

	CE	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			
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7	Iraq National Oil Co., Iraq										Iraq National Oil Co., Iraq																															
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10						1930s					1930s					1940s					1950s					1960s																
11	1926	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			
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48	3,606	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			
49	984	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			
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%	0.00%	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%
52																																										
53																																										
54	21.2	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			
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Entity emissions from combustion, venting, flaring, and fugitive methane

Richard Heede
Climate Accountability Institute
18-Oct-20

Iraq National Oil Co., Iraq

	DR	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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	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003		
11	18	151	133	163	165	168	183	159	219	214	245	262	255	278	377	274	109	110	110	132	157	184	227	293	320	225	33	46	57	62	63	65	127	235	274	280	261	222	143		
12	0.1	0.9	0.8	1.2	1.4	1.2	1.3	1.3	1.5	1.7	2.5	2.5	2.5	2.6	2.6	2.7	1.0	1.0	0.8	0.9	1	2	6	9	9	6	2	5	4	5	5	5	5	6	5	5	5	5	4	2	
13	18	152	134	164	166	169	185	161	221	215	248	265	257	280	380	276	110	111	110	133	157	186	232	302	329	231	35	51	61	67	69	70	132	241	279	286	266	226	145		
14	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	1	1	1	1	1	1	1	
15	0	2	2	3	3	3	3	3	3	3	4	4	4	4	6	4	2	2	2	2	2	3	4	5	5	4	1	1	1	1	1	1	2	4	4	4	4	4	2		
16	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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	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
18	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
19	0	3	3	3	3	3	4	3	4	4	5	5	5	6	8	6	2	2	2	2	3	3	4	5	7	7	5	1	1	1	2	2	2	3	5	6	6	6	5	3	
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29	18	155	137	167	170	173	188	164	225	220	253	270	263	286	388	282	112	114	113	135	161	190	237	309	336	236	36	52	63	69	70	72	135	246	285	292	271	230	148		
30																																									
31																																									
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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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
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	0	0	0	0	0	0	0	0	0	0	0
35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
36	0.0	0.3	0.3	0.3	0.3	0.3	0.4	0.3	0.4	0.4	0.5	0.5	0.5	0.6	0.8	0.6	0.2	0.2	0.2	0.3	0.3	0.4	0.5	0.6	0.7	0.5	0.1	0.1	0.2	0.2	0.2	0.2	0.3	0.5	0.6	0.6	0.5	0.5	0.3		
37																																									
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39	1	8	7	9	9	9	10	9	12	12	13	14	14	15	20	15	6	6	6	7	8	10	12	16	17	12	2	2	3	3	3	7	13	15	15	14	12	8			
40	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	1	2	2	3	2	0	1	1	1	1	1	1	2	1	1	1	1	1	
41	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
42	1	8	7	9	9	9	10	9	12	12	14	15	14	16	21	15	6	6	6	7	9	10	14	18	20	14	2	4	4	5	5	5	8	14	16	17	15	13	8		
43																																									
44																																									
45	19	163	144	176	179	182	199	173	237	232	267	285	277	302	409	297	118	120	119	143	169	201	251	327	356	250	38	56	67	74	75	77	144	261	301	308	287	243	156		
46																																									
47																																									
48	11,282	11,807	12,184	12,849	13,705	14,840	15,440	16,158	17,016	16,943	16,921	17,819	18,308	18,979	19,485	19,392	18,865	18,725	18,903	19,453	20,146	20,433	21,095	21,902	22,232	22,547	23,032	22,313	22,580	22,742	23,232	23,963	24,103	24,018	24,326	25,025	25,235	25,788	27,034		
49	3,079	3,222	3,325	3,507	3,740	4,050	4,214	4,410	4,644	4,624	4,618	4,863	4,996	5,180	5,318	5,292	5,149	5,110	5,159	5,309	5,498	5,576	5,757	5,977	6,067	6,153	6,286	6,089	6,162	6,207	6,340	6,540	6,578	6,555	6,639	6,830	6,887	7,038	7,378		
50																																									
51	0.16%	1.31%	1.12%	1.30%	1.24%	1.16%	1.22%	1.01%	1.32%	1.30%	1.49%	1.52%	1.43%	1.51%	1.99%	1.45%	0.59%	0.61%	0.60%	0.70%	0.80%	0.93%	1.12%	1.41%	1.51%	1.05%	0.15%	0.23%	0.28%	0.30%	0.30%	0.30%	0.56%	1.03%	1.17%	1.17%	1.08%	0.89%	0.55%		
52																																									
53																																									
54	51.3	53.4	54.7	57.2	60.6	86.8	92.3	99.4	112.6	112.5	105.2	117.3	114.8	122.9	119.4	110.5	93.4	92.8	89.4	86.3	87.0	86.8	84.9	92.0	93.2	90.0	89.1	89.9	89.7	90.1	89.9	91.9	89.3	84.0	82.0	82.6	83.0	82.8	88.0		
55																																									
56	0.07%	0.56%	0.48%	0.57%	0.54%	0.39%	0.40%	0.32%	0.39%	0.38%	0.47%	0.45%	0.45%	0.46%	0.63%	0.50%	0.23%	0.24%	0.24%	0.30%	0.36%	0.43%	0.58%	0.71%	0.76%	0.55%	0.09%	0.15%	0.17%	0.19%	0.19%	0.19%	0.33%	0.61%	0.70%	0.71%	0.66%	0.56%	0.34%		
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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	Entity emissions from combustion, venting, flaring, and fugitive methane																																																
2	Richard Heede Climate Accountability Institute 18-Oct-20																																																
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10	2000s																			2010s							Cumulative																						
11	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	MtCO2e	Entity emissions	Cumulative	Cumulative	Cumulative	Cumulative																										
12																				(except where noted)	V (V = verified)	(except where noted)	(except where noted)	(except where noted)	(except where noted)	(except where noted)	(except where noted)	(except where noted)	(except where noted)	(except where noted)	(except where noted)	(except where noted)	(except where noted)	(except where noted)	(except where noted)	(except where noted)	(except where noted)	(except where noted)											
13																																																	
14	220	205	218	228	259	261	262	286	325	333	367	440	484	485	502																																		
15	3	4	5	9	12	13	13	11	14	14	20	15	16	16	20																																		
16	223	209	223	237	271	274	274	297	338	347	386	455	499	501	522																																		
17	1	1	1	1	1	1	1	1	1	1	1	1	2	2	2	2																																	
18	4	3	3	4	4	4	4	5	5	6	7	8	8	8	8																																		
19	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1																																		
20	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1																																		
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																		
22	5	4	5	5	6	6	6	7	8	8	9	10	11	11	12																																		
23	227	214	228	242	277	280	281	304	346	355	395	465	510	512	533																																		
24	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1																																		
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0																																		
26	0.5	0.4	0.5	0.5	0.6	0.6	0.6	0.7	0.8	0.8	0.9	1.0	1.1	1.1	1.2																																		
27	12	11	12	12	14	14	14	15	17	18	20	24	26	26	27																																		
28	1	1	1	3	3	4	4	3	4	4	5	4	4	4	5																																		
29	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-																																		
30	13	12	13	15	17	18	18	21	22	25	28	30	31	32																																			
31	240	226	241	257	294	298	298	322	367	377	421	493	541	543	566																																		
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																																		
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																																		
34	0.80%	0.73%	0.75%	0.78%	0.87%	0.89%	0.85%	0.89%	1.00%	1.02%	1.13%	1.32%	1.45%	1.43%	1.46%																																		
35	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																																		
36	0.49%	0.46%	0.47%	0.53%	0.61%	0.63%	0.60%	0.60%	0.67%	0.68%	0.76%	0.84%	0.92%	0.91%	0.95%																																		
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Comment: Rick Heede:

CAI compares entity emissions to the CDIAC / Global Carbon Project (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