

Georgetown Harbor, South Carolina Project

Supplemental Environmental Assessment

Appendix J: Greenhouse Gas Analysis

U.S. Army Corps of Engineers
Charleston District



SEAX-202-00-K2P-1769676917

February 2026

Contents

Construction/O&M Equipment List	J-1
EPA Emissions Factors	J-3

Construction/O&M Equipment List

EPA Emissions Factors



Emission Factors for Greenhouse Gas Inventories

Last Modified: January 16, 2025

Blue text indicates an update from the 2024 version of this document.

Typically, greenhouse gas emissions are reported in units of carbon dioxide equivalent (CO₂e). Gases are converted to CO₂e by multiplying by their global warming potential (GWP). In most cases, the emission factors listed in this document generally have not been converted to CO₂e. To do so, multiply the emissions by the corresponding GWP listed in the table below.

Gas	Global Warming Potential
CH ₄	25
N ₂ O	298

Source: Intergovernmental Panel on Climate Change (IPCC),
 2019 Refinement to the 2006 IPCC Guidelines,
 and the online tool at <http://www.ipcc-nggip.org>.

Table 1 Stationary Combustion

Fuel Type	Heat Content (Btu)	CO ₂ Factor		CH ₄ Factor		N ₂ O Factor		CO ₂ e Factor		GHG Factor	
		mm Btu per million	kg CO ₂ per mm Btu	g CH ₄ per mm Btu	g N ₂ O per mm Btu	kg CO ₂ per mm Btu	g CH ₄ per mm Btu	g N ₂ O per mm Btu	kg CO ₂ e per mm Btu	g CH ₄ per mm Btu	g N ₂ O per mm Btu
Coal and Coke											
Anthracite	27,800	102.80	11	1.4	0.001	2,863	278	43			
Bituminous	24,900	92.25	11	1.8	0.001	2,252	274	40			
Sub-bituminous	17,400	67.67	11	1.8	0.001	1,700	195	31			
Lignite	12,400	50.24	11	1.8	0.001	1,265	150	23			
Wood (Commercial Sector)	21,300	84.27	11	1.2	0.001	2,019	235	34			
Wood (Residential Sector)	19,200	75.52	11	1.2	0.001	1,855	217	31			
Wood (Industrial Sector)	20,400	81.80	11	1.2	0.001	2,060	239	32			
Wood (Other Sector)	22,200	88.71	11	1.2	0.001	2,119	255	33			
Coal Coke	24,800	113.87	11	1.6	0.001	2,819	277	40			
Other Fuels - Solid											
Manure (Solid Waste)	9,800	40.20	32	4.2	0.002	1,002	119	17			
Manure (Liquid Waste)	30,200	123.81	32	4.2	0.002	3,272	369	52			
Manure	38,800	158.00	32	4.2	0.002	4,250	478	66			
Slur	20,200	82.20	32	4.2	0.002	2,081	239	34			
Biomass Fuels - Solid											
Natural Gas	9,200	116.81	32	4.2	0.002	3,072	354	47			
Peat	8,800	111.84	32	4.2	0.002	2,955	345	44			
Waste (Residential)	10,200	105.83	32	4.2	0.002	3,088	357	45			
Wood and Wood Residuals	17,400	67.67	32	4.2	0.002	1,700	195	28			
Natural Gas											
Natural Gas	0.001027	51.07	1.0	0.10	0.0044	0.00182	0.00019	0.00019			
Other Biomass Gas	0.000072	274.31	0.022	0.10	0.0224	0.00082	0.00002	0.00002			
Other Biomass Gas	0.000072	46.21	0.02	0.10	0.0202	0.00079	0.00002	0.00002			
Other Biomass Gas	0.001103	56.80	0.02	0.05	0.00193	0.00074	0.00013	0.00013			
Other Biomass Gas	0.000072	51.07	0.02	0.05	0.00193	0.00074	0.00013	0.00013			
Other Biomass Gas	0.000072	51.07	0.02	0.05	0.00193	0.00074	0.00013	0.00013			
Petroleum Products											
Asphalt and Road Oil	0.140	25.26	3.0	0.00	0.00	11.91	0.47	0.00			
Cracked Naphtha	0.140	26.24	3.0	0.00	0.00	12.11	0.25	0.00			
Gasoline	0.140	24.77	3.0	0.00	0.00	9.87	0.31	0.00			
Jet Fuel	0.140	29.74	3.0	0.00	0.00	12.94	0.24	0.00			
Kerosene	0.140	24.54	3.0	0.00	0.00	10.20	0.41	0.00			
Distillate Fuel Oil No. 1	0.140	22.21	3.0	0.00	0.00	10.19	0.45	0.00			
Distillate Fuel Oil No. 2	0.140	22.21	3.0	0.00	0.00	10.21	0.41	0.00			
Distillate Fuel Oil No. 4	0.140	22.21	3.0	0.00	0.00	10.20	0.44	0.00			
Heavy Gas Oil	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Light Gas Oil	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 5	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 6	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 7	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 8	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 9	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 10	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 11	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 12	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 13	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 14	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 15	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 16	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 17	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 18	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 19	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 20	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 21	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 22	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 23	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 24	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 25	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 26	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 27	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 28	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 29	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 30	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 31	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 32	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 33	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 34	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 35	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 36	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 37	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 38	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 39	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 40	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 41	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 42	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 43	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 44	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 45	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 46	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 47	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 48	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 49	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 50	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 51	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 52	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 53	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 54	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 55	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 56	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 57	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 58	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 59	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 60	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 61	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 62	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 63	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 64	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 65	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 66	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 67	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 68	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 69	0.140	24.61	3.0	0.00	0.00	11.69	0.44	0.00			
Residual Fuel Oil No. 70	0										

Blue text indicates an update from the 2024 version of this document.

Emission Factors for Greenhouse Gas Inventories
Last Modified: 15 January 2025

Table 2 Mobile Combustion CO₂

Fuel Type	kg CO ₂ per unit	Unit
Acetylene (C ₂ H ₂)	8.31	gallon
Propane (C ₃ H ₈)	2.25	gallon
Compressed Natural Gas (CNG)	0.05424	cubic foot
Gasoline Fuel	0.21	gallon
Gasoline (V8's)	0.25	gallon
Gasoline (V6's)	0.20	gallon
Gasoline (V4's)	0.15	gallon
Gasoline (V2's)	0.10	gallon
Gasoline (V1's)	0.05	gallon
Lighter Fluid	0.08	gallon
Motor Oil	1.0	gallon
Refrigerant Fuel Oil	11.27	gallon

Notes:
 1. Fuel oil figures are from EPA Part 61, Appendix C, Table C-4 (75 FR 196), Vol. 20, 2005, at 2044-2045 (FR 6022, Vol. 20, 2005).
 2. <http://www.epa.gov/ghg-reports/ghg-emissions>

Blue text indicates an update from the 2024 version of this document.

Note: The motor oil figures are based on the CO₂ motor oil CO₂ (from EPA) for motor oil from Table 1 and the light-duty gas (IMO) and medium-duty gas (IMO) from the 2024 Mobile Air Pollutant Emissions Inventory (Emissions Inventory) published January 10, 2025 (Emissions Inventory).

Please see the Greenhouse Gas Inventory (GHGI) for more information on the data sources and the methodology used to calculate the CO₂ emissions for the 2024 Emissions Inventory.

The motor oil figures in the table above represent motor oil only (not blends) and do not represent a spectrum of motor oil blends from retail.

Table 3 Mobile Combustion CH₄ and H₂O for On-Road Gasoline Vehicles

Vehicle Type	Model Year	CH ₄ Factor (g CH ₄ /vehicle-mile)	H ₂ O Factor (g H ₂ O/vehicle-mile)
Gasoline Passenger Cars	1970-1974	0.160	0.177
	1975	0.143	0.143
	1976-1977	0.140	0.140
	1978-1979	0.139	0.139
	1980	0.135	0.135
	1981	0.134	0.134
	1982	0.132	0.132
	1983	0.130	0.130
	1984-1985	0.128	0.128
	1986	0.127	0.127
	1987	0.126	0.126
	1988	0.124	0.124
	1989	0.123	0.123
	1990	0.122	0.122
	1991	0.121	0.121
	1992	0.120	0.120
	1993	0.119	0.119
	1994	0.118	0.118
	1995	0.117	0.117
	1996	0.116	0.116
	1997	0.115	0.115
	1998	0.114	0.114
	1999	0.113	0.113
	2000	0.112	0.112
	2001	0.111	0.111
	2002	0.110	0.110
	2003	0.109	0.109
	2004	0.108	0.108
	2005	0.107	0.107
	2006	0.106	0.106
2007	0.105	0.105	
2008	0.104	0.104	
2009	0.103	0.103	
2010	0.102	0.102	
2011	0.101	0.101	
2012	0.100	0.100	
2013	0.099	0.099	
2014	0.098	0.098	
2015	0.097	0.097	
2016	0.096	0.096	
2017	0.095	0.095	
2018	0.094	0.094	
2019	0.093	0.093	
2020	0.092	0.092	
2021	0.091	0.091	
2022	0.090	0.090	
2023	0.089	0.089	
2024	0.088	0.088	
2025	0.087	0.087	
2026	0.086	0.086	
2027	0.085	0.085	
2028	0.084	0.084	
2029	0.083	0.083	
2030	0.082	0.082	
2031	0.081	0.081	
2032	0.080	0.080	
2033	0.079	0.079	
2034	0.078	0.078	
2035	0.077	0.077	
2036	0.076	0.076	
2037	0.075	0.075	
2038	0.074	0.074	
2039	0.073	0.073	
2040	0.072	0.072	
2041	0.071	0.071	
2042	0.070	0.070	
2043	0.069	0.069	
2044	0.068	0.068	
2045	0.067	0.067	
2046	0.066	0.066	
2047	0.065	0.065	
2048	0.064	0.064	
2049	0.063	0.063	
2050	0.062	0.062	
2051	0.061	0.061	
2052	0.060	0.060	
2053	0.059	0.059	
2054	0.058	0.058	
2055	0.057	0.057	
2056	0.056	0.056	
2057	0.055	0.055	
2058	0.054	0.054	
2059	0.053	0.053	
2060	0.052	0.052	
2061	0.051	0.051	
2062	0.050	0.050	
2063	0.049	0.049	
2064	0.048	0.048	
2065	0.047	0.047	
2066	0.046	0.046	
2067	0.045	0.045	
2068	0.044	0.044	
2069	0.043	0.043	
2070	0.042	0.042	
2071	0.041	0.041	
2072	0.040	0.040	
2073	0.039	0.039	
2074	0.038	0.038	
2075	0.037	0.037	
2076	0.036	0.036	
2077	0.035	0.035	
2078	0.034	0.034	
2079	0.033	0.033	
2080	0.032	0.032	
2081	0.031	0.031	
2082	0.030	0.030	
2083	0.029	0.029	
2084	0.028	0.028	
2085	0.027	0.027	
2086	0.026	0.026	
2087	0.025	0.025	
2088	0.024	0.024	
2089	0.023	0.023	
2090	0.022	0.022	
2091	0.021	0.021	
2092	0.020	0.020	
2093	0.019	0.019	
2094	0.018	0.018	
2095	0.017	0.017	
2096	0.016	0.016	
2097	0.015	0.015	
2098	0.014	0.014	
2099	0.013	0.013	
2100	0.012	0.012	
2101	0.011	0.011	
2102	0.010	0.010	
2103	0.009	0.009	
2104	0.008	0.008	
2105	0.007	0.007	
2106	0.006	0.006	
2107	0.005	0.005	
2108	0.004	0.004	
2109	0.003	0.003	
2110	0.002	0.002	
2111	0.001	0.001	
2112	0.000	0.000	
2113	0.000	0.000	
2114	0.000	0.000	
2115	0.000	0.000	
2116	0.000	0.000	
2117	0.000	0.000	
2118	0.000	0.000	
2119	0.000	0.000	
2120	0.000	0.000	
2121	0.000	0.000	
2122	0.000	0.000	
2123	0.000	0.000	
2124	0.000	0.000	
2125	0.000	0.000	
2126	0.000	0.000	
2127	0.000	0.000	
2128	0.000	0.000	
2129	0.000	0.000	
2130	0.000	0.000	
2131	0.000	0.000	
2132	0.000	0.000	
2133	0.000	0.000	
2134	0.000	0.000	
2135	0.000	0.000	
2136	0.000	0.000	
2137	0.000	0.000	
2138	0.000	0.000	
2139	0.000	0.000	
2140	0.000	0.000	
2141	0.000	0.000	
2142	0.000	0.000	
2143	0.000	0.000	
2144	0.000	0.000	
2145	0.000	0.000	
2146	0.000	0.000	
2147	0.000	0.000	
2148	0.000	0.000	
2149	0.000	0.000	
2150	0.000	0.000	
2151	0.000	0.000	
2152	0.000	0.000	
2153	0.000	0.000	
2154	0.000	0.000	
2155	0.000	0.000	
2156	0.000	0.000	
2157	0.000	0.000	
2158	0.000	0.000	
2159	0.000	0.000	
2160	0.000	0.000	
2161	0.000	0.000	
2162	0.000	0.000	
2163	0.000	0.000	
2164	0.000	0.000	
2165	0.000	0.000	
2166	0.000	0.000	
2167	0.000	0.000	
2168	0.000	0.000	
2169	0.000	0.000	
2170	0.000	0.000	
2171	0.000	0.000	
2172	0.000	0.000	
2173	0.000	0.000	
2174	0.000	0.000	
2175	0.000	0.000	
2176	0.000	0.000	
2177	0.000	0.000	
2178	0.000	0.000	
2179	0.000	0.000	
2180	0.000	0.000	
2181	0.000	0.000	
2182	0.000	0.000	
2183	0.000	0.000	
2184	0.000	0.000	
2185	0.000	0.000	
2186	0.000	0.000	
2187	0.000	0.000	
2188	0.000	0.000	
2189	0.000	0.000	
2190	0.000	0.000	
2191	0.000	0.000	
2192	0.000	0.000	
2193	0.000	0.000	
2194	0.000	0.000	
2195	0.000	0.000	
2196	0.000	0.000	
2197	0.000	0.000	
2198	0.000	0.000	
2199	0.000	0.000	
2200	0.000	0.000	
2201	0.000	0.000	
2202	0.000	0.000	
2203	0.000	0.000	
2204	0.000	0.000	
2205	0.000	0.000	
2206	0.000	0.000	
2207	0.000	0.000	
2208	0.000	0.000	
2209	0.000	0.000	
2210	0.000	0.000	
2211	0.000	0.000	
2212	0.000	0.000	
2213	0.000	0.000	
2214	0.000	0.000	
2215	0.000	0.000	
2216	0.000	0.000	
2217	0.000	0.000	
2218	0.000	0.000	
2219	0.000	0.000	
2220	0.000	0.000	
2221	0.000	0.000	
2222	0.000	0.000	
2223	0.000	0.000	
2224	0.000	0.000	
2225	0.000	0.000	
2226	0.000	0.000	
2227	0.000	0.000	
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2236	0.000	0.000	
2237	0.000	0.000	
2238	0.000	0.000	
2239	0.000	0.000	
2240	0.000	0.000	
2241	0.000	0.000	
2242	0.000	0.000	
2243	0.000	0.000	
2244	0.000	0.000	
2245	0.000	0.000	
2246	0.000	0.000	
2247	0.000	0.000	
2248	0.000	0.000	
2249	0.000	0.000	
2250	0.000	0.000	
2251	0.000	0.000	
2252	0.000	0.000	
2253	0.000	0.000	
2254	0.000	0.000	
2255	0.000	0.000	
2256	0.000	0.000	
2257	0.000	0.000	
2258	0.000	0.000	
2259	0.000	0.000	
2260	0.000	0.000	
2261	0.000	0.000	
2262	0.000	0.000	
2263	0.000	0.000	
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2277	0.000	0.000	
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2289	0.000	0.000	
2290	0.000	0.000	
2291	0.000	0.000	
2292	0.000	0.000	
2293	0.000	0.000	
2294	0.000	0.000	
2295	0.000	0.000	
2296	0.000	0.000	
2297	0.000	0.000	
2298	0.000	0.000</	

