

**ExxonMobil, USA**

**Entity emissions from combustion, venting, flaring, and fugitive methane**

Richard Heede  
Climate Accountability Institute  
#####

1850s				1860s				1870s				1880s				1890s																		
1850	1851	1852	1853	1854	1855	1856	1857	1858	1859	1860	1861	1862	1863	1864	1865	1866	1867	1868	1869	1870	1871	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	1882	1883	1884
[Data rows for years 1850-1894]																																		

Emission factors

**Entity CO2 emissions**

kg CO2/tCO2

Category	Unit	Value	Source
Oil & NGLs	MtCO2	linked	[Linked]
Natural Gas	MtCO2	linked	
Coal	MtCO2	linked	
Combustion total	MtCO2	sum	

Oil & NGLs: Venting	MtCO2	calculated	3.83	linked	0
Oil & NGLs: Flaring	MtCO2	calculated	15.94	linked	0
Own fuel use	MtCO2	calculated	57.26	linked	0
Natural Gas: Venting	MtCO2	calculated	28.53	linked	
Natural Gas: Flaring	MtCO2	calculated	1.74	linked	
Venting & Flaring total	MtCO2	sum			0

Cement	MtCO2	linked	
<b>Total CO2 emissions</b>	MtCO2	sum	row 18+24+26

**Entity methane emissions**

kg CH4/tCO2

Category	Unit	Value	Source	
Methane: Oil & NGLs	MtCH4	calculated	1.92	linked
Methane: Natural Gas	MtCH4	calculated	9.88	linked
Methane: Coal	MtCH4	calculated	4.03	linked
<b>Total methane emissions</b>	MtCH4	sum		0.00

**Entity methane emissions**

GWP

Methane: Oil & NGLs	MtCO2e	calculated	28		0
Methane: Natural Gas	MtCO2e	calculated	28		
Methane: Coal	MtCO2e	calculated	28		
<b>Total methane emissions</b>	MtCO2e	sum		(per IPCC AR5)	0

<b>Total attributed emissions</b>	MtCO2e	sum		0
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Category	Unit	Converted to CO2	4,595	198	198	209	216	253	260	278	282	286	304	333	348	352	377	410	436	447	476	491	520	539	575	638	674	638	689	700	711	718	769	865	890	938	997	1,008
Oil, Natural Gas, Coal, Flaring, & Cement	Mt Carbon	Sum 1751-1849:	1,254	54	54	57	59	69	71	76	77	78	83	91	95	96	103	112	119	122	130	134	142	147	157	174	184	174	188	191	194	196	210	236	243	256	272	275
<b>CDIAC CO2 emissions</b>	MtCO2	Converted to CO2:	4,595	[Data]																																		
Oil, Natural Gas, Coal, Flaring, & Cement	Mt Carbon	Sum 1751-1849:	1,254	[Data]																																		

Entity percent of total CO2 emissions	Percent	[Data]																														
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Category	Unit	(MtCH4)	[Data]																											
<b>CDIAC/EDGAR methane</b>	Tg CH4	(MtCH4)	2.22	2.35	2.34	2.51	2.73	2.89	3.04	3.26	3.22	3.34	3.41	3.80	4.13	4.41	4.3	4.4	4.5	4.6	4.6	4.8	5.3	5.7	6.1	6.5	6.5			

Entity percent of total methane emission	Percent	[Data]																											
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Stern, D.I., & R.K. Kaufmann (1998) "Annual Estimates of Global Anthropogenic Methane Emissions: 1860-1994," in Trends Online: A Compendium of Data on Global Change, CDIAC, ONRL, <http://cdiac.esd.ornl.gov/trends/meth/ch4.htm#flaring>.

European Commission's Joint Research Centre (2011) "Global Emissions EDGAR v4.2: Methane Emissions," Emission Database for Global Atmospheric Research (EDGAR), Nov11; [edgar.jrc.ec.europa.eu/overview.php?v=42](http://edgar.jrc.ec.europa.eu/overview.php?v=42)

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18-Oct-20

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	AP	AQ	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA	BB	BC	BD	BE	BF	BG	BH	BI	BJ	BK	BL	BM	BN	BO	BP	BQ	BR	BS	BT	BU	BV	BW	BX	BY	BZ	CA	CB	CC	CD	CE	
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	1890s										1900s										1910s										1920s												
	1885	1886	1887	1888	1889	1890	1891	1892	1893	1894	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922	1923	1924	1925	1926	
11																																											
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15	0.07	0.11	0.16	0.21	0.31	0.40	0.56	0.67	0.79	0.90	0.94	1.09	1.30	1.41	1.42	1	2	2	2	2	3	3	3	4	4	5	5	6	5	5	7	7	8	10	12	14	14	16	21	28	28	32	
16																0.5	0.7	0.8	1	1	1	2	2	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	4	5	5	5
17																																											
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19	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	2	2	3	3	3	4	4	5	5	6	7	7	8	8	8	9	10	11	13	15	17	17	19	25	32	33	37	
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30	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	2	2	3	3	3	4	5	5	5	6	7	8	8	8	8	9	10	12	13	16	18	18	20	26	33	34	38	
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36	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.04	0.04	0.05	0.05	0.05	0.06	0.05	0.06	0.08	0.10	0.10	0.11	
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48	1,019	1,033	1,081	1,198	1,198	1,304	1,359	1,370	1,356	1,403	1,488	1,535	1,612	1,700	1,861	1,957	2,026	2,074	2,261	2,286	2,433	2,594	2,869	2,744	2,876	3,001	3,060	3,221	3,459	3,115	3,071	3,298	3,503	3,430	2,953	3,415	2,942	3,096	3,554	3,525	3,573	3,606	
49	278	282	295	327	327	356	371	374	370	383	406	419	440	464	508	534	553	566	617	624	664	708	783	749	785	819	835	879	944	850	838	900	956	936	806	932	803	845	970	962	975	984	
50																																											
51	0.01%	0.01%	0.01%	0.02%	0.03%	0.03%	0.04%	0.05%	0.06%	0.07%	0.06%	0.07%	0.08%	0.08%	0.08%	0.10%	0.12%	0.14%	0.14%	0.15%	0.16%	0.18%	0.18%	0.20%	0.21%	0.24%	0.25%	0.25%	0.23%	0.26%	0.31%	0.32%	0.34%	0.39%	0.53%	0.52%	0.60%	0.63%	0.73%	0.94%	0.95%	1.06%	
52																																											
53																																											
54	6.4	6.4	6.8	7.4	7.5	8.0	8.3	8.4	8.2	8.5	9.0	9.3	9.7	10.2	11.2	11.8	12.1	12.4	13.6	13.7	14.4	15.5	17.1	16.3	17.0	17.8	18.1	19.1	20.4	18.4	18.1	19.5	20.6	20.3	17.9	20.6	17.7	19.0	21.3	21.1	21.2	21.2	
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	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR	CS	CT	CU	CV	CW	CX	CY	CZ	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL	DM	DN	DO	DP	DQ	DR		
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	1930s					1930s					1940s					1950s					1960s																				
	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943	1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965		
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15	33	36	41	42	41	51	66	80	86	93	107	100	110	102	113	83	112	146	158	174	193	198	176	214	255	272	284	293	327	361	369	362	381	393	423	466	515	558	606		
16	6	6	8	8	7	6	6	7	8	9	12	8	11	12	13	14	16	17	18	19	23	25	28	33	36	40	44	46	50	53	57	58	62	66	69	78	82	93	107		
17																																									
18	38	42	49	49	48	58	72	87	94	102	119	109	122	114	126	98	128	163	176	192	215	223	203	247	291	313	328	339	377	414	426	420	443	459	493	543	597	651	712		
19																																									
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	
21	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	3	3	3	3	3	3	3	3	3	4	4	5	5	6	6	6	6	6	6	7	8	9	10	
22	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1	1	1	1	1	1	1	1	2	2	2	2	3	3	3	3	3	3	4	4	4	4	4	5	5	6	
23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	3	3	
24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	1	1	1	1	1	2	2	2	2	3	3	3	3	3	3	3	4	4	5	5	6	6	6	7	8	9	9	10	11	12	12	12	13	14	14	16	17	19	21		
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29	40	43	50	51	49	59	74	90	96	105	123	111	125	117	129	100	132	168	181	198	221	229	209	254	299	322	337	349	388	426	439	433	456	473	507	559	615	671	733		
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33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	
35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
36	0.12	0.13	0.15	0.16	0.14	0.16	0.19	0.22	0.24	0.27	0.33	0.27	0.33	0.32	0.35	0.30	0.37	0.45	0.48	0.52	0.59	0.63	0.61	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	
37																																									
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39	2	2	2	2	2	3	4	4	5	5	6	5	6	5	6	4	6	8	9	9	10	11	9	12	14	15	15	16	18	19	20	19	21	21	23	25	28	30	33		
40	2	2	2	2	2	2	2	2	2	3	3	2	3	3	4	4	4	5	5	5	6	7	8	9	10	11	12	13	14	15	16	16	17	18	19	21	23	26	29		
41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
42	3	4	4	4	4	4	5	6	7	8	9	8	9	9	10	8	10	13	14	15	17	18	17	21	24	26	27	29	31	34	36	36	38	39	42	47	50	56	62		
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45	43	47	55	55	53	64	79	96	103	112	132	119	134	126	139	109	142	180	194	212	237	247	227	274	323	348	365	377	419	460	474	468	493	512	549	606	665	726	795		
46																																									
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48	3,891	3,906	4,195	3,855	3,441	3,104	3,276	3,565	3,759	4,141	4,430	4,188	4,364	4,760	4,884	4,914	5,097	5,068	4,254	4,536	5,104	5,383	5,199	5,976	6,475	6,577	6,742	6,834	7,490	7,977	8,318	8,538	8,857	9,345	9,366	9,699	10,248	10,781	11,282		
49	1,062	1,066	1,145	1,052	939	847	894	973	1,026	1,130	1,209	1,143	1,191	1,299	1,333	1,341	1,391	1,383	1,161	1,238	1,393	1,469	1,419	1,631	1,767	1,795	1,840	1,865	2,044	2,177	2,270	2,330	2,417	2,550	2,556	2,647	2,797	2,942	3,079		
50																																									
51	1.02%	1.10%	1.20%	1.32%	1.42%	1.90%	2.26%	2.51%	2.56%	2.53%	2.77%	2.66%	2.86%	2.46%	2.65%	2.05%	2.58%	3.31%	4.25%	4.35%	4.33%	4.26%	4.03%	4.25%	4.63%	4.89%	5.00%	5.10%	5.18%	5.34%	5.27%	5.07%	5.15%	5.06%	5.41%	5.77%	6.00%	6.22%	6.50%		
52																																									
53																																									
54	23.0	22.8	24.4	22.3	19.9	17.9	18.8	20.4	21.0	23.3	24.8	23.4	24.8	26.2	27.0	27.0	27.4	26.9	23.5	24.7	27.6	29.2	28.1	30.4	32.2	32.7	33.1	33.1	35.9	38.4	39.7	40.9	42.7	44.6	44.3	45.1	47.1	49.4	51.3		
55																																									
56	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	3.69%	3.82%	4.03%	4.32%
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	DS	DT	DU	DV	DW	DX	DY	DZ	EA	EB	EC	ED	EE	EF	EG	EH	EI	EJ	EK	EL	EM	EN	EO	EP	EQ	ER	ES	ET	EU	EV	EW	EX	EY	EZ	FA	FB	FC	FD			
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	FE	FF	FG	FH	FI	FJ	FK	FL	FM	FN	FO	FP	FQ	FR	FS	FT	FU	FV	FW	FX	FY	FZ	GA	GB	GC	GD	GE	GF	GG	GH	GI	GJ	GK	GL						
1	<b>Entity emissions from combustion, venting, flaring, and fugitive methane</b>																																							
2	Richard Heede Climate Accountability Institute 18-Oct-20																																							
3	<b>ExxonMobil, USA</b>																																							
4																			to 2015				to 2016				to 2017				to 2018									
5	2000s						2010s														Cumulative		Cumulative				Cumulative				Cumulative									
6	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	MtCO2e		Entity emissions				MtCO2e				MtCO2e				MtCO2e								
7																			(except where noted)		(V = verified)				(except where noted)				(except where noted)				(except where noted)							
8																			Entity CO2 emissions		kg CO2/AC02				to 2015				to 2016				to 2017				to 2018			
9	353	349	371	363	336	335	328	313	296	299	286	318	321	310	307	32,037	Oil & NGLs	MtCO2	linked	3.83	31,099	31,420	31,729	32,037	11,849	12,047	12,246	12,429	1,317	1,317	1,317	1,317	44,266	44,784	45,293	45,783				
10	209	201	205	211	215	225	237	257	240	231	217	205	198	199	183	12,429	Natural Gas	MtCO2	linked	15.94	11,849	12,047	12,246	12,429	1,317	1,317	1,317	1,317	44,266	44,784	45,293	45,783								
11	561	549	576	574	550	560	565	570	537	529	504	523	518	509	491	1,317	Coal	MtCO2	linked	4.03	1,317	1,317	1,317	1,317	44,266	44,784	45,293	45,783												
12	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	45,783	Combustion total	MtCO2	sum		44,266	44,784	45,293	45,783																
13	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	123	Oil & NGLs: Venting	MtCO2	calculated	3.83	119	120	122	123																
14	6	6	6	6	5	5	5	5	5	5	5	5	5	5	5	511	Oil & NGLs: Flaring	MtCO2	calculated	15.94	496	501	506	511																
15	12	11	12	12	12	13	14	15	14	13	12	12	11	11	11	712	Own fuel use	MtCO2	calculated	57.26	679	690	701	712																
16	6	6	6	6	6	6	7	7	7	7	6	6	6	6	5	355	Natural Gas: Venting	MtCO2	calculated	28.53	338	344	349	355																
17	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	Natural Gas: Flaring	MtCO2	calculated	1.74	21	21	21	22																
18	25	24	25	26	25	26	27	29	27	26	25	24	24	24	22	1,722	Venting & Flaring total	MtCO2	sum		1,652	1,676	1,699	1,722																
19																			-		Cement				-				-											
20	587	574	602	600	576	586	593	599	563	555	528	547	542	532	513	47,505	Total CO2 emissions	MtCO2	sum	row 18+24+26	45,918	46,460	46,992	47,505																
21																			summed scope 1 CO2 & CH4		(for UCS carbon intensity project, Jan17)				Entity methane emissions				kg CH4/AC02											
22	102.0	103.7	102.8	106.5	110.4	116.6	109.3	106.0	100.2	98.1	95.5	95.3	89.4	62	Methane: Oil & NGLs	MtCH4	calculated	1.92	60	60	61	62																		
23	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	123	Methane: Natural Gas	MtCH4	calculated	9.88	117	119	121	123																
24	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	5	Methane: Coal	MtCH4	calculated	4.03	5	5	5	5																
25	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	190	Total methane emissions	MtCH4	sum		182	185	187	190																
26																			Entity methane emissions		GWP				to 2015				to 2016				to 2017				to 2018			
27	19	19	20	20	18	18	18	17	16	16	15	17	17	17	17	1,725	Methane: Oil & NGLs	MtCO2e	calculated	28	1,675	1,692	1,709	1,725																
28	58	55	57	58	59	62	66	71	66	64	60	57	55	55	51	3,438	Methane: Natural Gas	MtCO2e	calculated	28	3,277	3,332	3,387	3,438																
29	77	74	77	78	77	80	83	88	82	80	76	74	72	72	67	149	Methane: Coal	MtCO2e	calculated	28	149	149	149	149																
30	77	74	77	78	77	80	83	88	82	80	76	74	72	72	67	5,312	Total methane emissions	MtCO2e	sum	(per IPCC AR5)	5,101	5,173	5,245	5,312																
31	663	648	678	678	653	666	676	687	646	635	604	621	614	604	580	52,817	Total attributed emissions	MtCO2e	sum		51,019	51,633	52,237	52,817																
32	28,308	29,264	30,231	31,135	31,854	31,414	33,018	34,136	34,660	34,825	35,089	35,106	35,251	35,681	36,443	1,612,851	CDIAC CO2 emissions	MtCO2		1,505,476	1,540,727	1,576,408	1,612,851																	
33	7,726	7,986	8,250	8,497	8,693	8,573	9,011	9,316	9,459	9,504	9,576	9,581	9,620	9,738	9,946	440,166	Oil, Natural Gas, Coal, Flaring, & Cement	Mt Carbon																						
34																			CDIAC sums December 2019		Entity percent of total CO2 emissions				Percent															
35	2.07%	1.96%	1.99%	1.93%	1.81%	1.87%	1.79%	1.75%	1.63%	1.60%	1.51%	1.56%	1.54%	1.49%	1.41%	2.95%		Percent		3.05%	3.02%	2.98%	2.95%																	
36	91.7	94.7	98.4	99.5	101.2	99.9	105.1	109.5	113.4	115.2	118.2	117.8	118.4	120.0	122.7	6,971	CDIAC/EDGAR methane	Tg CH4		6,610	6,728	6,848	6,971																	
37	2.99%	2.80%	2.79%	2.80%	2.73%	2.87%	2.83%	2.87%	2.60%	2.48%	2.28%	2.24%	2.17%	2.14%	1.96%	2.72%	Entity percent of total CH4 emissions	Percent		2.76%	2.75%	2.74%	2.72%																	

Heede 29-Aug-20 Offsheet calculation of Scope 1 + Scope 3 / production for oil and gas

**Cell:** FY48

**Comment:** Rick Heede:

CAI compares entity emissions to the CDIAC / Global Carbon Project ([www.globalcarbonproject.org](http://www.globalcarbonproject.org)) annual estimate of carbon dioxide emissions from fossil fuels and cement production. The CAI Carbon Majors methodology is based on the CDIAC methodology; see: Heede, Richard (2019) Carbon Majors: Accounting for carbon and methane emissions 1854-2010 Methods & Results Report, ISBN 978-3-659-57841-0, OmniScriptum, Riga, 148 pp.  
 Reference of the full global carbon budget 2019: Pierre Friedlingstein, Matthew W. Jones, Michael O'Sullivan, Robbie M. Andrew, Judith Hauck, Glen P. Peters, Wouter Peters, Julia Pongratz, Stephen Sitch, Corinne Le Quéré, Dorothee C. E. Bakker, Josep G. Canadell, Philippe Ciais, Rob Jackson, Peter Anthoni, Leticia Barbero, Ana Bastos, Vladislav Bastrikov, Meike Becker, Laurent Bopp, Erik Buitenhuis, Naveen Chandra, Frédéric Chevallier, Louise P. Chini, Kim I. Currie, Richard A. Feely, Marion Gehlen, Dennis Gillilan, Thanos Gkritzalis, Daniel S. Goll, Nicolas Gruber, Sören Gutekunst, Ian Harris, Vanessa Haverd, Richard A. Houghton, George Hurtt, Tatiana Ilyina, Atul K. Jain, Emilie Joetzjer, Jed O. Kaplan, Etsushi Kato, Kees Klein Goldewijk, Jan Ivar Korsbakken, Peter Landschützer, Siv K. Lauvset, Nathalie Lefèvre, Andrew Lenton, Sebastian Lienert, Danica Lombardozzi, Gregg Marland, Patrick C. McGuire, Joe R. Melton, Nicolas Metz, David R. Munro, Julia E. M. S. Nabel, Shin-Ichiro Nakaoka, Craig Neill, Abdirahman M. Omar, Tsunee Ono, Anna Peregon, Denis Pierrot, Benjamin Poulter, Gregor Rehder, Laure Resplandy, Eddy Robertson, Christian Rödenbeck, Roland Séférian, Jörg Schwinger, Naomi Smith, Pieter P. Tans, Hanqin Tian, Bronte Tilbrook, Francesco N Tubiello, Guido R. van der Werf, Andrew J. Wiltshire, Sönke Zaehele. Global Carbon Budget 2019, Earth Syst. Sci. Data, 2019.  
<https://doi.org/10.5194/essd-11-1783-2019>  
 See also: Gillilan, D., Marland, G., Boden, T. and Andres, R.: Global, Regional, and National Fossil-Fuel CO2 Emissions.

**Cell:** FY54

**Comment:** Rick Heede:

This study's total fugitive and vented methane from oil and natural gas systems and coal mining are summed here and compared to CDIAC's estimate for 1860 to 1969 (Stern & Kaufmann, 1998). CAI uses revised data from EDGAR for 1970-2015, with extrapolation by CAI for 2016-2018 (based on growth of emissions from oil, gas, and coal production). There is a non-linearity at 1969/1970 btw datasets.  
 Methane emissions may be revised if a more comprehensive and integrated dataset becomes available.  
 Furthermore, the Stern & Kaufman does not estimate methane emissions from oil (only gas-related CH4). The most recent EDGAR Nov19 datasets aggregate methane emissions from the Oil & Gas sector. CAI disaggregates methane from oil and methane from gas on the basis of an earlier EDGAR dataset 1970-2008 that reports CH4 from oil and gas separately. CAI uses this average allocation of ~695% from gas and ~30.5% from oil to estimate methane emissions from both sectors. This, given the fluctuations of methane emissions --the proportion from natural gas increases over time (from 50% in 1970 to 76% in 2008) -- this disaggregation is only approximate.

Stern, David I., & Robert K. Kaufmann (1998) "Annual Estimates of Global Anthropogenic Methane Emissions: 1860-1994," in Trends Online: A Compendium of Data on Global Change, Carbon Dioxide Information Analysis Center, Oak Ridge National Lab., U.S. DOE, Oak Ridge, Tenn., U.S.A. <http://cdiac.esd.ornl.gov/trends/meth/ch4.htm#flaring>

Crippa, M., G. Oreggioni, D. Guizzardi, M. Muntean, E. Schaaf, E. Lo Vullo, E. Solazzo, F. Monforti-Ferrario, J.G.J. Olivier, & E. Vignati (2019) Fossil CO2 and GHG emissions of all world countries - 2019 Report, Publications Office of the European Union, Luxembourg. ISBN 978-92-76-11100-9. [https://edgar.jrc.ec.europa.eu/overview.php?VP\\_GHG](https://edgar.jrc.ec.europa.eu/overview.php?VP_GHG)