

Emission Factors and Reference Values

Version 4.0
September 2026

Canada's Greenhouse Gas
Offset Credit System



Environment and
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Document revision history

Version number	Publication Date	Summary of changes
4.0	September 9, 2026	Addition of emission factors and other reference values applicable to the <i>Reducing Manure Methane Emissions</i> federal offset protocol Addition of reference values applicable to protocols with methane destruction and displacement of fossil fuels Update of emission factors and other reference values in alignment with the <i>National Inventory Report 1990–2024: Greenhouse Gas Sources and Sinks in Canada</i>
3.0	October 24, 2025	Addition of emission factors and other reference values applicable to the <i>Reducing Enteric Methane Emissions from Beef Cattle</i> federal offset protocol Update of emission factors and other reference values in alignment with the <i>National Inventory Report 1990–2023: Greenhouse Gas Sources and Sinks in Canada</i>
2.0	May 6, 2024	Addition of reference values applicable to the <i>Improved Forest Management on Private Land</i> federal offset protocol Update of emission factors and other reference values in alignment with the <i>National Inventory Report 1990–2022: Greenhouse Gas Sources and Sinks in Canada</i> Addition of rules on the timing applicability of emission factors and other reference values Changes to clarify the structure and facilitate the use of the document
1.1	June 13, 2023	Update of information and emission factors in alignment with the April 2023 publication of the <i>National Inventory Report 1990–2021: Greenhouse Gas Sources and Sinks in Canada</i>
1.0	June 8, 2022	Initial version

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1.0 Introduction

[Canada's Greenhouse Gas \(GHG\) Offset Credit System](#) is established under Part 2 of the *Greenhouse Gas Pollution Pricing Act* to provide an incentive to implement projects that result in domestic GHG reductions that would not have been generated in the absence of the project, that go beyond legal requirements and that are not subject to carbon pollution pricing mechanisms.

Canada's GHG Offset Credit System consists of:

- the [Canadian Greenhouse Gas Offset Credit System Regulations](#) (the Regulations), which establish the system, implement the operational aspects and set the general requirements applicable to all project types
- federal offset protocols, included in the [Compendium of Federal Offset Protocols](#) (the Compendium), each containing requirements for project implementation and methods for quantifying GHG reductions for a given project type, and
- the [Credit and Tracking System](#) (CATS) to register offset projects, issue and track offset credits, and share key information through [Canada's GHG Offset Credit System Public Registry](#)

The Regulations apply to a proponent of a project which is of a type for which a protocol has been included in the Compendium; that aims to generate GHG reductions by preventing GHG emissions or removing GHGs from the atmosphere; and with respect to which the GHG reductions are real, additional, quantified, verified, unique and permanent. Offset credits will be issued to a proponent of a project for the period covered by a project report in the amount determined in accordance with subsection 29(2) of the Regulations if requirements of subsection 29(1) of the Regulations are met.

As per subsection 19(1) of the Regulations, this document provides emission factors and other reference values that a proponent must use in conjunction with a federal offset protocol to quantify the GHG reductions generated by a project. It also specifies timing applicability for the emission factors and other reference values that are to be used for the quantification of GHG reductions occurring in a given calendar year.

This document is categorized into general emission factors and other reference values that are applicable to more than one federal offset protocol, and protocol-specific emission factors and other reference values. For all emission factors and other reference values, it is specified which parameter in a given protocol the emission factor or other reference value corresponds to. The proponent may need to convert the units of the emission factors and other reference values provided in this document to align with the units presented in the quantification methodology of the relevant federal offset protocol.

Emission factors and other reference values are subject to periodic updates when a new federal offset protocol is included in the Compendium, or when updated versions of the sources referenced in this document are published. As per subsection 1(2) of the Regulations, proponents must use the latest version of this document.

2.0 Abbreviations and acronyms

The following abbreviations and acronyms are used in this document:

Act	<i>Greenhouse Gas Pollution Pricing Act</i>
CH ₄	methane
CO ₂	carbon dioxide
CO ₂ e	carbon dioxide equivalent
g	gram
kg	kilogram
kWh	kilowatt hour
L	litre
m ³	cubic meter
N ₂ O	nitrous oxide
SF ₆	sulfur hexafluoride
t	metric tonne

Many emission factors and other reference values contained in this document are sourced from the annual [National inventory reports for GHG sources and sinks in Canada](#) (NIR), published by Environment and Climate Change Canada (ECCC). To simplify references to these reports in the footnotes, a short form citation is used. The complete citation of “Environment and Climate Change Canada. (year x). *National Inventory Report 1990–year y: Greenhouse Gas Sources and Sinks in Canada*” is replaced by “ECCC. (year x). NIR 1990–year y.” The short form citation in the footnotes also includes the relevant report part number, table number and table title corresponding to the emission factor or other reference value.

3.0 General

3.1 Global warming potentials

Global warming potentials to be used for the quantification of GHG reductions are the ones published in Schedule 3 to the Act at the time GHG reductions occur.

3.2 Timing applicability of emission factors and other reference values

Many emission factors and other reference values contained in this document are sourced from Canada’s NIR, which is submitted annually to the United Nations Framework Convention on Climate Change by April 15 of each year. The NIR covers GHG emissions from 1990 to two

calendar years prior to publication (e.g., the NIR published in April 2026 contains the national inventory of GHG emissions for 2024).

To reflect the emission factors and other reference values from the most recently published NIR, this document is published each year. Given the difference between the year of NIR publication and the last year included in the GHG emission inventory, as well as the need to provide project proponents time to obtain and apply emission factors and other reference values to their project after this document is published, the following general approach is used for the timing applicability of emission factors and other reference values in this document:

- Emission factors and other reference values from an NIR published in a given year apply to the quantification of GHG reductions that occur in the subsequent calendar year. For clarity and ease of reference, this document contains a **table applicable to each calendar year** for any emission factor or other reference value, regardless of whether the factor or other value has changed compared with the previous NIR.

This approach is only applicable for projects in Canada's GHG Offset Credit System. It is not applicable to the national GHG inventory or other pricing mechanisms for GHG emissions.

4.0 General emission factors and other reference values

Emission factors and other reference values in Section 4.0 may be applicable to more than one federal offset protocol.

4.1 Fossil fuel combustion

Emission factors contained in Tables 1.1, 1.2, 1.3, and 1.4 correspond to the parameter EF_{CO_2} in applicable protocols.

Emission factors contained in Table 1.1 must be used for the quantification of GHG reductions occurring in calendar years 2023 and 2024.

Table 1.1: CO₂ emission factors for natural gas (g CO₂/m³ natural gas) for 2023 and 2024

Province / Territory	Marketable ^{1 a}	Non-marketable ^{2 b}
British Columbia	1 966	2 162
Alberta	1 962	2 109
Saskatchewan	1 920	2 441
Manitoba	1 915	2 401
Ontario	1 921	2 401

¹ ECCC. (2023). NIR 1990-2021, Part 2, Table A6.1-1, "CO₂ Emission Factors for Marketable Natural Gas"

² ECCC. (2023). NIR 1990-2021, Part 2, Table A6.1-2, "CO₂ Emission Factors for Non-Marketable Natural Gas"

Province / Territory	Marketable ^{1 a}	Non-marketable ^{2 b}
Quebec	1 926	-
New Brunswick	1 919	2 401
Nova Scotia	1 919	2 494
Prince Edward Island	1 919	-
Newfoundland and Labrador	1 919	2 202
Yukon	1 966	2 401
Northwest Territories	1 966	2 466
Nunavut	1 966	-

^a The term “marketable” applies to fuel consumed by the Utility, Industry, Residential, Commercial, and Transport subsectors.

^b The term “non-marketable” applies to raw/unprocessed gas consumption, mainly by natural gas producers.

Emission factors contained in Table 1.2 must be used for the quantification of GHG reductions occurring in calendar year 2025.

Table 1.2: CO₂ emission factors for natural gas (g CO₂/m³ natural gas) for 2025

Province / Territory	Marketable ³	Non-marketable ⁴
British Columbia	1 966	2 162
Alberta	1 962	2 113
Saskatchewan	1 920	2 441
Manitoba	1 915	2 401
Ontario	1 921	2 401
Quebec	1 926	-
New Brunswick	1 919	2 401
Nova Scotia	1 919	2 494
Prince Edward Island	1 919	-
Newfoundland and Labrador	1 919	2 340
Yukon	1 966	2 401
Northwest Territories	1 966	2 466
Nunavut	1 966	-

³ ECCC. (2024). NIR 1990-2022, Part 2, Table A6.1-1, “CO₂ Emission Factors for Marketable Natural Gas”

⁴ ECCC. (2024). NIR 1990-2022, Part 2, Table A6.1-2, “CO₂ Emission Factors for Non-Marketable Natural Gas”

Emission factors contained in Table 1.3 must be used for the quantification of GHG reductions occurring in calendar year 2026.

Table 1.3: CO₂ emission factors for natural gas (g CO₂/m³ natural gas) for 2026

Province / Territory	Marketable ⁵	Non-marketable ⁶
British Columbia	1 966	2 162
Alberta	1 962	2 112
Saskatchewan	1 920	2 441
Manitoba	1 915	2 401
Ontario	1 921	2 401
Quebec	1 926	-
New Brunswick	1 919	2 401
Nova Scotia	1 919	2 494
Prince Edward Island	1 919	-
Newfoundland and Labrador	1 919	2 260
Yukon	1 966	2 401
Northwest Territories	1 966	2 466
Nunavut	1 966	-

Emission factors contained in Table 1.4 must be used for the quantification of GHG reductions occurring in calendar year 2027.

Table 1.4: CO₂ emission factors for natural gas (g CO₂/m³ natural gas) for 2027

Province / Territory	Marketable ⁷	Non-marketable ⁸
British Columbia	1 966	2 199
Alberta	1 962	2 115
Saskatchewan	1 920	2 441
Manitoba	1 915	2 401
Ontario	1 921	2 401
Quebec	1 926	-

⁵ ECCC. (2025). NIR 1990-2023, Part 2, Table A6.1-1, "CO₂ Emission Factors for Marketable Natural Gas"

⁶ ECCC. (2025). NIR 1990-2023, Part 2, Table A6.1-2, "CO₂ Emission Factors for Non-Marketable Natural Gas"

⁷ ECCC. (2026). NIR 1990-2024, Part 2, Table A6.1-1, "CO₂ Emission Factors for Marketable Natural Gas"

⁸ ECCC. (2026). NIR 1990-2024, Part 2, Table A6.1-2, "CO₂ Emission Factors for Non-Marketable Natural Gas"

Province / Territory	Marketable ⁷	Non-marketable ⁸
New Brunswick	1 919	2 401
Nova Scotia	1 919	2 494
Prince Edward Island	1 919	-
Newfoundland and Labrador	1 919	2 290
Yukon	1 966	2 401
Northwest Territories	1 966	2 466
Nunavut	1 966	-

Emission factors contained in Tables 2.1, 2.2, 2.3, and 2.4 correspond to the parameters EF_{CH_4} or EF_{N_2O} in applicable protocols.

Emission factors contained in Table 2.1 must be used for the quantification of GHG reductions occurring in calendar years 2023 and 2024.

Table 2.1: CH₄ and N₂O emission factors for natural gas (g GHG/m³ natural gas)⁹ for 2023 and 2024

Source	CH ₄	N ₂ O
Electric Utilities	0.490	0.049
Industrial	0.037	0.033
Producer Consumption (Non-marketable)	6.4	0.060
Producer Consumption (Non-marketable) – Newfoundland and Labrador	0.490	0.060
Pipelines	1.900	0.050
Cement	0.037	0.034
Manufacturing Industries	0.037	0.033
Residential, Construction, Commercial/Institutional, Agriculture	0.037	0.035

Emission factors contained in Table 2.2 must be used for the quantification of GHG reductions occurring in calendar year 2025.

⁹ ECCC. (2023). NIR 1990-2021, Part 2, Table A6.1-3, “CH₄ and N₂O Emission Factors for Natural Gas”

Table 2.2: CH₄ and N₂O emission factors for natural gas (g GHG/m³ natural gas)¹⁰ for 2025

Source	CH ₄	N ₂ O
Electric Utilities	0.490	0.049
Industrial	0.037	0.033
Producer Consumption (Non-marketable) – Newfoundland and Labrador	0.490	0.060
Producer Consumption (Non-marketable) – British Columbia	8.83 ¹¹	0.060
Producer Consumption (Non-marketable) – Alberta	8.22 ¹¹	0.060
Producer Consumption (Non-marketable) – Saskatchewan	4.64 ¹¹	0.060
Producer Consumption (Non-marketable) – Other provinces and territories	6.4	0.060
Pipelines	1.900	0.050
Cement	0.037	0.034
Manufacturing Industries	0.037	0.033
Residential, Construction, Commercial/Institutional, Agriculture	0.037	0.035

Emission factors contained in Table 2.3 must be used for the quantification of GHG reductions occurring in calendar year 2026.

Table 2.3: CH₄ and N₂O emission factors for natural gas (g GHG/m³ natural gas)¹² for 2026

Source	CH ₄	N ₂ O
Electric Utilities	0.490	0.049
Industrial	0.037	0.033
Producer Consumption (Non-marketable) – Newfoundland and Labrador	0.490	0.060

¹⁰ ECCC. (2024). NIR 1990-2022, Part 2, Table A6.1-3, “CH₄ and N₂O Emission Factors for Natural Gas”

¹¹ ECCC. (2024). NIR 1990-2022, Part 2, Table A6.1-4, “CH₄ Emission Factors for Natural Gas Producer Consumption in Western Provinces”

¹² ECCC. (2025). NIR 1990-2023, Part 2, Table A6.1-3, “CH₄ and N₂O Emission Factors for Natural Gas”

Source	CH ₄	N ₂ O
Producer Consumption (Non-marketable) – British Columbia	9.20 ¹³	0.060
Producer Consumption (Non-marketable) – Alberta	8.22 ¹³	0.060
Producer Consumption (Non-marketable) – Saskatchewan	4.20 ¹³	0.060
Producer Consumption (Non-marketable) – Other provinces and territories	6.4	0.060
Pipelines	1.900	0.050
Cement	0.037	0.034
Manufacturing Industries	0.037	0.033
Residential, Construction, Commercial/Institutional, Agriculture	0.037	0.035

Emission factors contained in Table 2.4 must be used for the quantification of GHG reductions occurring in calendar year 2027.

Table 2.4: CH₄ and N₂O emission factors for natural gas (g GHG/m³ natural gas)¹⁴ for 2027

Source	CH ₄	N ₂ O
Electric Utilities	0.490	0.049
Industrial	0.037	0.033
Producer Consumption (Non-marketable) – Newfoundland and Labrador	0.490	0.060
Producer Consumption (Non-marketable) – British Columbia	9.35 ¹⁵	0.060
Producer Consumption (Non-marketable) – Alberta	8.14 ¹⁵	0.060
Producer Consumption (Non-marketable) – Saskatchewan	4.10 ¹⁵	0.060
Producer Consumption (Non-marketable) – Other provinces and territories	6.4	0.060

¹³ ECCC. (2025). NIR 1990-2023, Part 2, Table A6.1-4, “CH₄ Emission Factors for Natural Gas Producer Consumption in Western Provinces”

¹⁴ ECCC. (2026). NIR 1990-2024, Part 2, Table A6.1-4, “CH₄ and N₂O Emission Factors for Natural Gas”

¹⁵ ECCC. (2026). NIR 1990-2024, Part 2, Table A6.1-5, “CH₄ Emission Factors for Natural Gas Producer Consumption in Western Provinces”

Source	CH ₄	N ₂ O
Pipelines	1.9	0.050
Cement	0.037	0.034
Manufacturing Industries	0.037	0.033
Residential, Construction, Commercial/Institutional, Agriculture	0.037	0.035

Emission factors contained in Tables 3.1, 3.2, 3.3, and 3.4 correspond to the parameters EF_{CO₂}, EF_{CH₄} or EF_{N₂O} in applicable protocols.

Emission factors contained in Table 3.1 must be used for the quantification of GHG reductions occurring in calendar years 2023 and 2024.

Table 3.1: Emission factors for natural gas liquids (g GHG/L fuel)¹⁶ for 2023 and 2024

Fuel	CO ₂	CH ₄	N ₂ O
Propane – Residential	1 515	0.027	0.108
Propane – All Other Uses	1 515	0.024	0.108
Ethane	986	0.024	0.108
Butane	1 747	0.024	0.108

Emission factors contained in Table 3.2 must be used for the quantification of GHG reductions occurring in calendar year 2025.

Table 3.2: Emission factors for natural gas liquids (g GHG/L fuel)¹⁷ for 2025

Fuel	CO ₂	CH ₄	N ₂ O
Propane – Residential	1 515	0.027	0.108
Propane – All Other Uses	1 515	0.024	0.108
Ethane	986	0.024	0.108
Butane	1 747	0.024	0.108

Emission factors contained in Table 3.3 must be used for the quantification of GHG reductions occurring in calendar year 2026.

¹⁶ ECCC. (2023). NIR 1990-2021, Part 2, Table A6.1-4, “Emission Factors for Natural Gas Liquids”

¹⁷ ECCC. (2024). NIR 1990-2022, Part 2, Table A6.1-5, “Emission Factors for Natural Gas Liquids”

Table 3.3: Emission factors for natural gas liquids (g GHG/L fuel)¹⁸ for 2026

Fuel	CO ₂	CH ₄	N ₂ O
Propane – Residential	1 515	0.027	0.108
Propane – All Other Uses	1 515	0.024	0.108
Ethane	986	0.024	0.108
Butane	1 747	0.024	0.108

Emission factors contained in Table 3.4 must be used for the quantification of GHG reductions occurring in calendar year 2027.

Table 3.4: Emission factors for natural gas liquids (g GHG/L fuel)¹⁹ for 2027

Fuel	CO ₂	CH ₄	N ₂ O
Propane – Residential	1 515	0.027	0.108
Propane – All Other Uses	1 515	0.024	0.108
Ethane	986	0.024	0.108
Butane	1 747	0.024	0.108

Emission factors contained in Tables 4.1, 4.2, 4.3, and 4.4 correspond to the parameters EF_{CO2}, EF_{CH4} or EF_{N2O} in applicable protocols.

Emission factors contained in Table 4.1 must be used for the quantification of GHG reductions occurring in calendar years 2023 and 2024.

Table 4.1: Emission factors for refined petroleum products (g GHG/L fuel)²⁰ for 2023 and 2024

Fuel	CO ₂	CH ₄	N ₂ O
Light Fuel Oil – Electric Utilities	2 753	0.18	0.031
Light Fuel Oil – Industrial	2 753	0.006	0.031
Light Fuel Oil – Producer Consumption	2 670	0.006	0.031
Light Fuel Oil – Residential	2 753	0.026	0.006
Light Fuel Oil – Forestry, Construction, Public Administration and Commercial/Institutional	2 753	0.026	0.031
Heavy Fuel Oil – Electric Utilities	3 156	0.034	0.064

¹⁸ ECCC. (2025). NIR 1990-2023, Part 2, Table A6.1-5, “Emission Factors for Natural Gas Liquids”

¹⁹ ECCC. (2026). NIR 1990-2024, Part 2, Table A6.1-3, “Emission Factors for Natural Gas Liquids”

²⁰ ECCC. (2023). NIR 1990-2021, Part 2, Table A6.1-5, “Emission Factors for Refined Petroleum Products”

Fuel	CO ₂	CH ₄	N ₂ O
Heavy Fuel Oil – Industrial	3 156	0.12	0.064
Heavy Fuel Oil – Producer Consumption	3 190	0.12	0.064
Heavy Fuel Oil – Residential, Forestry, Construction, Public Administration and Commercial/Institutional	3 156	0.057	0.064
Kerosene – Electric Utilities	2 560	0.006	0.031
Kerosene – Industrial	2 560	0.006	0.031
Kerosene – Producer Consumption	2 560	0.006	0.031
Kerosene – Residential	2 560	0.026	0.006
Kerosene – Forestry, Construction, Public Administration and Commercial/Institutional	2 560	0.026	0.031
Diesel – Refineries and Others	2 681	0.078	0.022
Diesel – Upgraders	2 681	0.078	0.022
Petroleum Coke – Refineries and Others	3 877 ²¹	0.12	27.5 g/m ³ ²²
Petroleum Coke – Upgraders	3 494 ²¹	0.12	24.0 g/m ³ ²²
Still Gas – Refineries and Others	1 755 g/m ³ ²¹	0.032 g/m ³ ²³	0.00002
Still Gas – Upgraders	2 140 g/m ³ ²¹	0.000039	0.00002
Motor Gasoline	2 307	0.100	0.02

Emission factors contained in Table 4.2 must be used for the quantification of GHG reductions occurring in calendar year 2025.

Table 4.2: Emission factors for refined petroleum products (g GHG/L fuel)²⁴ for 2025

Fuel	CO ₂	CH ₄	N ₂ O
Light Fuel Oil – Electric Utilities	2 753	0.18	0.031
Light Fuel Oil – Industrial	2 753	0.006	0.031
Light Fuel Oil – Producer Consumption	2 670	0.006	0.031
Light Fuel Oil – Residential	2 753	0.026	0.006

²¹ ECCC. (2023). NIR 1990-2021, Part 2, Table A6.1-6, “CO₂ Emission Factors for Petroleum Coke and Still Gas”

²² ECCC. (2023). NIR 1990-2021, Part 2, Table A6.1-7, “N₂O Emission Factors for Petroleum Coke”

²³ ECCC. (2023). NIR 1990-2021, Part 2, Table A6.1-8, “CH₄ Emission Factors for Still Gas (Refineries and Others)”

²⁴ ECCC. (2024). NIR 1990-2022, Part 2, Table A6.1-6, “Emission Factors for Refined Petroleum Products”

Fuel	CO ₂	CH ₄	N ₂ O
Light Fuel Oil – Forestry, Construction, Public Administration and Commercial/Institutional	2 753	0.026	0.031
Heavy Fuel Oil – Electric Utilities	3 156	0.034	0.064
Heavy Fuel Oil – Industrial	3 156	0.12	0.064
Heavy Fuel Oil – Producer Consumption	3 190	0.12	0.064
Heavy Fuel Oil – Residential, Forestry, Construction, Public Administration and Commercial/Institutional	3 156	0.057	0.064
Kerosene – Electric Utilities	2 560	0.006	0.031
Kerosene – Industrial	2 560	0.006	0.031
Kerosene – Producer Consumption	2 560	0.006	0.031
Kerosene – Residential	2 560	0.026	0.006
Kerosene - Forestry, Construction, Public Administration and Commercial/Institutional	2 560	0.026	0.031
Diesel – Refineries and Others	2 681	0.078	0.022
Diesel – Upgraders	2 681	0.078	0.022
Petroleum Coke – Refineries and Others	3 776 ²⁵	0.12	27.5 g/m ³ ²⁶
Petroleum Coke – Upgraders	3 494 ²⁵	0.12	24.0 g/m ³ ²⁶
Still Gas – Refineries and Others	1 780 g/m ³ ²⁵	0.032 g/m ³ ²⁷	0.00002
Still Gas – Upgraders	2 140 g/m ³ ²⁵	0.000039	0.00002
Motor Gasoline	2 307	0.100	0.02

Emission factors contained in Table 4.3 must be used for the quantification of GHG reductions occurring in calendar year 2026.

Table 4.3: Emission factors for refined petroleum products (g GHG/L fuel)²⁸ for 2026

Fuel	CO ₂	CH ₄	N ₂ O
Light Fuel Oil – Electric Utilities	2 753	0.18	0.031

²⁵ ECCC. (2024). NIR 1990-2022, Part 2, Table A6.1-7, “CO₂ Emission Factors for Petroleum Coke and Still Gas”

²⁶ ECCC. (2024). NIR 1990-2022, Part 2, Table A6.1-8, “N₂O Emission Factors for Petroleum Coke”

²⁷ ECCC. (2024). NIR 1990-2022, Part 2, Table A6.1-9, “CH₄ Emission Factors for Still Gas (Refineries and Others)”

²⁸ ECCC. (2025). NIR 1990-2023, Part 2, Table A6.1-6, “Emission Factors for Refined Petroleum Products”

Fuel	CO ₂	CH ₄	N ₂ O
Light Fuel Oil – Industrial	2 753	0.006	0.031
Light Fuel Oil – Producer Consumption	2 670	0.006	0.031
Light Fuel Oil – Residential	2 753	0.026	0.006
Light Fuel Oil – Forestry, Construction, Public Administration and Commercial/Institutional	2 753	0.026	0.031
Heavy Fuel Oil – Electric Utilities	3 156	0.034	0.064
Heavy Fuel Oil – Industrial	3 156	0.12	0.064
Heavy Fuel Oil – Producer Consumption	3 190	0.12	0.064
Heavy Fuel Oil – Residential, Forestry, Construction, Public Administration and Commercial/Institutional	3 156	0.057	0.064
Kerosene – Electric Utilities	2 560	0.006	0.031
Kerosene – Industrial	2 560	0.006	0.031
Kerosene – Producer Consumption	2 560	0.006	0.031
Kerosene – Residential	2 560	0.026	0.006
Kerosene – Forestry, Construction, Public Administration and Commercial/Institutional	2 560	0.026	0.031
Diesel – Refineries and Others	2 681	0.078	0.022
Diesel – Upgraders	2 681	0.078	0.022
Petroleum Coke – Refineries and Others	3 254 ²⁹	0.12	23.6 g/m ³ ³⁰
Petroleum Coke – Upgraders	2 717 ²⁹	0.12	18.7 g/m ³ ³⁰
Still Gas – Refineries and Others	1 773 g/m ³ ²⁹	0.032 g/m ³ ³¹	0.00002
Still Gas – Upgraders	2 140 g/m ³ ²⁹	0.000039	0.00002
Motor Gasoline	2 307	0.100	0.02

Emission factors contained in Table 4.4 must be used for the quantification of GHG reductions occurring in calendar year 2027.

²⁹ ECCC. (2025). NIR 1990-2023. Part 2, Table A6.1-7, “CO₂ Emission Factors for Petroleum Coke and Still Gas”

³⁰ ECCC. (2025). NIR 1990-2023. Part 2, Table A6.1-8, “N₂O Emission Factors for Petroleum Coke”

³¹ ECCC. (2025). NIR 1990-2023. Part 2, Table A6.1-9, “CH₄ Emission Factors for Still Gas (Refineries and Others)”

Table 4.4: Emission factors for refined petroleum products (g GHG/L fuel)³² for 2027

Fuel	CO ₂	CH ₄	N ₂ O
Light Fuel Oil – Electric Utilities	2 753	0.18	0.031
Light Fuel Oil – Industrial	2 753	0.006	0.031
Light Fuel Oil – Producer Consumption	2 670	0.006	0.031
Light Fuel Oil – Residential	2 753	0.026	0.006
Light Fuel Oil – Forestry, Construction, Public Administration and Commercial/Institutional	2 753	0.026	0.031
Heavy Fuel Oil – Electric Utilities	3 156	0.034	0.064
Heavy Fuel Oil – Industrial	3 156	0.12	0.064
Heavy Fuel Oil – Producer Consumption	3 190	0.12	0.064
Heavy Fuel Oil – Residential, Forestry, Construction, Public Administration and Commercial/Institutional	3 156	0.057	0.064
Kerosene – Electric Utilities	2 560	0.006	0.031
Kerosene – Industrial	2 560	0.006	0.031
Kerosene – Producer Consumption	2 560	0.006	0.031
Kerosene – Residential	2 560	0.026	0.006
Kerosene – Forestry, Construction, Public Administration and Commercial/Institutional	2 560	0.026	0.031
Diesel – Refineries and Others	2 681	0.078	0.022
Diesel – Upgraders	2 681	0.078	0.022
Petroleum Coke – Refineries and Others	3 319 ³³	0.12	23.4 g/m ³ ³⁴
Petroleum Coke – Upgraders	2 703 ³³	0.12	18.6 g/m ³ ³⁴
Still Gas – Refineries and Others	1 790 g/m ³ ³³	0.033 g/m ³ ³⁵	0.00002
Still Gas – Upgraders	2 140 g/m ³ ³³	0.000039	0.00002
Motor Gasoline	2 307	0.100	0.02

³² ECCC. (2026). NIR 1990-2024, Part 2, Table A6.1-6, “Emission Factors for Refined Petroleum Products”³³ ECCC. (2026). NIR 1990-2024. Part 2, Table A6.1-7, “CO₂ Emission Factors for Petroleum Coke and Still Gas”³⁴ ECCC. (2026). NIR 1990-2024. Part 2, Table A6.1-8, “N₂O Emission Factors for Petroleum Coke”³⁵ ECCC. (2026). NIR 1990-2024. Part 2, Table A6.1-9, “CH₄ Emission Factors for Still Gas (Refineries and Others)”

4.2 Grid electricity consumption

A 'consumption intensity' indicator reflects the GHG emissions intensity of electricity as it is delivered to the consumer.

Emission factors contained in Tables 5.1, 5.2, 5.3, and 5.4 correspond to the parameter $EF_{EL,GHG}$ in applicable protocols.

Emission factors contained in Table 5.1 must be used for the quantification of GHG reductions occurring in calendar years 2023 and 2024.

Table 5.1: Electricity consumption intensities (g CO₂e/kWh electricity consumed)³⁶ for 2023 and 2024

Province / Territory	Consumption intensity ^c
British Columbia	15
Alberta	540
Saskatchewan	730
Manitoba	2.0
Ontario	30
Quebec	1.7
New Brunswick	300
Nova Scotia	690
Prince Edward Island ³⁷	300
Newfoundland and Labrador	17
Yukon	80
Northwest Territories	170
Nunavut	840

^c Consumption intensity values are impacted by unallocated energy and SF₆ transmission emissions.

Emission factors contained in Table 5.2 must be used for the quantification of GHG reductions occurring in calendar year 2025.

³⁶ ECCC. (2023). NIR 1990-2021, Part 3, Tables A13-2 to A13-14

³⁷ Due to the high level of imports from New Brunswick, Prince Edward Island takes New Brunswick's value.

Table 5.2: Electricity consumption intensities (g CO₂e/kWh electricity consumed)³⁸ for 2025

Province / Territory	Consumption intensity
British Columbia	15
Alberta	490
Saskatchewan	670
Manitoba	1.4
Ontario	38
Quebec	1.7
New Brunswick	350
Nova Scotia	700
Prince Edward Island ³⁹	350
Newfoundland and Labrador	18
Yukon	70
Northwest Territories	190
Nunavut	820

Emission factors contained in Table 5.3 must be used for the quantification of GHG reductions occurring in calendar year 2026.

Table 5.3: Electricity consumption intensities (g CO₂e/kWh electricity consumed)⁴⁰ for 2026

Province / Territory	Consumption intensity
British Columbia	18
Alberta	438
Saskatchewan	631
Manitoba	2.5
Ontario	59
Quebec	1.9
New Brunswick	234

³⁸ ECCC. (2024). NIR 1990-2022, Part 3, Tables A13-2 to A13-14

³⁹ Due to the high level of imports from New Brunswick, Prince Edward Island takes New Brunswick's value.

⁴⁰ ECCC. (2025). NIR 1990-2023, Part 3, Tables A13-2 to A13-14

Province / Territory	Consumption intensity
Nova Scotia	581
Prince Edward Island ⁴¹	234
Newfoundland and Labrador	17
Yukon	74
Northwest Territories	420
Nunavut	800

Emission factors contained in Table 5.4 must be used for the quantification of GHG reductions occurring in calendar year 2027.

Table 5.4: Electricity consumption intensities (g CO₂e/kWh electricity consumed)⁴² for 2027

Province / Territory	Consumption intensity
British Columbia	18
Alberta	346
Saskatchewan	581
Manitoba	3.0
Ontario	73
Quebec	2.6
New Brunswick	375
Nova Scotia	628
Prince Edward Island	265
Newfoundland and Labrador	17
Yukon	134
Northwest Territories	490
Nunavut	760

⁴¹ Due to the high level of imports from New Brunswick, Prince Edward Island takes New Brunswick's value.

⁴² ECCC. (2026). NIR 1990-2024, Part 3, Tables A7-2 to A7-14

4.3 Biogas combustion

Biogas includes landfill gas and biogas from manure.

Emission factors contained in Tables 6.1, 6.2, 6.3, and 6.4 correspond to the parameter EF_{LFG,N_2O} or EF_{BG,N_2O} in applicable protocols.

Emission factors contained in Table 6.1 must be used for the quantification of GHG reductions occurring in calendar years 2023 and 2024.

Table 6.1: N_2O emission factors for biogas combustion ($kg\ N_2O/t\ CH_4$)⁴³ for 2023 and 2024

Biogas combustion type	N_2O
Combustion for energy generation through a boiler, turbine, internal combustion engine or station for natural gas network	0.005
Flaring ⁴⁴	0

Emission factors contained in Table 6.2 must be used for the quantification of GHG reductions occurring in calendar year 2025.

Table 6.2: N_2O emission factors for biogas combustion ($kg\ N_2O/t\ CH_4$)⁴⁵ for 2025

Biogas combustion type	N_2O
Combustion for energy generation through a boiler, turbine, internal combustion engine or station for natural gas network	0.005
Flaring ⁴⁶	0.005

Emission factors contained in Table 6.3 must be used for the quantification of GHG reductions occurring in calendar year 2026.

Table 6.3: N_2O emission factors for biogas combustion ($kg\ N_2O/t\ CH_4$)⁴⁷ for 2026

Biogas combustion type	N_2O
Combustion for energy generation through a boiler, turbine, internal combustion engine or station for natural gas network	0.005
Flaring ⁴⁸	0.005

⁴³ ECCC. (2023). NIR 1990-2021, Part 2, Table A6.6-2, "Emission Factors for Landfill Gas Combustion"

⁴⁴ This emission factor is currently reported as "not estimated" in Canada's National Inventory Report. A value of zero has been assigned to this emission factor for the purposes of the quantification of GHG reductions.

⁴⁵ ECCC. (2024). NIR 1990-2022, Part 2, Table A6.6-2, "Emission Factors for Landfill Gas Combustion"

⁴⁶ This emission factor is currently reported as "not estimated" in Canada's National Inventory Report. To be conservative, the emission factor applicable to combustion of biogas for energy is applied to flaring of biogas.

⁴⁷ ECCC. (2025). NIR 1990-2023, Part 2, Table A6.6-2, "Emission Factors for Gaseous Biomass Combustion"

⁴⁸ This emission factor is currently reported as "not estimated" in Canada's National Inventory Report. To be conservative, the emission factor applicable to combustion of biogas for energy is applied to flaring of biogas.

Emission factors contained in Table 6.4 must be used for the quantification of GHG reductions occurring in calendar year 2027.

Table 6.4: N₂O emission factors for biogas combustion (kg N₂O/t CH₄)⁴⁹ for 2027

Biogas combustion type	N ₂ O
Combustion for energy generation through a boiler, turbine, internal combustion engine or station for natural gas network	0.005
Flaring ⁵⁰	0.005

4.4 CH₄ destruction by eligible destruction device

Default CH₄ destruction efficiencies by eligible destruction device contained in Table 7 correspond to the parameter DE_{CH₄} in applicable protocols.

These CH₄ destruction efficiencies must be used for GHG reductions occurring from calendar year 2022 onwards, as applicable.

Table 7: Default CH₄ destruction efficiencies by eligible destruction device⁵¹

Eligible destruction device	CH ₄ destruction efficiency (DE _{CH₄})
Open flare	0.96
Enclosed flare	0.995
Boiler	0.98
Turbine (micro or large)	0.995
Internal combustion engine (stationary or mobile)	0.936
Station for direct injection of upgraded biogas into a natural gas network	0.98
Station for compression or liquefaction of upgraded biogas prior to transport and injection into a natural gas network	0.95

4.5 Displacement of fossil fuels

Higher heating values (HHV) of fuels contained in Table 8 correspond to the parameters HHV_{BG} or HHV_{FF} in applicable protocols.

These higher heating values must be used for GHG reductions occurring from calendar year 2026 onwards.

⁴⁹ ECCC. (2026). NIR 1990-2024, Part 2, Table A6.6-2, “Emission Factors for Gaseous Biomass Combustion”

⁵⁰ This emission factor is currently reported as “not estimated” in Canada’s National Inventory Report. To be conservative, the emission factor applicable to combustion of biogas for energy is applied to flaring of biogas.

⁵¹ These destruction efficiencies align with those of most similar offset protocols from other systems.

Table 8: Higher heating values (HHV) of fuels (MJ/m³)⁵²

Fuel type	HHV
Biogas ^d	18.61
Renewable natural gas (RNG), gaseous	38.39
Renewable natural gas (RNG), liquid	23 640.92
Natural gas, gaseous	38.39
Natural gas, liquid	23 640.92
Diesel	38 351.95
Gasoline	33 452.32
Heavy fuel oil	42 501.77
Light fuel oil	38 801.69

^d HHV of biogas assumes a 50/50 ratio of CH₄/CO₂.

5.0 Protocol-specific emission factors and other reference values

Emission factors and other reference values in Section 5.0 are only applicable to the federal offset protocol specified.

5.1 Improved forest management on private land

Reference values contained in Tables 9 and 10 must be used for the quantification of GHG reductions generated by projects implemented following the *Improved Forest Management on Private Land* protocol and occurring from calendar year 2024 onwards.

Reference values contained in Table 9 correspond to the parameter PC in the protocol.

Table 9: Percentage of harvest by wood product class⁵³

Wood product class	Percentage of harvest (%)
Softwood lumber	37.76
Hardwood lumber	0.38

⁵² HHV values are from the [Clean Fuel Regulations Data Workbook](#)

⁵³ Values are based off the national average harvested wood product production ratios developed by the Food and Agriculture Organization (FAO) based on a reference period of 1990-2020. Ratio of softwood lumber to hardwood lumber for harvested industrial roundwood was based on a reference period of 2014-2021 from Statistics Canada (Table 16-10-0017-01 Lumber production, shipments, and stocks by species, monthly (x 1,000), [doi: 10.25318/1610001701-eng](#)).

Wood product class	Percentage of harvest (%)
Pulp and paper	34.60
Panels (plywood and oriented strandboard)	12.42
Other industrial roundwood	3.55
Fuelwood	11.29

Reference values contained in Table 10 correspond to the parameter SF in the protocol.

Table 10: 100-year storage factor by wood product class⁵⁴

Wood product class	100-year storage factor
Softwood lumber	0.213
Hardwood lumber	0.156
Softwood plywood	0.215
Oriented strandboard	0.285
Non-structural panels	0.174
Other industrial roundwood	0.149
Fuelwood	0
Pulp and paper	0

5.2 Reducing enteric methane emissions from beef cattle

Emission factors and other reference values contained in Tables 11 to 14 must be used for the quantification of GHG reductions generated by projects implemented following the *Reducing Enteric Methane Emissions from Beef Cattle* protocol and occurring from calendar year 2025 onwards.

Reference values contained in Table 11 correspond to the parameter Y_m in the protocol.

⁵⁴ Hoover et al. (2014). [Chapter 6: quantifying greenhouse gas sources and sinks in managed forest systems](#). M., D. Pape, M. Flugge, R. Steele, D. Man, M. Riley-Gilbert, and S. Biggar, (Eds.). *Greenhouse Gas Fluxes in Agriculture and Forestry: Methods for Entity-Scale Inventory* (Technical Bulletin Number 1939). US Department of Agriculture.

Table 11: Enteric CH₄ conversion factors based on diet composition and quality⁵⁵

Diet description	Enteric CH ₄ conversion factor (Y _m)
Diets of more than 75% low to medium quality forage containing < 60% total digestible nutrients	0.07
Diets of more than 75% high quality forage containing ≥ 60% total digestible nutrients	0.063
Mixed diets with forage content of 15 to 75% and the total diet is mixed with grain	0.063
All other grains with 0 to 15% forage	0.04
Steam-flaked corn and ionophore supplement with 0 to 10% forage	0.03

Emission factors contained in Table 12 correspond to the parameter EF_{lip} in the protocol.

Table 12: Emission factors for the addition of supplemented lipid determined by the percentage of total dry weight of feed delivered

Supplemented lipid added (%)	Emission factor (EF _{lip})
< 1.0	1.0
1.0 to 1.99	0.96
2.0 to 2.99	0.92
3.0 to 3.99	0.88
4.0 to 4.99	0.84
≥ 5.0	0.80

Emission factors and other reference values contained in Table 13 correspond to the parameters MCF, EF_{MS}, Frac_v, or Frac_L in the protocol.

⁵⁵ Reference values are adapted from International Panel on Climate Change. (2019). Chapter 10: Agriculture, Forestry and Other Land Use. Calvo Buendia, E., Tanabe, K., Kranjc, A., Baasansuren, J., Fukuda, M., Ngarize S., Osako, A., Pyrozhenko, Y., Shermanau, P. and Federici, S. (eds). in [2019 refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories](#), Table 10.12.

Table 13: Emission factors and other reference values for manure CH₄ and N₂O based on manure storage system

Manure storage system ⁵⁶	CH ₄ conversion factor (MCF) ⁵⁷	Emission factor for direct N ₂ O emissions (EF _{MS}) ⁵⁸	Fraction of nitrogen (N) excreted in manure that volatilizes (Frac _v) ⁵⁹	Fraction of N excreted in manure leached (Frac _L) ⁶⁰
Solid storage and dry lot	0.02	0.02	0.3	0.03
Liquid, slurry or pit storage below confinements	0.2	0.001	0.4	0
Other manure storage system	0.01	0.005	0.24 ⁶⁰	0.05

Emission factors contained in Table 14 correspond to the parameter EF_V in the protocol.

Table 14: Emission factors for indirect N₂O emissions from volatilization of manure by ecozone⁶¹

Ecozone	Emission factor for indirect N ₂ O emissions from volatilization of manure (EF _V)
Taiga Plains	0.005
Boreal Shield	0.014
Atlantic Maritime	0.014
Mixedwood Plains	0.014
Boreal Plains	0.005

⁵⁶ Description of each type of manure storage system can be found in International Panel on Climate Change. (2019). 2019 refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories Volume 4, [Chapter 10 Emissions from Livestock and Manure Management](#), Table 10.18.

⁵⁷ ECCC. (2025). NIR 1990-2023, Part 2, Table A6.4-4, "Methane Conversion Factors (MCF) by Animal Category and Manure Management System"

⁵⁸ ECCC. (2025). NIR 1990-2023, Part 2, Table A6.4-10, "Emission Factors (EF) for Manure Nitrogen (N) Lost as N₂O-N by Animal Category and Animal Waste Management Systems"

⁵⁹ ECCC. (2025). NIR 1990-2023, Part 2, Table A3.4-27, "Total N, NH₃- and NO_x-N Losses Associated with Various Livestock and Manure Management Systems"

⁶⁰ ECCC. (2025). NIR 1990-2023, Part 2, Table A3.4-28, "Total N, NH₃- and NO_x-N Losses Associated with Manure Management Systems for Dairy Cattle"

⁶¹ ECCC. (2025). NIR 1990-2023, Part 2, Table A3.4-26, "Application of Emission Factor EF₄ from the 2019 Refinement to the 2006 IPCC Guidelines, by Ecozone"

Ecozone	Emission factor for indirect N ₂ O emissions from volatilization of manure (EF _v)
Prairies	0.005
Pacific Maritime	0.014
Montane Cordillera	0.005

5.3 Reducing manure methane emissions

Emission factors and other reference values contained in Tables 15 to 17 must be used for the quantification of GHG reductions generated by projects implemented following the *Reducing Manure Methane Emissions* protocol and occurring from calendar year 2026 onwards.

Reference values contained in Table 15 correspond to the parameters VS_{rate} or B₀ in the protocol.

Table 15: Volatile solids (VS) excretion rates (kg VS/head/day) and maximum CH₄ producing potentials (m³ CH₄/kg VS) by livestock type

Livestock type	Livestock type description	VS excretion rate (VS _{rate}) ⁶²	Maximum CH ₄ producing potential (B ₀) ⁶³
Dairy cow	Female cattle 1 year or older which have calved at least once and are used for dairy production	6.51	0.24
Dairy heifer	Female cattle 1 year or older which have never calved and are used for dairy herd replacement	3.59	0.19
Beef cow	Female cattle 1 year or older which have calved at least once and are used for the reproduction of beef calves	6.16	0.19
Bull	Male cattle 1 year or older which have not been castrated and are kept for breeding purposes or fed for slaughter	6.38	0.19

⁶² For cattle, VS excretion rates have been developed by ECCC. For swine, VS excretion rates are from ECCC. (2026). NIR 1990-2024, Part 2, Table A3.4-14 "Mean Volatile Solids Values in Swine Manure". For other livestock, VS excretion rates are from ECCC. (2026). NIR 1990-2024, Part 2, Table A3.4-13 "Mean Volatile Solids Values in Manure from Non-Cattle Categories".

⁶³ International Panel on Climate Change. (2019). Chapter 10: Agriculture, Forestry and Other Land Use. Calvo Buendia, E., Tanabe, K., Kranjc, A., Baasansuren, J., Fukuda, M., Ngarize S., Osako, A., Pyrozhenko, Y., Shermanau, P. and Federici, S. (eds). in [2019 refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories](#), Table 10.16

Livestock type	Livestock type description	VS excretion rate (VS_{rate}) ⁶²	Maximum CH ₄ producing potential (B_0) ⁶³
Beef heifer – bred	Female cattle 1 year or older which have never calved and are used for beef herd replacement	4.43	0.19
Beef heifer – slaughter	Female cattle 1 year or older fed for slaughter	2.94	0.19
Steer	Castrated male cattle 1 year or older fed for slaughter	2.66	0.19
Calve	Cattle of either sex under 1 year old	2.21	0.19
Swine (<20 kg)	Swine under 20 kg such as weaner	0.10	0.48
Swine (20-60 kg)	Swine from 20 to 60 kg fed for slaughter	0.19	0.48
Swine (>60 kg)	Swine over 60 kg fed for slaughter	0.42	0.48
Breeding swine	Mature sows or boars used for breeding	0.31	0.48
Chicken – Layers	Chickens raised for egg production	0.02	0.39
Poultry	All other poultry including those raised for meat production	0.02	0.36
Sheep	Sheep of any size, sex or purpose	0.60	0.19
Goat	Goats of any size, sex or purpose	0.72	0.18
Horse	Horses of any size, sex or purpose	3.50	0.30

Reference values contained in Table 16 correspond to the parameter CF_{MCF} in the protocol. The “MCF correction factor” is a modifier applied to the methane conversion factor (MCF) determined in accordance with the protocol.

Table 16: MCF correction factors by storage type for liquid treated manure

Storage type	MCF correction factor (CF_{MCF})
Anaerobic storage, non acidified	1
Anaerobic storage, acidified	0.05

Emission factors contained in Table 17 correspond to the parameters EF_{TM,CH_4} or EF_{TM,N_2O} in the protocol.

Table 17: Storage emission factors (kg GHG/t treated manure, wet weight) by storage type for solid treated manure

Storage type	Storage CH ₄ emission factor (EF_{TM,CH_4})	Storage N ₂ O emission factor (EF_{TM,N_2O})
Static pile or other composting ⁶⁴	3.54	0.18
Deep bedding ⁶⁵	0	0

⁶⁴ ECCC. (2026). NIR 1990-2024, Part 2, Table A6.7-6 “EFs for Biological Treatment of Solid Waste” for composting of biosolids or manure

⁶⁵ Deep bedding means the coarse fraction of treated manure from a mechanical manure treatment system used as bedding for the purpose of absorbing moisture from fresh livestock excreta, typically for several months. GHG emissions for deep bedding storage are assumed to be zero as the coarse fraction of treated manure replaces material used in the baseline scenario, such as straw or wood shavings, with similar GHG emissions.