Gold Standard
for the Global Goals

METHODOLOGY TOOL

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SDG 13

EMISSIONS FROM FOSSIL FUEL COMBUSTION

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SUMMARY

This document, Methodology Tool 1 (herein referred to as Tool 1), details methods and requirements for calculating greenhouse gas (GHG) emissions from fossil fuel combustion for process operations (i.e., non-transport applications). It includes methods based on the quantity and characteristics of the fuel and the combustion process. It outlines two calculation methods and details the corresponding monitoring methodology and requirements. Tool 1 shall be used for emission calculations in conjunction with a Gold Standard-approved methodology(ies).

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1| KEY INFORMATION

Tool summary	Tool 1 can be used to calculate GHG emissions from fossil fuel combustion for process operations (i.e., non-transport applications).
Applicable mitigation type	☒ Emission reduction ☒ GHG removal
Applicable activity scale	☒ Micro scale (e.g., ≤10,000 tCO_2e per year) ☒ Small scale (e.g., ≤60,000 tCO_2e per year) ☒ Large scale (e.g.,>60,000 tCO_2e per year)
Applicable methodologies	Tool 1 is applicable to methodologies which involve fossil fuel combustion for process operations.
Limitations	Tool 1 shall not be used for transport applications.

2| APPLICABILITY CONDITIONS

2.1.1 | Tool 1 shall be used in conjunction with a Gold Standard-approved methodology(ies) and cannot be applied to quantify emission reductions in isolation.

2.1.2 | Tool 1 is applicable to activities in which fossil fuel combustion is not the primary activity nor the main source of GHG emissions for the activity. Tool 1 does not provide procedures to estimate baseline emissions from fossil fuel combustion.

2.1.3 | Activities that apply Tool 1 shall specify the particular combustion process to which Tool 1 is being applied.

2.1.4 | Tool 1 can be applied where carbon dioxide (CO_2), methane (CH_4), and/or nitrous oxide (N_2O) emissions from fossil fuel combustion are calculated based on the respective quantities and properties, such as chemical composition or net calorific value (NCV) of the fuel combusted.

2.1.5 | Tool 1 shall not be used for transport applications.

3| SOURCES AND REFERENCES

3.1.1 | This Tool 1 refers to the latest approved versions of the following methodologies, tools, and documents:

A. Gold Standard
   i. Principles & Requirements
   ii. Safeguarding Principles & Requirements

B. Other sources:

i. Clean Development Mechanism (CDM) Tool 03: Tool to calculate project or leakage CO_2 emissions from fossil fuel combustion, Version 3.0

ii. 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 2 (Energy) Chapter 2: Stationary Combustion

4| DEFINITIONS

4.1.1 | The definitions outlined in the Glossary of Gold Standard for the Global Goals shall apply.

5| TOOL SCOPE AND BOUNDARY

5.1 | Activity Scope

5.1.1 | Tool 1 provides methods to calculate activity and/or leakage emissions resulting from the combustion of fossil fuels in non-transport applications.

5.2 | Activity Boundary

5.2.1 | The activity boundary shall be specified as per the applied methodology.

6| BASELINE EMISSIONS/REMOVALS

6.1.1 | Tool 1 does not apply to baseline emissions and/or removals.

7| ACTIVITY REMOVALS

7.1.1 | Tool 1 does not apply to activity removals.

8| ACTIVITY EMISSIONS

8.1 | Calculation of Total Emissions

8.1.1 | The activity emissions in monitoring period *y* from fossil fuel combustion in the process *j* ($AE_{j,y}$) shall be calculated as follows:

$$AE_{j,y} = AE_{CO2,j,y} + (AE_{CH4,j,y} \times GWP_{CH4}) + (AE_{N2O,j,y} \times GWP_{N2O}) \quad (1)$$

Where:			Parameter ID/ section
$AE_{j,,y}$	=	Total emissions from process *j* during the monitoring period *y* (tCO_2e)	N/A
$AE_{CO2,j,y}$	=	Carbon dioxide emissions from process *j* during the monitoring period *y* (tCO_2)	Sections 9.2–9.4
$AE_{CH4,j,y}$	=	CH_4 emissions from process *j* during the monitoring period *y* (tCH_4)	Sections 9.5–9.6
$AE_{N2O,j,y}$	=	N_2O emissions from process *j* during the monitoring period *y* (tN_2O)	Sections 9.5–9.6

GWP_{CH4}	=	Global warming potential of CH_4 (IPCC, AR 5)	N/A
GWP_{N2O}	=	Global warming potential of N_2O (IPCC, AR 5)	N/A

8.2 | Calculation of CO_2 Emissions

8.2.1 | The CO_2 emissions from the combustion of fossil fuels in process *j* is calculated based on the quantity of fuel burned and the CO_2 emission factor coefficient of that fuel, as follows:

$$AE_{CO2,j,y} = \sum_i \left(FC_{i,j,y} \times COEF_{CO2,i,y}\right) \quad (2)$$

Where:			Parameter ID/ section
$FC_{i,j,y}$	=	Quantity of fuel type *i* combusted in process *j* during the monitoring period *y* (mass or volume unit/year)	Parameter 1
$COEF_{CO2,i,y}$	=	CO_2 emission coefficient of fuel type *i* in year *y* (tCO2/mass or volume unit)	Section 9.3
i	=	Fuel types combusted in process *j* during the monitoring period *y*	N/A
j	=	Combustion process type	N/A

8.2.2 | The CO_2 emission coefficient ($COEF_{CO2,i,y}$) can be calculated using the chemical composition method (Section 8.3) or NCV method (Section 8.4), which shall be selected depending on the availability of data on the fossil fuel type *i*. Both options assume carbon oxidation factor as 1.

8.3 | Calculation of CO_2 Emission Coefficient – Chemical Composition Method

8.3.1 | $COEF_{CO2,i,y}$ can be calculated based on its chemical composition, as follows:

If $FC_{i,j,y}$ is measured in a mass unit:

$$COEF_{CO2,i,y} = w_{c,i,y} \times \frac{44}{12} \quad (3)$$

Or if $FC_{i,j,y}$ is measured in a volume unit:

$$COEF_{CO2,i,y} = w_{c,i,y} \times \rho_{i,y} \times \frac{44}{12} \quad (4)$$

Where:			Parameter ID/section
$w_{c,i,y}$	=	Weighted average mass fraction of carbon in fuel type *i* in monitoring period *y* (tC/mass unit of the fuel)	Parameter 2
$\rho_{i,y}$	=	Weighted average density of fuel type *i* in monitoring period (mass unit/volume unit of the fuel)	Parameter 3

8.4 | Calculation of CO_2 Emission Coefficient – NCV Method

8.4.1 | $COEF_{CO2,i,y}$ can be calculated based on its NCV and emission factor, as follows:

$$COEF_{CO2,i,y} = NCV_{i,y} \times EF_{CO2,i,y} \quad (5)$$

Where:			Parameter ID/section
$NCV_{i,y}$	=	Weighted average net calorific value of the fuel type *i* in monitoring period *y* (GJ/mass or volume unit)	Parameter 4
$EF_{CO2,i,y}$	=	Weighted average CO_2 emission factor of fuel type *i* in monitoring period *y* (tCO_2/GJ)	Parameter 5

8.5 | Calculation of CH_4 and N_2O Emissions – Technology-Based Method

8.5.1 | CH_4 and N_2O emissions ($AE_{CH4,j,y}$, $AE_{N2O,j,y}$) depend not only on fuel characteristics but also on the combustion technology type, conditions in the combustion chamber, usage of pollution control equipment, and ambient environmental conditions. Emissions of these gases also vary with the size, efficiency, and vintage of the combustion technology as well as maintenance and operational practices. CH_4 and N_2O emissions are calculated using either the technology-based method or the NCV method.

8.5.2 | This technology-based method requires splitting the fuel consumption data for each technology type and the use of emission factors that are technology-specific. Here, technology refers to any device, combustion process, or fuel property that might influence the emissions.

8.5.3 | CH_4 and N_2O emissions ($AE_{CH4,j,y}$, $AE_{N2O,j,y}$) can be calculated on a technology basis as follows:

$$PE_{CH4,j,y} = \sum_{i,j,t}\left(FC_{i,j,t,y} \times EF_{CH4,i,j,t}\right) \quad (6)$$

$$PE_{N2O,j,y} = \sum_{i,j,t}\left(FC_{i,j,y} \times EF_{N2O,i,j,t}\right) \quad (7)$$

Where:			Parameter ID/section
$FC_{i,j,t,y}$	=	Quantity of fuel type *i* combusted in process *j* using technology type *t* during the monitoring period *y* (GJ/year)	Parameter 6
$EF_{CH4,i,j,t}$	=	weighted average CH_4 emission factor of fuel type *i* combusted in process *j* using technology type *t* during the monitoring period *y* (tCH_4/GJ)	Parameter 7
$EF_{N2O,i,j,t}$	=	weighted average N_2O emission factor of fuel type *i* combusted in process *j* using technology type *t* during the monitoring period *y* (tN_2O/GJ)	Parameter 8

8.6 | Calculation of CH_4 and N_2O Emissions – NCV Method

8.6.1 | CH_4 and N_2O emissions ($AE_{CH4,j,y}$, $AE_{N2O,j,y}$) based on their NCV and emission factors, as follows:

$$PE_{CH4,j,y} = \sum_{i,j}\left(FC_{i,j,y} \times NCV_{i,y} \times EF_{CH4,i,y}\right) \quad (8)$$

$$PE_{N2O,j,y} = \sum_{i,j}\left(FC_{i,j,y} \times NCV_{i,y} \times EF_{N2O,i,y}\right) \quad (9)$$

Where:			Parameter ID/ section
$EF_{CH4,i,y}$	=	CH_4 emission factor of fuel type *i* in monitoring period *y* (tCH_4/ GJ of fuel energy)	Parameter 9
$EF_{N2O,i,y}$	=	N_2O emission factor of fuel type *i* in monitoring period *y* (tN_2O/ GJ of fuel energy)	Parameter 10

9| LEAKAGE EMISSIONS

9.1.1 | Leakage emissions shall be covered using the same methods as outlined above for activity emissions, where required by the applied methodology.

10| QUANTIFICATION OF UNCERTAINTY

10.1.1 |Potential sources of uncertainty, along with the associated Quality Assurance/Quality Control (QA/QC) requirements to minimize them, are summarized in the Monitoring Methodology section.

10.1.2 |The uncertainties associated with the parameters shall be aggregated in the methodology into an overall uncertainty estimate for emission reductions or removals. A 95% confidence interval shall be employed for quantifying uncertainty due to random errors, following the statistical approaches in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories and 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories (propagation of errors method). When the uncertainty in the estimated value of emission reductions or removals is expected to be at a 95% confidence interval (within +/-10% range when applicable), the activity may exclude such random errors, while in the case of being outside +/-10% range at a 95% confidence interval, the activity shall address such random errors by deducting the emission reductions or removals accordingly. The uncertainty estimation and means of addressal shall be determined to the extent possible in the methodology, thereby simplifying or eliminating the associated procedure required from the activity.

11| MONITORING METHODOLOGY

11.1.1 |The activity developer shall describe and specify all monitoring procedures in the Project Design Document, including the types of measurement instrumentation used, the responsibilities for monitoring, and QA/QC

procedures that will be applied. When the methodology provides different options (e.g., use of default values or on-site measurements), the activity developer shall specify which option will be used.

11.1.2 | Meters shall be installed, maintained, and calibrated according to equipment manufacturer instructions and shall be in line with national standards or, if these are not available, international standards (e.g., International Electrotechnical Commission [IEC], International Organization for Standardization [ISO]).

11.1.3 | All data collected for monitoring shall be archived electronically and kept for at least two years after the end of the last crediting period. Unless indicated otherwise in the tables below, 100% of the data shall be monitored.

11.2 | Data and Parameters Not Monitored

Parameter ID	**1**	
Data/Parameter	$FC_{i,j,y}$	
Description	Quantity of fuel type i combusted in process j during the monitoring period y	
Data unit	Mass or volume unit per time (e.g. tonnes/yr or m^3/yr)	
Equations referred	Equations 2, 8, and 9	
Purpose of data	☐ Baseline emissions ☒ Activity emissions ☒ Leakage emissions	
Measurement methods and procedures	On-site measurements	
Entity/person responsible for the measurement	Activity developer, unless specified otherwise in the applied methodology	
Measuring instrument(s)	Type of instrument	Mass or volume meters In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: a. The ruler gauge shall be part of the daily tank and calibrated at least once a year and have a book of control for recording the measurements (on a daily basis or per shift). b. Accessories such as transducers and sonar and piezoelectronic devices are accepted if they are properly calibrated with the ruler gauge and receive reasonable maintenance.

	Accuracy class	Not applicable
	Calibration requirements	Meters shall be installed, maintained, and calibrated according to equipment manufacturer instructions and shall be in line with national standards or, if these are not available, international standards (e.g., IEC, ISO). In the case of daily tanks with pre-heaters for heavy oil, the calibration will be made with the system at typical operational conditions.
	Location	Not applicable
Measurement intervals	Continuous	
QA/QC procedures	The consistency of metered fuel consumption quantities shall be cross-checked with: a. an annual energy balance that is based on purchased quantities and stock changes, and b. available purchase invoices from the financial records, where the purchased fuel invoices can be identified specifically for the activity. Volume measurements shall be taken at ambient conditions (e.g., 15°C).	
Comments	Activities or Programmes of Activities in which end users of the subsystems or measures are households/communities/small and medium enterprises faced with data gaps due to meter failure or other unforeseen reasons may estimate the quantity of fuel using one of the following options, provided the gap period does not exceed 30 consecutive days within six consecutive months: a. The purchased fuel/energy invoices/bills, where the purchased fuel can be identified specifically for the activity. b. The energy produced by the equipment, adjusted by efficiency. Efficiency of the equipment is determined using CDM Tool 09: Determining the baseline efficiency of thermal or electric energy generation systems, and energy produced is measured directly or calculated based on operation hours. c. The highest value of the parameter for the same calendar period of the previous years.	

	d. The fuel consumption of a representative sample of the first batch[1] of devices. It may be assumed that the fuel consumption measured in a representative sample of the first batch of devices apply to all subsequent batches.

Parameter ID	**2**	
Data/Parameter	$w_{c,i,y}$	
Description	Weighted average mass fraction of carbon in fuel type i in monitoring period y	
Data unit	Total carbon (tC)/mass unit of the fuel	
Equations referred	Equations 3 and 4	
Purpose of data	☐ Baseline emissions ☒ Activity emissions ☒ Leakage emissions	
Measurement methods and procedures	The following data sources may be used in the order of preference listed below: a. Values provided by the fuel supplier in invoices. This is the preferred source. b. Measurements by the activity developer, if (a) data source is not available.	
Entity/person responsible for the measurement	Activity developer or supplier to the activity developer	
Measuring instrument(s)	Type of instrument	The weighted average mass fraction of carbon in a fuel type can be measured by calculating the mass fraction of carbon in a fuel and the total amount of fuel consumed. For fuels, the mass fraction of carbon can be determined from its chemical formula or empirical formula. The amount of fuel can be obtained from fuel purchase records or can be measured. Measurements shall be undertaken in line with national or international fuel standards, e.g., American Petroleum Institute (API) Manual of Petroleum Measurement Standards (MPMS), ISO 4267, ASTM D1250.
	Accuracy class	Not applicable

[1] A batch refers to a group of devices of the same type commissioned within a specific year. To determine the commissioning date, activity developer can choose to categorise the devices into "batches." The most recent commissioning date of a device within a batch will be considered the commissioning date for the whole batch.

	Calibration requirements	Calibration shall be undertaken in line with equipment manufacturer instructions and shall be in line with national standards or, if these are not available, international standards (e.g., IEC, ISO).
	Location	Not applicable
Measurement intervals	The mass fraction of carbon shall be obtained for each fuel delivery, from which weighted average annual values shall be calculated.	
QA/QC procedures	Cross-check if the values for data for (a) and (b) fall within the uncertainty range of the product, based on the IPCC default values provided in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 1, Table 1.2 and Table 1.3, Volume 2, (Energy). If the values are below the range mentioned, obtain additional information from the testing laboratory to justify the result or conduct more measurements. Laboratories used for conducting the measurements for the source of data (b) shall have ISO 17025 accreditation or provide justification for their compliance with similar quality standards.	
Comments	Applicable to the chemical composition-based method for the calculation of the CO_2 emission factor coefficient	

Parameter ID	**3**
Data/Parameter	$\rho_{i,y}$
Description	Weighted average density of fuel type i in monitoring period y
Data unit	Mass unit/volume unit
Equations referred	Equation 4
Purpose of data	☐ Baseline emissions ☒ Activity emissions ☒ Leakage emissions
Measurement methods and procedures	The following data sources may be used in the order of preference listed below: a. Values provided by the fuel supplier in invoices. This is the preferred source. b. Measurements by the activity developer, if (a) data source is not available. c. Regional or national default values for liquid fuels, if (a) or (b) data source is not available. The values shall be obtained from well-documented and reliable data sources, such as national energy balances.
Entity/person	Activity developer or supplier to the activity developer

responsible for the measurement		
Measuring instrument(s)	Type of instrument	Density measurements shall be undertaken in line with national or international fuel standards, e.g., ISO 12185, ASTM D4052
	Accuracy class	Not applicable
	Calibration requirements	Calibration shall be undertaken in line with equipment manufacturer instructions and shall be in line with national standards or, if these are not available, international standards (e.g., IEC, ISO).
	Location	Not applicable
Measurement intervals	The density of the fuel shall be obtained for each fuel delivery, from which weighted average annual values shall be calculated.	
QA/QC procedures	Not applicable	
Comments	Applicable to the chemical composition-based method for the calculation of the CO_2 emission factor coefficient, $FC_{i,j,y}$, measured in volume units. Preferably, the same data source shall be used for both $w_{c,i,y}$ and $\rho_{i,y}$.	

Parameter ID	**4**
Data/Parameter	$NCV_{i,y}$
Description	Weighted average NCV of fuel type i in monitoring period y
Data unit	Gigajoule (GJ) per mass or volume unit (e.g. GJ/m³, GJ/ton)
Equations referred	Equations 5, 8, and 9
Purpose of data	☐ Baseline emissions ☒ Activity emissions ☒ Leakage emissions
Measurement methods and procedures	The following data sources may be used in the order of preference listed below: a. Values provided by the fuel supplier in invoices. This is the preferred source, if the carbon fraction of the fuel is not provided. b. Measurements by the activity developer, if (a) data source is not available. c. Regional or national default values for liquid fuels, if (a) data source is not available. The values shall be obtained

	from well-documented and reliable data sources, such as national energy balances. d. IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Table 1.3, Volume 2 (Energy), if data source (a), (b), or (c) is not available.	
Entity/person responsible for the measurement	Activity developer or supplier to the activity developer	
Measuring instrument(s)	Type of instrument	Measurements shall be undertaken in line with national or international fuel standards.
	Accuracy class	Not applicable
	Calibration requirements	Calibration shall be undertaken in line with equipment manufacturer instructions and shall be in line with national standards or, if these are not available, international standards (e.g., IEC, ISO).
	Location	Not applicable
Measurement intervals	For data sources (a) and (b), the NCV value shall be obtained for each fuel delivery, from which weighted average annual values shall be calculated. For data source (c), review appropriateness of the values annually. For data source (d), any future revision of the IPCC Guidelines shall be taken into account.	
QA/QC procedures	Cross-check if the values for data sources (a), (b), and (c) fall within the uncertainty range of the IPCC default values provided in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Table 1.2, Chapter 1, Volume 2 (Energy). If the values are below the range mentioned, obtain additional information from the testing laboratory to justify the result or conduct more measurements. Laboratories used for conducting the measurements for the source of data (b) shall have ISO 17025 accreditation or provide justification for their compliance with similar quality standards.	
Comments	Applicable to NVC calculations	

Parameter ID	**5**
Data/Parameter	$EF_{CO2,i,y}$

Description	Weighted average CO_2 emission factor of fuel type i in monitoring period y	
Data unit	tCO_2/GJ	
Equations referred	Equation 5	
Purpose of data	☐ Baseline emissions ☒ Activity emissions ☒ Leakage emissions	
Measurement methods and procedures	The following data sources may be used in the order of preference listed below: a. Values provided by the fuel supplier in invoices. This is the preferred source. b. Measurements by the activity developer, if data source (a) is not available. c. Values obtained by the fuel supplier in official documents/publications applicable to the location and date of refuelling, if data source (a) or (b) is not available. d. Regional or national default values for liquid fuels, if data source (a), (b), or (c) is not available. The values shall be obtained from well-documented and reliable data sources, such as national energy balances. e. IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Table 1.4, Chapter 1, Volume 2 (Energy), if data source (a), (b), (c), or (d) is not available.	
Entity/person responsible for the measurement	Activity developer or supplier to the activity developer	
Measuring instrument(s)	Type of instrument	Measurements shall be undertaken in line with national or international fuel standards.
	Accuracy class	Not applicable
	Calibration requirements	Calibration shall be undertaken in line with equipment manufacturer instructions and shall be in line with national standards or, if these are not available, international standards (e.g., IEC, ISO).
	Location	Not applicable
Measurement intervals	For data sources (a) and (b), the CO_2 emission factor value shall be obtained for each fuel delivery, from which weighted average annual values shall be calculated. For data sources (c) and (d), review appropriateness of the values annually.	

	For data source (e), any future revision of the IPCC Guidelines shall be taken into account.
QA/QC procedures	Not applicable
Comments	For data source (a): If the fuel supplier includes both the NCV and the CO_2 emission factor for the specific fuel on the invoice, this CO_2 factor shall be used. If the fuel supplier does not provide this information or if another source of data is used, data source (b), (c), (d), or (e) shall be used in the order of preference (alphabetical).

Parameter ID	**6**	
Data/Parameter	$FC_{i,j,t,y}$	
Description	Quantity of fuel type i combusted in process j using technology type t during the monitoring period y	
Data unit	GJ/year	
Equations referred	Equations 6 and 7	
Purpose of data	☐ Baseline emissions ☒ Activity emissions ☒ Leakage emissions	
Measurement methods and procedures	On-site measurements	
Entity/person responsible for the measurement	Activity developer or supplier to the activity developer	
Measuring instrument(s)	Type of instrument	Mass or volume meters. Measurements shall be undertaken in line with national or international fuel standards, e.g., API MPMS, ISO 4267, ASTM D1250. In cases where fuel is supplied from small daily tanks, rulers can be used to determine mass or volume of the fuel consumed, with the following conditions: a. The ruler gauge shall be part of the daily tank, shall be calibrated at least once a year, and shall have a book of control for recording the measurements (on a daily basis or per shift). b. Accessories such as transducers and sonar and piezoelectronic devices are accepted if they are properly calibrated with the ruler gauge and receive reasonable maintenance.

	Accuracy class	Not applicable
	Calibration requirements	Calibration shall be undertaken in line with equipment manufacturer instructions and shall be in line with national standards or, if these are not available, international standards (e.g., IEC, ISO). In the case of daily tanks with pre-heaters for heavy oil, the calibration will be made with the system at typical operational conditions.
	Location	Not applicable
Measurement intervals	Continuous	
QA/QC procedures	The consistency of metered fuel consumption quantities shall be cross-checked with: a. an annual energy balance that is based on purchased quantities and stock changes, and b. available purchase invoices from the financial records, where the purchased fuel invoices can be identified specifically for the activity.	
Comments	Fuel consumption may be expressed on a mass or volume basis, and emissions may be estimated as the product of fuel consumption and an emission factor expressed on a compatible basis, using NCV of fuel.	

Parameter ID	**7**
Data/Parameter	$EF_{CH4,i,j,t}$
Description	CH_4 emission factor of fuel type i using technology t in monitoring period y
Data unit	tCH_4/GJ
Equations referred	Equation 6
Purpose of data	☐ Baseline emissions ☒ Activity emissions ☒ Leakage emissions
Measurement methods and procedures	The following data sources may be used in the order of preference listed below: a. Values provided by the fuel supplier in invoices. This is the preferred source. b. Measurements by the activity developer, if data source (a) is not available.

	c. Values obtained by the fuel supplier in official documents/publications applicable to the location and date of refuelling, if data source (a) or (b) is not available. d. Regional or national default values for liquid fuels, if data source (a), (b), or (c) is not available. The values shall be obtained from well-documented and reliable data sources, such as national energy balances. e. IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Table 1.4, Chapter 1, Volume 2 (Energy), if data source (a), (b), (c), or (d) is not available.	
Entity/person responsible for the measurement	Activity developer or supplier to the activity developer	
Measuring instrument(s)	Type of instrument	Measurements shall be undertaken in line with national or international fuel standards.
	Accuracy class	Not applicable
	Calibration requirements	Calibration shall be undertaken in line with equipment manufacturer instructions and shall be in line with national standards or, if these are not available, international standards (e.g., IEC, ISO).
	Location	Not applicable
Measurement intervals	For data source (a) and (b), the CO_2 emission factor value shall be obtained for each fuel delivery, from which weighted average annual values shall be calculated. For data source (c) and (d), review appropriateness of the values annually. For data source (e), any future revision of the IPCC Guidelines shall be taken into account.	
QA/QC procedures	Not applicable	
Comments	Not applicable	

Parameter ID	**8**
Data/Parameter	$EF_{N2O,i,j,t}$
Description	N_2O emission factor of fuel type i using technology t in monitoring period y

Data unit	tN_2O/GJ	
Equations referred	Equation 7	
Purpose of data	☐ Baseline emissions ☒ Activity emissions ☒ Leakage emissions	
Measurement methods and procedures	The following data sources may be used in the order of preference listed below: a. Values provided by the fuel supplier in invoices. This is the preferred source. b. Measurements by the activity developer, if data source (a) is not available. c. Values obtained by the fuel supplier in official documents/publications applicable to the location and date of refuelling, if data source (a) or (b) is not available. d. Regional or national default values for liquid fuels, if data source (a), (b), or (c) is not available. The values shall be obtained from well-documented and reliable data sources, such as national energy balances. e. IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Table 1.4, Chapter 1, Volume 2 (Energy), if data source (a), (b), (c), or (d) is not available.	
Entity/person responsible for the measurement	Activity developer or supplier to the activity developer	
Measuring instrument(s)	Type of instrument	Measurements shall be undertaken in line with national or international fuel standards.
	Accuracy class	Not applicable
	Calibration requirements	Calibration shall be undertaken in line with equipment manufacturer instructions and shall be in line with national standards or, if these are not available, international standards (e.g., IEC, ISO).
	Location	Not applicable
Measurement intervals	For data sources (a) and (b), the CO_2 emission factor value shall be obtained for each fuel delivery, from which weighted average annual values shall be calculated. For data sources (c) and (d), review appropriateness of the values annually. For data source (e), any future revision of the IPCC Guidelines shall be taken into account.	

QA/QC procedures	Not applicable
Comments	Not applicable

Parameter ID	**9**	
Data/Parameter	$EF_{CH4,j,t}$	
Description	CH_4 emission factor of fuel type i in monitoring period y	
Data unit	tCH_4/GJ of fuel energy	
Equations referred	Equation 8	
Purpose of data	☐ Baseline emissions ☒ Activity emissions ☒ Leakage emissions	
Measurement methods and procedures	The following data sources may be used in the order of preference listed below: a. Values provided by the fuel supplier in invoices. This is the preferred source. b. Measurements by the activity developer, if data source (a) is not available. c. Values obtained by the fuel supplier in official documents/publications applicable to the location and date of refuelling, if data source (a) or (b) is not available. d. Regional or national default values for liquid fuels, if data source (a), (b), or (c) is not available. The values shall be obtained from well-documented and reliable data sources, such as national energy balances. e. IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Table 1.4, Chapter 1, Volume 2 (Energy), if data source (a), (b), (c), or (d) is not available.	
Entity/person responsible for the measurement	Activity developer or supplier to the activity developer	
Measuring instrument(s)	Type of instrument	Measurements shall be undertaken in line with national or international fuel standards.
	Accuracy class	Not applicable
	Calibration requirements	Calibration shall be undertaken in line with equipment manufacturer instructions and shall be in

		line with national standards or, if these are not available, international standards (e.g., IEC, ISO).
	Location	Not applicable
Measurement intervals	For data sources (a) and (b), the CO_2 emission factor value shall be obtained for each fuel delivery, from which weighted average annual values shall be calculated. For data sources (c) and (d), review appropriateness of the values annually. For data source (e), any future revision of the IPCC Guidelines shall be taken into account.	
QA/QC procedures	Not applicable	
Comments	Not applicable	

Parameter ID	**10**
Data/Parameter	$EF_{N2O,j,t}$
Description	N_2O emission factor of fuel type i in monitoring period y
Data unit	tN_2O/ GJ of fuel energy
Equations referred	Equations
Purpose of data	☐ Baseline emissions ☒ Activity emissions ☒ Leakage emissions
Measurement methods and procedures	The following data sources may be used in the order of preference listed below: a. Values provided by the fuel supplier in invoices. This is the preferred source. b. Measurements by the activity developer, if data source (a) is not available. c. Values obtained by the fuel supplier in official documents/publications applicable to the location and date of refuelling, if data source (a) or (b) is not available. d. Regional or national default values for liquid fuels, if data source (a), (b), or (c) is not available. The values shall be obtained from well-documented and reliable data sources, such as national energy balances. e. IPCC default values at the upper limit of the uncertainty at a 95% confidence interval as provided in the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Table 1.4, Chapter 1, Volume 2 (Energy), if data source (a), (b), (c), or (d) is not available.

Entity/person responsible for the measurement	Activity developer or supplier to the activity developer	
Measuring instrument(s)	Type of instrument	Measurements shall be undertaken in line with national or international fuel standards.
	Accuracy class	Not applicable
	Calibration requirements	Calibration shall be undertaken in line with equipment manufacturer instructions and shall be in line with national standards or, if these are not available, international standards (e.g., IEC, ISO).
	Location	Not applicable
Measurement intervals	For data sources (a) and (b), the CO_2 emission factor value shall be obtained for each fuel delivery, from which weighted average annual values shall be calculated. For data sources (c) and (d), review appropriateness of the values annually. For data source (e), any future revision of the IPCC Guidelines shall be taken into account.	
QA/QC procedures	Not applicable	
Comments	Not applicable	

11.3 | Sampling requirements

11.3.1 |Not applicable

12| DOCUMENT INFORMATION

Version	Date	Description
01.0	05/09/2025	First version released

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