{CH4,flare,p}$ = Amount of methane in LFG sent to the flare during the period p [tCH₄/p]
- $F_{CH4,engine,p}$ = Amount of methane in LFG sent to the electricity generator during the period p [tCH₄/p]
- $Q_{LFGflare,p}$ = Volume of landfill gas injected into the flare stack during the period p [m³/p]
- $Q_{LFGengine,p}$ = Volume of landfill gas injected into the generator during the period p [m³/p]
- $W_{CH4,p}$ = Methane concentration in landfill gas during the period p [volume fraction]
- ρ_{CH4} = Methane density at reference conditions [tCH₄/m³]

$$RE_{elec,p} = EG_{elec,p} \times EF_{elec,RE}$$

Where:

- $RE_{elec,p}$ = Reference emissions from displaced grid electricity during the period p [tCO₂e/p]
- $EG_{elec,p}$ = Quantity of electricity generated by the project facility during the period p [MWh/p]
- $EF_{elec,RE}$ = Emission factor for grid electricity used in the reference emissions calculation [tCO₂e/MWh]

G. Calculation of project emissions

$$PE_p = PE_{CH4slip,p} + PE_{EC,p} + PE_{FC,p}$$

Where:

- PE_p = Project emissions during the period p [tCO₂e/p]
- $PE_{CH4slip,p}$ = Project emissions from unburned methane from the flare and/or electricity generator during the period p [tCO₂e/p]
- $PE_{EC,p}$ = Project emissions from electricity consumption by the project facility during the period p [tCO₂e/p]
- $PE_{FC,p}$ = Project emissions from auxiliary fossil fuel consumption by the project facility during the period p [tCO₂e/p]

$$PE_{CH4slip,p} = [F_{CH4,flare,p} \times (1 - \eta_{flare}) + F_{CH4,engine,p} \times (1 - \eta_{engine})] \times GWP_{CH4}$$

Where:

- $F_{CH_4,flare,p}$ = Amount of methane in LFG sent to the flare during the period p [tCH₄/p]
- $F_{CH_4,engine,p}$ = Amount of methane in LFG sent to the electricity generator during the period p [tCH₄/p]
- η_{flare} = Methane destruction efficiency of the flare [fraction]
- η_{engine} = Methane destruction efficiency of the electricity generator [fraction]
- GWP_{CH_4} = Global Warming Potential of methane [tCO₂e/tCH₄]

$$PE_{EC,p} = EC_p \times EF_{elec,PE}$$

Where:

- $PE_{EC,p}$ = Project emissions from electricity consumption by the project facility during the period p [tCO₂e/p]
- EC_p = Total electricity consumed by the project facility during the period p, including electricity supplied from the project generator and electricity imported from the grid [MWh/p]
- $EF_{elec,PE}$ = Emission factor for grid electricity, fixed ex ante (see Section I) [tCO₂e/MWh]

$$PE_{FC,p} = FC_{fuel,p} \times NCV_{fuel} \times EF_{CO_2,fuel}$$

Where:

- $PE_{FC,p}$ = Project emissions from auxiliary fossil fuel consumption during the period p [tCO₂e/p]
- $FC_{fuel,p}$ = Quantity of auxiliary fossil fuel consumed during the period p [t/p]
- NCV_{fuel} = Net calorific value of the fuel combusted by the project [GJ/t]
- $EF_{CO_2,fuel}$ = CO₂ emission factor of the fuel combusted by the project [tCO₂/GJ]

In cases where the project consumes more than one type of auxiliary fossil fuel, $PE_{FC,p}$ is calculated as the sum over fuel types i: $PE_{FC,p} = \sum_i (FC_{fuel,i,p} \times NCV_{fuel,i} \times EF_{CO_2,fuel,i})$, where the net calorific value $NCV_{fuel,i}$ and the CO₂ emission factor $EF_{CO_2,fuel,i}$ are set separately for each fuel type i (see PMS(calc_process) and its [List of Default Values]).

H. Calculation of emissions reductions

$$ER_p = RE_p - PE_p$$

Where:

- ER_p = Emission reductions during the period p [tCO₂e/p]
- RE_p = Reference emissions during the period p [tCO₂e/p]

- PE_p = Project emissions during the period p [tCO₂e/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
GWP_{CH_4}	Global Warming Potential of methane [tCO ₂ e/tCH ₄] Default value: 28	IPCC Global Warming Potential Values of IPCC Fifth Assessment Report (AR5)
$EF_{elec,RE}$	Emission factor for grid electricity used in the reference emissions calculation (conservative default value considering NDC) [tCO ₂ e/MWh] Default value: 0.45657 (= $EF_{elec,PE} \times 0.90$)	Derived from $EF_{elec,PE}$ by applying the discount factor of 0.90 (see Additional Information §3).
ρ_{CH_4}	Methane density [tCH ₄ /m ³] Default value: 0.0007168 tCH ₄ /m ³ Reference conditions are fixed <i>ex ante</i> at 0°C and 1 atm (normal conditions), and the monitored landfill-gas volumes ($Q_{LFGflare,p}$ and $Q_{LFGengine,p}$) are normalised to these same reference conditions. ρ_{CH_4} is therefore a single, unique default value.	Standard physical property of methane at 0°C and 1 atm.
η_{flare}	Methane destruction efficiency of the flare [fraction] A conservative value is selected based on the technical specification of the flare and/or validated manufacturer documentation.	Technical specification and/or manufacturer documentation of the flare
η_{engine}	Methane destruction efficiency of the generator [fraction] A conservative value is selected based on the technical specification of the generator and/or validated manufacturer documentation.	Technical specification and/or manufacturer documentation of the generator

NCV_{fuel}	Net calorific value of the auxiliary fossil fuel, set separately for each fuel type i [GJ/t]	Set per fuel type i. Priority order: (1) a country-specific value where available; (2) otherwise the IPCC default value. The selected value is fixed ex ante for each fuel type. IPCC Guidelines for National Greenhouse Gas Inventories (2006) or country-specific data
$EF_{CO_2, fuel}$	CO ₂ emission factor of the fuel [tCO ₂ /GJ]	Set per fuel type i. Priority order: (1) a country-specific value where available; (2) otherwise the IPCC default value. The selected value is fixed ex ante for each fuel type. IPCC Guidelines for National Greenhouse Gas Inventories (2006) or country-specific data
DF_{CH_4}	Conservative discount factor for the methane component [dimensionless]	Fixed at 0.87. This factor reflects the project-specific reference scenario setting in which 13% of the creditable methane mitigation outcome is treated as a non-creditable contribution to Moldova's NDC.
$EF_{elec, PE}$	Emission factor for grid electricity used in the project emissions calculation [tCO ₂ e/MWh] Default value: 0.5073	“Assessment of the Grid Emission Factor of Moldova’s Electricity System” (USAID, 2024)
$F_{CH_4, BL, p}$	Amount of methane in LFG that would have been captured and destroyed in the baseline during the period p [tCH ₄ /p]	No pre-existing LFG capture or destruction system exists at the SWDS (greenfield

		project); therefore set to zero for the entire crediting period.
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