

ExxonMobil Corporation: Emissions Inventory 1882-2002

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Climate Mitigation Services
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Special reporting columns

Year	Total oil products	Total CO2 emissions	Cumulative sum of CO2 emissions	Cumulative CO2, percent of total 1882-2002	Methane emissions	Methane emissions (carbon equiv)	Total "External"	Total "Internal"	Total Everything (Internal + external)	Cumulative sum, Total Everything	Cumulative sum, Total Everything, percent of total
	Carbon emitted per year Million tonnes carbon	Carbon emitted per year Million tonnes carbon	Cumulative carbon emitted Million tonnes carbon	Cumulative carbon emitted, divided by total carbon Percent	Methane emitted per year Million tonnes CH4	Carbon-equivalent per year Million tonnes C-equiv	Carbon emitted per year Million tonnes carbon	Carbon-equivalent per year Million tonnes C-equiv	Carbon-equivalent per year Million tonnes C-equiv	Cumulative carbon emitted Million tonnes C-equiv	Cumulative carbon-equiv, divided by total 1882-2002 Percent
1882	0.97	0.99	1	0.0049	0.01	0.07	0.97	0.09	1.06	1	0.0049
1883	0.95	0.96	2	0.0096	0.01	0.07	0.95	0.09	1.03	2	0.0097
1884	0.99	1.00	3	0.015	0.01	0.07	0.99	0.09	1.08	3	0.015
1885	1.03	1.05	4	0.020	0.01	0.08	1.13	0.10	1.23	4	0.020
1886	1.13	1.14	5	0.025	0.01	0.08	1.13	0.10	1.23	5	0.026
1887	1.20	1.22	6	0.031	0.01	0.09	1.20	0.11	1.31	6	0.032
1888	1.29	1.31	8	0.038	0.02	0.10	1.29	0.12	1.40	8	0.038
1889	1.59	1.62	9	0.046	0.02	0.12	1.59	0.15	1.74	10	0.046
1890	1.75	1.78	11	0.05	0.02	0.13	1.75	0.16	1.91	12	0.06
1891	2.11	2.13	13	0.07	0.02	0.16	2.11	0.49	2.26	14	0.07
1892	2.27	2.31	16	0.08	0.03	0.17	2.27	0.21	2.47	17	0.08
1893	2.41	2.45	18	0.09	0.03	0.18	2.41	0.22	2.63	19	0.09
1894	2.49	2.53	21	0.10	0.03	0.18	2.49	0.23	2.72	22	0.10
1895	2.39	2.43	23	0.11	0.03	0.17	2.39	0.22	2.61	25	0.11
1896	2.54	2.59	26	0.13	0.03	0.19	2.54	0.23	2.77	27	0.13
1897	2.82	2.87	29	0.23	0.04	0.23	2.82	0.25	3.07	30	0.14
1898	2.85	2.90	31	0.15	0.03	0.21	2.85	0.25	3.11	34	0.16
1899	2.85	2.93	34	0.17	0.03	0.19	2.69	0.24	2.93	37	0.17
1900	2.61	2.88	37	0.18	0.03	0.20	2.75	0.33	3.08	40	0.18
1901	2.85	3.20	40	0.20	0.04	0.22	3.03	0.39	3.42	43	0.20
1902	3.04	3.45	44	0.21	0.04	0.24	3.26	0.43	3.69	47	0.22
1903	3.17	3.53	47	0.23	0.04	0.24	3.32	0.45	3.77	50	0.23
1904	3.28	3.77	51	0.25	0.04	0.24	3.54	0.48	4.03	54	0.25
1905	3.52	4.12	55	0.27	0.05	0.28	3.85	0.55	4.41	59	0.27
1906	3.81	4.53	60	0.29	0.05	0.31	4.21	0.63	4.84	64	0.30
1907	4.21	4.97	64	0.32	0.05	0.34	4.64	0.67	5.31	69	0.32
1908	4.39	5.15	70	0.34	0.06	0.35	4.81	0.68	5.50	75	0.35
1909	4.75	5.64	75	0.37	0.06	0.38	5.25	0.77	6.02	81	0.37
1910	5.53	6.48	82	0.40	0.07	0.40	6.06	0.86	6.92	87	0.41
1911	5.84	6.80	89	0.44	0.07	0.46	6.07	0.89	6.97	95	0.44
1912	5.81	7.40	96	0.47	0.07	0.46	6.40	1.46	7.86	103	0.48
1913	5.41	6.98	103	0.51	0.07	0.43	6.02	1.40	7.42	110	0.51
1914	5.58	6.96	110	0.54	0.07	0.43	6.00	1.40	7.39	117	0.55
1915	6.26	8.00	118	0.58	0.08	0.49	6.92	1.58	8.50	126	0.58
1916	6.61	8.59	126	0.62	0.08	0.53	7.39	1.73	9.12	135	0.63
1917	7.44	9.59	136	0.67	0.09	0.59	8.27	1.90	10.18	145	0.67
1918	8.66	10.81	147	0.72	0.11	0.66	9.41	2.07	11.48	157	0.73
1919	10.24	12.61	159	0.79	0.12	0.77	11.02	2.36	13.38	170	0.79
1920	11.61	14.25	174	0.86	0.14	0.86	12.46	2.65	15.11	185	0.86
1921	11.56	13.97	188	0.93	0.13	0.84	12.27	2.54	14.81	200	0.93
1922	12.09	15.05	203	1.00	0.15	0.91	13.01	2.79	15.80	216	1.00
1923	16.20	19.69	223	1.10	0.19	1.18	17.27	3.61	20.88	237	1.10
1924	20.61	24.82	247	1.22	0.24	1.48	21.82	4.48	26.30	263	1.22
1925	20.34	24.59	272	1.34	0.23	1.46	21.59	4.46	26.05	289	1.34
1926	22.51	27.21	299	1.48	0.26	1.61	23.60	4.93	28.52	318	1.48
1927	22.10	27.00	326	1.61	0.25	1.60	23.93	4.97	28.60	347	1.61
1928	22.18	29.51	355	1.75	0.25	1.75	25.84	5.40	31.24	376	1.76
1929	27.65	33.94	390	1.92	0.32	1.99	28.68	6.25	35.94	414	1.92
1930	27.60	33.92	424	2.09	0.32	1.99	29.65	6.25	35.91	450	2.09
1931	25.47	31.11	455	2.24	0.29	1.82	27.26	5.67	32.93	483	2.24
1932	27.09	32.67	487	2.40	0.30	1.90	28.75	5.82	34.57	517	2.40
1933	32.55	38.72	526	2.59	0.36	2.24	34.21	6.75	40.96	558	2.59
1934	33.90	40.57	567	2.79	0.37	2.37	35.79	7.11	42.90	599	2.79
1935	35.49	43.60	609	3.00	0.39	2.46	37.54	7.52	45.06	646	3.00
1936	38.92	47.18	656	3.24	0.43	2.71	41.44	8.45	49.89	696	3.23
1937	43.66	53.52	710	3.50	0.49	3.06	46.94	9.64	56.58	753	3.50
1938	43.37	51.71	762	3.76	0.47	2.94	45.58	9.07	54.65	807	3.75
1939	45.99	55.99	818	4.03	0.50	3.15	49.08	10.06	59.14	867	4.02
1940	43.16	52.97	871	4.29	0.48	3.01	46.47	9.50	55.97	922	4.28
1941	49.52	60.41	934	4.84	0.53	3.34	53.83	10.78	64.61	988	4.84
1942	44.96	55.65	987	4.86	0.50	3.11	48.78	9.98	58.76	1,045	4.85
1943	52.00	63.99	1,051	5.18	0.58	3.61	56.27	11.34	67.61	1,113	5.17
1944	64.40	78.10	1,129	5.57	0.70	4.39	69.03	13.45	82.48	1,195	5.55
1945	67.23	81.61	1,210	5.97	0.74	4.61	72.14	14.08	86.22	1,281	5.95
1946	67.42	82.23	1,293	6.37	0.75	4.71	72.46	14.48	86.95	1,368	6.35
1947	83.69	101.80	1,394	6.88	0.85	5.15	85.44	17.47	102.91	1,465	6.88
1948	87.01	106.50	1,501	7.40	0.94	5.87	93.74	18.63	112.37	1,568	7.38
1949	86.45	107.10	1,608	7.93	0.95	5.95	93.96	19.08	113.04	1,701	7.90
1950	97.00	120.15	1,728	8.52	0.93	5.81	105.54	20.42	125.96	1,827	8.49
1951	108.62	135.13	1,863	9.19	0.98	6.16	118.58	22.72	141.29	1,968	9.14
1952	115.30	142.86	2,006	9.89	1.03	6.46	125.45	23.67	149.11	2,118	9.83
1953	119.30	148.24	2,154	10.62	1.08	6.79	132.68	25.02	157.70	2,279	10.55
1954	122.85	152.86	2,307	11.38	1.15	7.20	133.91	26.14	160.05	2,433	11.30
1955	137.50	170.67	2,478	12.22	1.27	7.98	149.50	29.15	178.65	2,611	12.13
1956	147.37	182.87	2,661	13.12	1.36	8.54	160.24	31.18	191.41	2,803	13.02
1957	148.30	185.26	2,846	14.03	1.37	8.57	161.53	32.30	193.83	2,996	13.92
1958	155.73	194.22	3,040	14.99	1.40	8.80	169.17	33.85	203.02	3,200	14.86
1959	160.20	201.15	3,240	15.93	1.41	8.82	174.89	35.00	210.89	3,419	15.88
1960	175.12	219.32	3,470	17.11	1.57	9.87	190.41	38.77	229.19	3,648	16.94
1961	183.04	229.00	3,699	18.24	1.63	10.24	199.13	40.11	239.24	3,888	18.06
1962	196.74	246.61	3,945	19.45	1.78	11.16	214.56	43.21	257.77	4,145	19.25
1963	206.97	259.17	4,204	20.73	1.85	11.63	225.86	44.95	270.81	4,416	20.51
1964	220.76	277.95	4,482	22.10	2.06	12.90	242.21	48.64	290.85	4,707	21.86
1965	235.93	303.12	4,783	23.59	2.29	14.36	263.41	53.07	316.48	5,023	23.33
1966	247.88	318.30	5,102	25.15	2.52	15.83	277.20	56.93	334.13	5,357	24.88
1967	264.17	339.73	5,441	26.83	2.69	16.88	296.38	60.24	356.61	5,713	26.53
1968	277.43	362.60	5,804	28.62	3.03	19.03	315.92	65.71	381.63	6,095	28.31
1969	299.10	395.11	6,199	30.57	3.41	21.39	344.62	71.88	416.50	6,511	30.24
1970	322.63	430.54	6,630	32.69	3.92	24.56	377.70	77.40	455.10	6,966	32.35
1971	320.93	437.51	7,067	34.85	4.22	26.48	385.40	80.59	465.98	7,451	34.51
1972	331.33	454.74	7,522	37.09	4.50	28.24	399.25	83.73	482.97	7,933	36.75
1973	353.19	488.44	8,010	39.50	4.97	31.17	428.74	90.87	519.61	8,433	39.17
1974	315.23	448.47	8,459	41.71	4.84	30.36	392.47	86.37	478.83	8,912	41.39
1975	290.97	419.97	8,879	43.78	4.61	28.94	367.03	81.88	448.91	9,361	43.47
1976	313.35	446.05	9,325	45.98	4.79	30.01	389.61	86.45	476.06	9,837	45.68
1977	308.92	441.45	9,766	48.15	4.84	30.54	385.07	85.72	470.79	10,309	47.88
1978	312.50	446.29	10,213	50.35	4.92	30.88	388.28	87.90	476.18	10,786	50.09
1979	307.81	439.86	10,652	52.52	4.80	30.14	384.61	85.39	470.00	11,256	52.27
1980	284.08	396.19	11,049	54.48	4.01	25.16	347.51	73.84	421.35	11,677	54.23
1981	2										

Cell: B2

Comment: Rick Heede:

John D. Rockefeller and four partners organized Standard Oil Company in Cleveland, Ohio in June 1870. Rockefeller had entered the oil refining and shipping business in 1862, three years after the first well had struck "rock oil" in the Oil Regions of western Pennsylvania. We could, therefore, have included oil sales and emissions starting in 1870 (when Rockefeller and Flagler established the Standard Oil Company), but a reliable data set is not available for these early years of Standard Oil and their omission decreases total estimated emissions by less than one-tenth of one percent. Standard Oil Company was re-organized in 1882 as the Standard Oil Trust (operating as Standard Oil Company as well as a myriad of other refining and transportation and product interests), forced to "dissolve" in 1892, and Standard Oil Company of New Jersey became Standard Oil Company (New Jersey), known simply as "Jersey." In 1899, Jersey became the sole holding company for all of Standard's various interests, and its phenomenal control of the oil sector led the Federal Government to file a suit in 1906 charging the company with running a monopoly under the Sherman Antitrust Act of 1890. Standard Oil Company (New Jersey) was ordered dissolved into 34 separate companies when the U.S. Supreme Court upheld a lower-court ruling in 1911. This report focuses on two of these disaffiliated companies that are once again affiliated as the ExxonMobil Corporation. As noted below, we trace the petroleum sales and emissions on the basis of each company's assumption of Standard Oil Company (New Jersey)'s net asset value upon dissolution.

For simplicity's sake we use four primary corporate names: 1. Standard Oil Company refers to its pre-1912 corporate entity (we frequently refer simply to Standard Oil, by which we mean only the pre-dissolution Standard Oil Company); 2. Standard Oil Company (New Jersey) (which we shorten to SONJ or SONJ-Exxon) refers to the post-1911 entity that became Exxon in 1972; 3. Standard Oil Company of New York (which we shorten to Socony or Socony-Mobil); and 4. ExxonMobil Corporation, which was created in the merger of Exxon Corporation and Mobil Corporation in 1999. Both Exxon and Mobil absorbed, spun off, founded new affiliates, and even briefly invested in joint ventures over each company's long history (e.g., SONJ took a 50 percent stake in Humble Oil & Refining Company in 1917, and Socony merged with Vacuum Oil in 1931 [Socony-Vacuum Oil Company changed its name to Socony Mobil Oil Company in 1955, to Mobil Oil Corporation in 1966, and to Mobil Corporation in 1976]).

For the years from 1882 to 1911 -- when Standard Oil Company was dissolved into Standard Oil Company (New Jersey) and Standard Oil Company of New York (Socony, later Mobil) -- we only count emissions from product sales representing the fraction equivalent to each company's assumption of Standard Oil Company's net asset value upon its dissolution, or 43 percent for SONJ and 9 percent for Socony. The remaining 48 was distributed among the 32 other disaffiliates of Standard Oil Company. The apportioning is based on the following:

For SONJ: Gibb & Knowlton (1956) *The Resurgent Years, 1911-1927*, p. 6: "aggregate net value of the thirty-three disaffiliated corporations totaled \$375,000,000, or 57 per cent of Jersey's predissolution total net value"; hence SONJ equals the remainder (43 percent).

For Socony: Yergin (1991) *The Prize*, p. 110: "Next largest, with 9 percent of net value, was Standard Oil of New York." After 1911 we allocate the full amount of sales and emissions to each company.

Note: Another source (Jay Pederson (2000) *International Directory of Company Histories*, vol. 32, p. 178) suggests a higher allocation of net asset value, and hence of SONJ's proportion of total sales and emissions for 1882-1911: namely that SONJ acquired \$285 million of the previous net asset value of about \$600 million, or 47.5 percent. The difference is not in the \$285 million, but in the value of the parent company, or \$600 million vs \$658 million (calculated from the above Gibb & Knowlton data). The quantitative difference is a total of 7.7 million tonnes of carbon on 1882-1911 emissions of 89 MtC, or 0.038 percent of total 1882-2002. We nonetheless apply the 43 percent allocation factor for SONJ based on Gibb & Knowlton in our study.

While these estimates are immensely complicated, we have made every effort to get it as right

as our sources, methods, and minds can achieve. Readers are referred to the discussions in the comments to data sets and columns in individual worksheets for details on assumptions, data sources, methodologies, formulas, and proxy data used. Also see the Methods & Results paper for further discussion of the gases covered, the definition of the inventory's boundary, carbon coefficients and combustion factors, data sources, proxy data sets used, caveats, summary of results, discussions of methodologies for each fuel, and an evaluation of the sources of uncertainty in the estimates. References used in this spreadsheet are listed in the Methods & Results paper.

We encourage readers to advise us of any errors of fact or interpretation at the author's electronic address listed below.

Cell: L3

Comment: Rick Heede:

Friends of the Earth Trust Limited commissioned this report from Climate Mitigation Services. CMS prepared this report for informational purposes. Although CMS exercised due care in compiling the information contained herein and the attached spreadsheet, CMS makes no warranty as to the accuracy, completeness, or usefulness of this information.

This work was done in May through October 2003 under contract with Friends of the Earth Trust Limited, with offices in London, 44-20-7490-1555, www.foe.co.uk. The project was conceived, funding secured, and administered through the good guidance of Peter Roderick, Esq, co-leader of Climate Justice Programme, London, www.climatelaw.org.

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Cell: D9

Comment: Rick Heede:

These columns summarize emissions of carbon dioxide and methane by ExxonMobil Corporation and its corporate predecessors from 1882 through 2002. (See cell B2 for a brief description of ExxonMobil's history.) All of these columns derive from the detailed worksheets that follow.

Cell: D10

Comment: Rick Heede:

This column shows a sum of carbon emissions from all combusted oil-related individual product sales (kerosene, gasoline, diesel and mid-distillates, and heavy fuels) plus aggregated product sales, plus a fraction of specialty products (see the worksheet for allocation details), and thus sums carbon emissions from combustion of oil products of all types from 1882 to 2002. It covers ExxonMobil's (and Socony-Mobil and their respective fractions of Standard Oil Company's emissions prior to 1912) product sales only, and therefore does NOT include emissions from the companies' own use of oil (see the worksheet on "Company energy use" for this latter set of emissions). See the oil products worksheets for details.

Cell: F10

Comment: Rick Heede:

This column is the sum all Standard Oil Company through ExxonMobil emissions of carbon dioxide (in units of million tonnes of carbon per year). It thus includes emissions from the combustion of marketed petroleum, natural gas, and coal for ExxonMobil and its predecessors, covering a period from 1882-2002. This sum includes all emissions of carbon dioxide: from the combustion of marketed oil products, natural gas, and coal, as well as emissions from each company's

consumption of electricity and fuels (including emissions at utilities from estimated purchased electricity), direct venting of CO₂, and flaring of natural gas from company facilities and equipment. These are all complicated estimations, and readers are referred to the discussions in comments to data sets and columns for details on assumptions, data sources, methodologies, formulas, and proxy data used.

Note: as explained elsewhere, we only count the proportion of Standard Oil Company emissions for 1882-1911 that represents the net asset value of SONJ-Exxon and Socony-Mobil as of the dissolution date (year-end 1911), or 43 and 9 percent, respectively.

Cell: H10

Comment: Rick Heede:

This column progressively sums all emissions of carbon dioxide -- in units of million tonnes of carbon -- from all ExxonMobil sources, including emissions from the combustion of the marketed products (oil, natural gas, and coal) as well as "internal" emissions from venting and flaring and company use of fuels and electricity.

Cell: J10

Comment: Rick Heede:

Cumulative sum of carbon dioxide emissions, in percent of total for 1882-2002.

Cell: L10

Comment: Rick Heede:

This column shows the sum of Standard Oil Company through ExxonMobil fugitive emissions of methane from oil, natural gas, and coal operations, in units of million tonnes of methane gas. Methane leakage occurred exclusively from oil production prior to the gradually growing market for natural gas. Coal production did not commence for either company until SONJ-Exxon opened a mine on its coal properties in 1970. See the methane worksheet for details.

Consult the comments embedded in each worksheet for data sources, methodologies, assumptions, limitations, caveats, and calculations.

Cell: N10

Comment: Rick Heede:

This column converts fugitive methane emissions -- which are expressed in units of million tonnes of methane gas per year -- to carbon-equivalent emissions as follows: we multiply methane emissions by 23 (the methane global warming potential factor [GWP] CH₄:CO₂) and divide by 3.667 (CO₂:carbon), 23/3.667, or a factor of 6.272. Methane is thus converted to carbon-equivalent when added to carbon emissions in columns R and T (Total internal and Total everything).

Note: the global warming potential of methane has been revised from 21 x CO₂ to 23 x CO₂ by the IPCC. Source: Houghton, J. T. et al (2001) Climate Change 2001: The Scientific Basis, Working Group One, Third Assessment, IPCC, Cambridge University Press, p. 388.

Cell: P10

Comment: Rick Heede:

Sum of all the combusted fractions of all marketed oil products plus natural gas plus coal sold by Standard Oil Company through ExxonMobil Corporation 1882-2002, in million tonnes of carbon per annum. Each fuel is analyzed for the fraction of the commodity sold that is fully combusted to carbon dioxide; see each worksheet for details.

Cell: R10

Comment: Rick Heede:

Sum of vented carbon dioxide, flared natural gas, company energy use, and fugitive methane by Standard Oil through ExxonMobil 1882-2002, in million tonnes of carbon-equivalent per annum.

This sum includes "internal" emissions of carbon dioxide plus methane: carbon dioxide emissions from each company's consumption of electricity (including emissions at utilities from estimated purchased electricity [used in buildings, pipelines, refineries, pumps, service stations]) and fuels (pipeline fuel, crude oil carriers, refinery fuels and steam, trucking of gasoline and other products), direct venting of CO₂ from company platforms and processing plants), and ubiquitous flaring of natural gas from company facilities and equipment. Plus emissions of methane from company systems and equipment.

These are all complicated estimations, and readers are referred to the discussions in comments to data sets and columns for details on assumptions, data sources, methodologies, formulas, and proxy data used. Also see the Methods & Results paper for further discussion.

Note: Since this column includes data for fugitive methane -- which is expressed in units of million tonnes of methane gas per year -- we convert methane emissions into carbon-equivalent emissions as follows: methane global warming potential of $23 \times \text{CO}_2 / (\text{CO}_2 / \text{carbon}) = 23 / 3.667 = 6.272$ methane equivalent of carbon.

Cell: T10

Comment: Rick Heede:

Sum of total external and total internal emissions per year, in millions tonnes carbon-equivalent per annum. In other words, total of all emissions of carbon dioxide and methane, external and internal, for Standard Oil Company through ExxonMobil Corporation from 1882 to 2002. See the individual worksheets, and their comments to columns and data sets, for details.

Note: Since this column includes data for fugitive methane -- which is expressed in units of million tonnes of methane gas per year -- we convert methane emissions into carbon-equivalent emissions as follows: methane global warming potential of $23 \times \text{CO}_2 / (\text{CO}_2 / \text{carbon}) = 23 / 3.667 = 6.272$ methane equivalent of carbon.

Cell: V10

Comment: Rick Heede:

This column progressively sums all emissions of carbon dioxide and methane -- in units of million tonnes of carbon-equivalent -- from all ExxonMobil sources from 1882 to 2002, including emissions from the combustion of the marketed products (oil, natural gas, and coal) as well as "internal" emissions from venting and flaring and company use of fuels and electricity.

Cell: X10

Comment: Rick Heede:

Cumulative sum of total carbon dioxide (internal plus external) and methane emissions, in percent of total for 1882-2002.