

Preliminary Interim Draft Emission Factors for Use by State Agencies and Project Proponents

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The preliminary emission factors provided in Table 1 and 2, below, represent presumptive and generic (non source-specific) factors that can be applied to the high heating content¹ of fossil fuels. The emission factors included in this document are being provided on an interim basis to facilitate ongoing reviews and assessments by State agencies and project proponents. These values should be considered interim draft values, as they are subject to change.

Pursuant to the Climate Leadership and Community Protection Act (Climate Act), the Department is required to issue an initial Statewide Greenhouse Gas Emissions Report by January 1, 2022, and thereafter to update the report on an annual basis.² This report will include information regarding upstream emissions associated with the extraction, production, and transmission of fossil fuels, along with information relating to fugitive emissions associated with fossil fuels. The Department is currently engaged with its State partners in the development of the initial report and will be seeking stakeholder input in 2021 regarding the methodology and analysis used in determining Statewide greenhouse gas emissions. Therefore, the preliminary emission factor values in both Table 1 and Table 2 may change as a result of that process.

Overall, the emission factors presented in this document are a work in progress, subject to future stakeholder comment, and will be subject to a continual improvement process that will update the values over time as additional information becomes available. Additional fuels and emission sectors may be added as analysis continues. These factors do not include the direct emissions resulting from the combustion of the fuel.

Finally, the values provided in Table 1 and 2 are intended to be presumptive, meaning that a State agency or project proponent may use a different value in a given context, provided that a different value is supported by appropriate justification and analysis.

¹ Select high heating values from <https://www.epa.gov/sites/production/files/2020-04/documents/ghg-emission-factors-hub.pdf> have been included in this document Appendix A. Project sponsors should identify if they are using different energy content, particularly if the energy content is provided by the fuel supplier.

² Chapter 106 of the Laws of 2019; Environmental Conservation Law (ECL) § 75-0105.

Table 1. Current Upstream and Out-of-State Emission Factors for Imported Fossil Fuels

These factors reflect greenhouse gas emissions associated with the extraction, production, and transmission of fossil fuels imported into New York State for the most recent year available, or 2018.³ This does not include extraction, production, or transmission of fuels within New York State.

Fuel Type**	Greenhouse gas emission rate (g/mmbtu)*			
	CO ₂	CH ₄	N ₂ O	CO ₂ e (20 yr GWP)+
Natural Gas	11,913	384	0.136	44,205
Diesel/ Distillate Fuel	15,164	121	0.258	25,375
Coal	3,279	397	0.103	36,650
Kerosene/Jet Fuel	10,071	109	0.170	19,270
Gasoline (E85)	5,097	33	0.085	7,905
Gasoline***	18,349	119	0.306	28,459
LPG	17,295	121	0.270	27,553
Petroleum Coke	11,612	112	0.204	21,096
Residual Fuel	11,799	111	0.194	21,184
Asphalt and Road Oil	8,487	105	0.128	17,325

*Sums or products may not match due to independent rounding. Units in grams(g) can be converted to pounds by dividing by 453.6.

** Users may wish to adjust the specified emission factors for blended fuels

*** The gasoline emission factors represent 100% fossil fuel content gasoline, equivalent to gasoline blend stock, if evaluating blends with oxygenates (e.g., ethanol) these blends can be apportioned to the fraction of emissions associated with the energy fraction of the blend that is from fossil fuels (e.g. E85 is a blend of ethanol and gasoline estimated here to have the energy content of approximately 28% gasoline and 72% ethanol).

+ CO₂e is calculated by multiplying the mass of each gas by its global warming potential(GWP) and adding the products together(CO₂ GWP is 1, CH₄ GWP is 84, N₂O GWP is 264).

Sources: Emission factors are derived from the same sources used for 6 NYCRR Part 496⁴, but for the most recent year available (2018). This analysis was conducted by Eastern Research Group on behalf of NYSERDA and NYSDEC using Department of Energy fuel data and lifecycle analysis tools. The lifecycle models used were the Argonne National Laboratory's "Greenhouse gases, Regulated Emissions, and Energy use in Transportation" (GREET) model for imported petroleum products and the National Energy Technology Laboratory (NETL) models for imported coal and natural gas. For natural gas, the leakage rates from Alvarez et al. (2018)⁵ were also used to address additional fugitive methane sources.

³ For purposes of accounting for Statewide greenhouse gas emissions under the Climate Act, consideration of upstream and out-of-state emissions is focused on the "greenhouse gases produced outside of the state that are associated with the . . . extraction and transmission of fossil fuels imported into the state." ECL § 75-0101(13).

⁴ NYSDEC. 2020. Regulatory Impact Statement, 6 NYCRR Part 496.

⁵ Alvarez,R.A., et al. 2018. Assessment of methane emissions from the U.S. oil and gas supply chain. Science.361: 186-188.

Table 2. Current Downstream In-State Emission Factors for Natural Gas/RNG Distribution

These factors reflect fugitive emissions within New York State associated with fuel throughput for the most recent year available, or 2018.

Fuel Type	Greenhouse gas emission rate (g/mmbtu)			
	CO ₂	CH ₄	N ₂ O	CO ₂ e (20 yr GWP)
Natural Gas/RNG	n/a	23	n/a	1,932

Source: Emission factor generated by summing emissions from natural gas distribution reported in NYSERDA (2019) New York State Oil and Gas Sector Methane Emission Inventory and dividing by energy content of natural gas consumed in residential, commercial, and industrial sectors of New York as reported by EIA.

Appendix A. High Heating Value of Select Fuels Per Unit of Mass or Volume

Fuel	High Heating Value (mmbtu)	Volume or Mass unit
Natural Gas/RNG*	0.001026	Standard cubic foot
Diesel/Distillate Fuel	0.138	U.S. gallon
Coal	21.39	Short Ton
Kerosene/Jet Fuel	0.135	U.S. gallon
Gasoline E85**	0.095	U.S. gallon
Gasoline	0.125	U.S. gallon
LPG	0.092	U.S. gallon
Petroleum Coke	0.143	U.S. gallon
Residual Fuel	0.145	U.S. gallon
Asphalt and Road Oil	0.158	U.S. gallon

*RNG is assumed to be pipeline quality gas and equivalent energy content to pipeline natural gas. Raw landfill gas has substantially different energy content per standard cubic foot.

**E85 is assumed to have the energy content of approximately 28% gasoline and 72% ethanol.