Appendix: Emission Factors for Use by State Agencies and Applicants

The following tables provide information on the greenhouse gas emissions associated with different types of fuels. This information can be used by any entity to estimate emissions that result from the use of fuels following the same CLCPA-compliant accounting used in this report and in the adoption of 6 NYCRR Part 496. These emission factors can be applied to generic (not source-specific) fossil fuels at the high heating content (see High Heating Values). The emission factors included in this document are derived from the same analyses described in the accompanying "*Sectoral Report #1: Energy"* for calculating Imported Fossil Fuels and Fugitive Emissions. 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 as additional information becomes available. These factors do not include the direct emissions resulting from the combustion of the fuel.

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

Emission factors in Table A1 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 2019. This does not include extraction, production, or transmission of fuels within New York State (see below). 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). Finally, units in grams can be converted to pounds by dividing by 453.6.

Table A1: 2021 Emission Rates for Upstream Out-of-State Sources (g/mmbtu)

Fuel Type	CO_2	CH_4	N_2O	Total CO_2e
Natural Gas	12,272	361	0.14	42,661
Diesel/ Distillate Fuel	14,104	120	0.26	24,214
Coal	3,297	349	0.10	32,605
Kerosene/Jet Fuel	9,695	108	0.17	18,798
Gasoline (E85)	4,916	33	0.09	7,714
Gasoline	18,906	127	0.33	29,668
LPG	16,924	121	0.28	27,173
Petroleum Coke	11,299	112	0.20	20,737
Residual Fuel	10,791	109	0.18	20,017

Note: Total CO2e conversion uses GWP20 per 6 NYCRR Part 496

Current Emission Factors for Non-Energy Fuel Use

Emission factors in Table A2 reflect the upstream out of state emissions associated with fossil fuel derived products that are not primary combustion fuels but have other consumption uses within the state.

Table A2: 2021 Emission Rates for Fossil Fuel Products (g/mmbtu)

Fuel Type	CO_2	CH_4	N_2O	Total CO_2e
Asphalt and Road Oil	8,201	104	0.13	17,010
Lubricants	10,791	109	0.18	20,017
Waxes	10,791	109	0.18	20,017
Miscellaneous Petroleum Products	10,793	109	0.18	20,022
Special Naphthas	13,469	116	0.25	23,250

Note: Total CO2e conversion uses GWP20 per 6 NYCRR Part 496

Current Downstream and In-State Emission Factors for Fossil Fuels

Emission factors in Table A3 reflect fugitive emissions within New York State associated with fuel throughput for the most recent year available, or 2021. Emission factors were generated by summing emissions from natural gas distribution, or downstream infrastructure and dividing by the instate consumption of natural gas in industry, commercial, residential, transportation sectors.

Table A3: 2021 Emission Rates for Downstream In-State Sources (g/mmbtu)

Fuel Type	CO_2	CH_4	N_2O	Total CO_2e
Natural Gas and Renewable Natural Gas (RNG/biogas)	2.36	81	n/a	6,798

Note: Total CO2e conversion uses GWP20 per 6 NYCRR Part 496

High Heating Value

The following table is reproduced from the Energy Information Administration (EIA) State Energy Data System (SEDS), with btu values divided by physical units. Renewable Natural Gas is assumed to be pipeline quality with equivalent energy content. Raw landfill gas has substantially different energy content per standard cubic foot. E85 is assumed to have the energy content of 28% gasoline and 72% ethanol.

Table A4: High Heating Value of Select Fuels For 2021 (mmbtu)

Fuel Type	High Heating Value	Unit of volume or mass
Natural Gas/RNG	0.001032	Standard cubic foot
Diesel/Distillate Fuel	0.1372	U.S. gallon
Coal	25.4502	Short Ton
Kerosene/Jet Fuel	0.1350	U.S. gallon
Gasoline E85	0.0945	U.S. gallon
Gasoline	0.1246	U.S. gallon
LPG	0.0915	U.S. gallon
Petroleum Coke	0.1362	U.S. gallon
Residual Fuel	0.1497	U.S. gallon
Asphalt and Road Oil	0.1580	U.S. gallon
Lubricants	0.1444	U.S. gallon
Waxes	0.1314	U.S. gallon
Misc. Petroleum Products	0.1379	U.S. gallon
Special Naphthas	0.1250	U.S. gallon
Biodiesel	0.1276	U.S. gallon