

	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	CF			
1	Emissions from combustion, venting, flaring, and fugitive methane																				Entity emissions from combustion, venting, flaring, and fugitive methane																									
2	Richard Heede Climate Accountability Institute 18-Oct-20										Richard Heede Climate Accountability Institute 18-Oct-20																																			
3	Chevron, USA																				Chevron, USA																									
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5																																														
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7																																														
8																																														
9																																														
10	1890s					1900s					1900s					1910s					1920s																									
11	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	1927			
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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	3,891			
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	1,062			
50																																														
51	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%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.07%	0.06%	0.08%	0.05%	0.05%	0.04%	0.04%	0.04%	0.04%	0.05%	0.10%	0.19%	0.16%	0.15%	0.55%	0.53%			
52																																														
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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	23.0			
55																																														
56	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	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	0.00	0.00	0.00	0.00
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**Entity emissions from combustion, venting, flaring, and fugitive methane**

Richard Heede  
Climate Accountability Institute  
18-Oct-20

**Chevron, USA**

to 2015 to 2016 to 2017 to 2018

	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						
10																	2010s										Cumulative	Entity emissions	Emission factors	Cumulative	Cumulative	Cumulative	Cumulative					
11	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	MtCO2e	MtCO2e	kg CO2/tCO2	to 2015	to 2016	to 2017	to 2018	to 2015	to 2016	to 2017	to 2018	to 2015	to 2016	to 2017	to 2018	to 2015	to 2016	to 2017	to 2018				
12																	(except where noted)	V (V = verified)																				
15	250	242	227	254	261	251	239	235	232	236	233	234	242	V	38,484	Oil & NGLs	MtCO2	linked	37,775	38,008	38,242	38,484	37,775	38,008	38,242	38,484	37,775	38,008	38,242	38,484	37,775	38,008	38,242	38,484				
16	97	98	100	97	98	96	99	101	101	103	102	118	134	V	9,320	Natural Gas	MtCO2	linked	8,965	9,068	9,185	9,320	8,965	9,068	9,185	9,320	8,965	9,068	9,185	9,320	8,965	9,068	9,185	9,320				
17	24	23	21	19	15	8	4							V	1,086	Coal	MtCO2	linked	1,086	1,086	1,086	1,086	1,086	1,086	1,086	1,086	1,086	1,086	1,086	1,086	1,086	1,086	1,086					
18	371	363	349	370	374	356	342	336	332	339	335	351	376		48,889	Combustion total	MtCO2	sum	47,826	48,162	48,513	48,889	47,826	48,162	48,513	48,889	47,826	48,162	48,513	48,889	47,826	48,162	48,513	48,889				
20	1	1	1	1	1	1	1	1	1	1	1	1	1		147	Oil & NGLs: Venting	MtCO2	calculated	3.83	linked	145	146	147	147	145	146	147	147	145	146	147	147	145	146	147			
21	4	4	4	4	4	4	4	4	4	4	4	4	4		614	Oil & NGLs: Flaring	MtCO2	linked	15.94	linked	602	606	610	614	602	606	610	614	602	606	610	614	602	606	610			
22	6	6	6	6	6	6	6	6	6	6	6	7	8		534	Own fuel use	MtCO2	calculated	57.26	linked	513	519	526	534	513	519	526	534	513	519	526	534	513	519	526			
23	3	3	3	3	3	3	3	3	3	3	3	3	4		266	Natural Gas: Venting	MtCO2	calculated	28.53	linked	256	259	262	266	256	259	262	266	256	259	262	266	256	259	262			
24	0	0	0	0	0	0	0	0	0	0	0	0	0		16	Natural Gas: Flaring	MtCO2	calculated	1.74	linked	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16			
25	13	13	13	14	14	13	13	14	13	14	14	15	17		1,577	Venting & Flaring total	MtCO2	sum	1,532	1,545	1,560	1,577	1,532	1,545	1,560	1,577	1,532	1,545	1,560	1,577	1,532	1,545	1,560	1,577				
26															-	Cement	MtCO2	linked																				
29	384	376	362	384	388	369	356	349	346	353	349	366	392	V	50,466	Total CO2 emissions	MtCO2	sum	row 18+24+26	49,358	49,707	50,073	50,466	49,358	49,707	50,073	50,466	49,358	49,707	50,073	50,466	49,358	49,707	50,073	50,466			
31	56	56	56	56	57	55	54	54	54	55	54	60	67		-	Cement	MtCO2	sum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-					
32																	summed scope 1 CO2 & CH4																					
33	0	0	0	0	1	0	0	0	0	0	0	0	0		74	Entity methane emissions	MtCH4	calculated	1.92	linked	73	73	74	74	73	73	74	74	73	73	74	74	73	73	74	74		
34	1	1	1	1	1	1	1	1	1	1	1	1	1		92	Methane: Natural Gas	MtCH4	calculated	9.88	linked	89	90	91	92	89	90	91	92	89	90	91	92	89	90	91	92		
35	0	0	0	0	0	0	0	0	0	0	0	0	0		4	Methane: Coal	MtCH4	calculated	4.03	linked	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4			
36	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.4	1.5	1.5	1.6	1.8	V	170	Total methane emissions	MtCH4	sum	166	167	169	170	166	167	169	170	166	167	169	170	166	167	169	170				
38	13	13	12	14	14	14	13	13	12	13	13	13	13		2,073	Entity methane emissions	MtCO2e	calculated	28	GWP	2,035	2,047	2,060	2,073	2,035	2,047	2,060	2,073	2,035	2,047	2,060	2,073	2,035	2,047	2,060	2,073		
40	27	27	28	27	27	27	27	28	28	28	28	33	37		2,578	Methane: Natural Gas	MtCO2e	calculated	28	2,480	2,508	2,541	2,578	2,480	2,508	2,541	2,578	2,480	2,508	2,541	2,578	2,480	2,508	2,541	2,578			
41	3	3	2	2	2	1	0								123	Methane: Coal	MtCO2e	calculated	28	123	123	123	123	123	123	123	123	123	123	123	123	123	123	123				
42	43	43	42	43	43	41	41	41	40	41	41	45	50		4,773	Total methane emissions	MtCO2e	sum	(per IPCC AR4)	4,637	4,678	4,723	4,773	4,637	4,678	4,723	4,773	4,637	4,678	4,723	4,773	4,637	4,678	4,723	4,773			
43	40	40	40	41	41	40	40	41	40	41	41	45	50		-	Methane Oil & gas only	MtCO2e	sum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
45	427	419	404	426	431	410	396	390	386	394	390	411	443	V	55,239	Total attributed emissions	MtCO2e	sum	53,995	54,385	54,796	55,239	53,995	54,385	54,796	55,239	53,995	54,385	54,796	55,239	53,995	54,385	54,796	55,239				
47	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	V	1,612,851	CDIAC CO2 emissions	MtCO2		1,505,476	1,540,727	1,576,408	1,612,851	1,505,476	1,540,727	1,576,408	1,612,851	1,505,476	1,540,727	1,576,408	1,612,851	1,505,476	1,540,727	1,576,408	1,612,851				
49	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	V	440,166	Oil, Natural Gas, Coal, Flaring, & Cement	Mt Carbon																					
50																	CDIAC sums December 2019																					
51	1.27%	1.21%	1.14%	1.22%	1.17%	1.08%	1.03%	1.00%	0.99%	1.01%	0.99%	1.03%	1.08%		3.13%	Entity percent of total CO2 emissions	Percent		3.28%	3.23%	3.18%	3.13%	3.28%	3.23%	3.18%	3.13%	3.28%	3.23%	3.18%	3.13%	3.28%	3.23%	3.18%	3.13%				
54	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	V	6,971	CDIAC/EDGAR methane	Tg CH4		6,610	6,728	6,848	6,971	6,610	6,728	6,848	6,971	6,610	6,728	6,848	6,971	6,610	6,728	6,848	6,971				
55	1.56%	1.53%	1.49%	1.53%	1.46%	1.34%	1.28%	1.26%	1.22%	1.25%	1.23%	1.34%	1.46%		2.45%	Entity percent of total CH4 emissions	Percent		2.51%	2.48%	2.46%	2.45%	2.51%	2.48%	2.46%	2.45%	2.51%	2.48%	2.46%	2.45%	2.51%	2.48%	2.46%	2.45%				

**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 Peregón, 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)