Emissions

Summary of emissions from identified gas production

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15-Oct-14

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		Natural Gas Emissions	Notes	1870s 1876	1877	1878	1879	1880s 1880	1881	1882	1883	1884	1885	1886	1887	1888	1889	1890s 1890	1891	1892	1893	1894
		Million tonnes CO2 per billion cubic feet:		0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.05343	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534
1	Abu Dhabi National Oil (ADNOC), UAE	Flaring not included (8 to 80%)																				
2	Anadarko, USA																					
3	Apache, USA	Apache gas-blow-out not included																				
4	Bahrain Petroleum Corporation																					
5	BG Group (British Gas), UK																					
6	BHP Billiton, Australia																					
7	BP, UK																					
8	Canadian Natural Resources, Canada																					
9	Chevron, USA																					
10	CNOOC (China National Offshore Oil), China																					
11	ConocoPhillips, USA																					
12	CONSOL Energy, USA																					
13	Devon Energy, USA																					
14	Ecopetrol, Colombia																					
15	Egyptian General Petroleum, Egypt																					
16	EnCana, Canada																					
17	ENI, Italy																					
18	ExxonMobil, USA																					
19	Former Soviet Union																					
20	Gazprom, Russian Federation																					
21	Hess, USA																					
22	Husky, Canada																					
23	Iraq National Oil Company, Iraq																					
24	Kuwait Petroleum Corp., Kuwait																					
25	Libya National Oil Corp., Libya																					
26	Lukoil, Russian Federation																					
27	Marathon, USA																					
28	Murphy Oil, USA																					
29	Nexen, Canada (acq. By CNOOC)																					
30	National Iranian Oil Company (NIOC), Iran																					
31	Nigerian National Petroleum, Nigeria																					
32	Occidental, USA																					
33	Oil and Gas Corporation, India																					
34	OMV Group, Austria																					
35	Pertamina, Indonesia																					
36	PetroChina (CNPC), China																					
37	Petroleo Brasileiro (Petrobras), Brazil																					
38	Petroleos de Venezuela, Venezuela																					
39	Petroleos Mexicanos (PEMEX), Mexico																					
40	Petroleum Development Oman, Oman																					
41	Petronas, Malaysia																					
42	Polish Oil & Gas, Poland																					
43	Qatar Petroleum, Qatar																					
44	Repsol, Spain																					
45	Rosneft, Russian Federation																					
46	Royal Dutch Shell plc, The Netherlands																					
47	Sasol, South Africa																					
48	Saudi Aramco, Saudi Arabia																					
49	Sinopec, China																					
50	Sonangol, Angola																					
51	Sonatrach, Algeria																					
52	Statoil, Norway	CCS CO2 re-injection not included																				
53	Suncor / Petro-Canada, Canada																					
54	Syrian Petroleum, Syria																					
55	Talisman, Canada																					
56	Total, France																					
57	Yukos, Russian Federation																					
		Emissions from identified gas prod'n (MtCO2/yr)																				
		Emissions from identified gas prod'n (MtC/yr)																				
		CDIAC emissions from annual gas prod'n (MtCO2/yr)											4	7	11	18	11	11	7	7	7	7
		CDIAC emissions from annual gas prod'n (MtC/yr)											1	2	3	5	3	3	2	2	2	2
		Percent of total CDIAC gas emissions identified	CDIAC 1885-2010										0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

1885: first year of CDIAC gas

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	1890s					1900s										1910s									
	1895	1896	1897	1898	1899	1900	1901	1902	1903	1904	1905	1906	1907	1908	1909	1910	1911	1912	1913	1914	1915	1916	1917	1918
	0.0534	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.053434	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343
						0.5	0.7	0.8	0.9	1.0	1.2	1.5	1.6	1.6	1.9	2	2	2	2	2	2	3	3	3
						0.5	0.7	0.8	0.9	1.0	1	2	2	2	2	2	2	2	2	2	2	3	3	3
						0.1	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0.4	1	1	1	1	1	1	1	1	1	1
	7	7	7	7	11	11	15	15	15	15	18	18	18	18	22	26	26	29	29	29	33	37	40	37
	2	2	2	2	3	3	4	4	4	4	5	5	5	5	6	7	7	8	8	8	9	10	11	10
	0.0%	0.0%	0.0%	0.0%	0.0%	4.5%	4.8%	5.4%	6.3%	6.8%	6.8%	8.2%	8.6%	8.5%	8.5%	7.7%	7.7%	7.4%	7.7%	7.8%	7.4%	8.0%	7.6%	7.6%

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	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
8		1920s										1930s										1940s			
9	1919	1920	1921	1922	1923	1924	1925	1926	1927	1928	1929	1930	1931	1932	1933	1934	1935	1936	1937	1938	1939	1940	1941	1942	1943
11	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.05343	0.053434	0.05343	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534
25														1	1	1	1	1	2	2	2	2	3	3	3
29																	1	2	3	4	4	8	11	10	11
33								5	6	6	7	7	8	9	10	11	12	13	14	12	13	14	14	15	16
47	3	3	3	3	4	5	5	5	6	6	8	8	7	6	6	7	8	9	12	8	11	12	13	14	16
103												3	3	3	3	4	4	4	5	5	5	6	6	7	7
127	3	3	3	3	4	5	5	10	11	12	14	18	18	19	20	22	25	29	35	31	36	42	47	49	53
129	1	1	1	1	1	1	1	3	3	3	4	5	5	5	6	6	7	8	10	8	10	11	13	13	15
131	37	40	37	40	51	59	62	70	77	84	103	103	92	88	92	103	110	125	139	136	139	154	154	165	183
133	10	11	10	11	14	16	17	19	21	23	28	28	25	24	25	28	30	34	38	37	38	42	42	45	50
135	7.9%	7.8%	7.1%	7.5%	7.7%	7.7%	7.5%	14.6%	14.6%	14.5%	13.9%	17.2%	19.3%	21.6%	22.1%	21.9%	23.0%	23.6%	25.3%	22.8%	25.6%	27.3%	30.4%	29.6%	29.1%

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	BU	BV	BW	BX	BY	BZ	CA	CB	CC	CD	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR	CS	CT	CU	CV
8							1940s																					
9		1944	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971
11		0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.0534	0.0534	0.0534	0.0534
13																			0	0	1	1	2	2	2	3	3	4
15																								31	28	25	25	24
19																										natural gas vented prior to 1979 (see worksheet)	0.0	0.1	0.1	0.1
21																				2	2	3	3	3	4	4	5	6
23																										0.01	0.20	0
25		4	4	5	5	7	9	10	13	15	18	19	21	26	29	30	33	42	45	49	53	61	66	71	76	82	94	99	102
29		13	14	14	16	20	21	26	29	31	38	45	55	59	67	73	81	93	102	113	122	134	145	167	186	205	225	245	251
33		17	18	24	25	27	28	43	51	52	52	54	56	62	66	67	74	75	76	78	79	82	81	81	79	80	82	85	86
41																											0.02	0.02
45								0.6	1	2	4	5	6	8	9	9	11	12	13	13	13	14	14	16	17	18	21	23	23
47		17	18	19	23	25	28	33	36	40	44	46	50	53	57	58	62	66	69	78	82	93	107	122	133	155	181	209	234
49														24	37	60	74	94	121	150	182	208	244	273	299	322	345	377	401
53																5	5	6	6	6	7	7	8	8	8	9	11	12	13
57																		0.1	0.1	0.1	0.1	0.1	0.1	1	1	1	1	1	1
59																					0.0	0.0	0.0	0.0	1	1	1	1
61																											0.1	0.4
65								2	2	3	4	4	4	5	6	6	6	6	6	6	6	7	6	7	8	8	8	9	9
71														1	1	1	2	2	6	6	6	2	2	3	3	3	5	21	16
73																		0	0	0	0	0	0	0	0	0	0	0	0
75																0.0	0.1	0.2	0	0	0	1	1	1	1	1	1	1	1
77														0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.8	1	1	1	1	1
81																0.2	0.2	0.2	0.3	0.3	0.3	0.4	0.4	0	1	1	1	1	1
85																												

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	CW	CX	CY	CZ	DA	DB	DC	DD	DE	DF	DG	DH	DI	DJ	DK	DL	DM	DN	DO	DP	DQ	DR	DS	DT	DU	DV	DW
	1970s								1980s										1990s					1990s			
	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
	0.0534	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.05343	0.0534	0.0534	0.0534	0.0534
	4	5	5	5	5	8	10	11	14	17	18	17	19	21	21	22	22	25	26	30	31	32	37	33	36	38	46
	23	23	22	22	21	20	20	19	19	18	17	17	16	30	29	31	34	34	36	35	37	37	41	31	45	47	55
									See Apache note for gas well blow-out					2	2	2	3	5	5	6	5	7	9	11	11	12	3
	0.1	0.3	0.4	2	2	3	3	3	5	6	7	7	7	9	10	9	10	10	11	8	9	10	10	15	16	11	11
	8	9	10	12	13	15	14	13	14	15	15	15	16	17	18	18	17	17	17	17	18	22	25	23	23	23	23
	1	1	1	2	2	3	3	3	3	4	5	5	5	5	6	7	10	9	11	10	10	10	10	11	11	12	13
	107	105	97	89	89	89	88	87	79	80	75	72	78	81	79	82	89	108	110	114	113	114	119	122	132	131	149
																		0.2	1	2	3	4	5	6	10	12	13
	263	254	250	231	226	218	209	208	194	178	164	153	171	135	129	134	128	122	131	129	127	123	130	125	128	131	130
																									10	15	15
	88	88	87	81	82	79	80	79	75	71	66	66	66	68	68	67	72	80	81	84	87	89	94	97	106	112	117
																		0.4	16	15	18	24	27	37	37	38	45
																8	9	9	8	8	8	8	10	10	9	11	7
	0.01	0.02	0.01	0.01	0.4	0	1	1	1	1	3	3	4	5	5	6	7	7	8	9	10	11	12	12	13	13	13
																11	13	13	12	13	15	17	19	20	24	26	28
	26	28	28	27	27	25	26	26	27	27	26	25	26	26	28	30	33	33	34	35	33	38	43	43	43	44	45
	249	274	278	270	267	265	264	267	207	187	164	157	179	178	171	181	185	194	190	197	200	204	209	208	220	215	212
	418	445	492	545	606	660	713	767	821	878	945	1,011	1,108	1,213	1,293	1,355	1,453										
																		1,216	1,245	1,239	1,188	1,146	1,127	1,104	1,044	993	1,030
	15	14	14	13	11	12	12	12	12	11	11	10	10	9	9	10	10	11	14	16	18	17	17	17	13	11	11
																	2	5	4	4	5	5	5	6	5	5	5
	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1	4	6	7	5	1	3	3	4	4	4	4	5
	2	3	8	10	11	11	12	12	13	11	8	8	10	9	12	10	12	15	10	1	5	8	9	11	11	11	11
	6	10	10	12	18	16	13	10	7	4	4	5	6	7	7	7	7	8	8	9	9	8	8	8	8	9	8
																									6	7	
	8	8	8	9	8	9	9	8	8	9	10	11	12	20	20	19	22	25	23	21	18	17	18	21	22	24	23
												3	3	4	4	4	4	5	5	4	5	5	5	5	4	5	5
	24	37	42	41	42	35	28	21	13	11	13	17	25	32	29	36	33	41	45	42	50	54	53	60	72	162	184
	0	0	0	0	0	0	0	1	1	2	2	3	3	3	4	4	7	7	7	6	9	9	9	8	8	8	7
	1	1	1	2	2	2	2	2	2	2	3	15	14	14	14	16	16	15	14	14	14	15	15	16	16	16	16
	2	2	1	2	3	3	3	3	3	3	5	6	6	7	10	14	17	20	23	26	30	29	32	37	41	42	35
																										2	2
	1	1	1	2	3	7	11	14	18	18	18	21	28	31	32	35	38	40	45	51	53	55	61	62	66	66	63
																	5	27	28	29	29	31	32	32	42	40	41
	2	2	3	3	3	3	3	3	4	5	6	8	9	10	11	11	11	11	11	12	13	13	14	15	17	18	20
	2	2	3	2	21	24	27	30	33	24	26	25	26	26	29	28	28	33	38	40	38	41	44	45	49	52	58
	34	36	40	42	41	46	50	57	69	79	77	76	74	72	70	68	68	70	71	71	70	70	71	73	82	87	93
	0.1	0.1	0.1	0.1	0.1	0	1	1	1	2	2	4	4	5	6	7	5	5	7	7	8	9	9	9	9	9	9
			1	1	1	2	2	3	3	3	3	8	17	23	28	30	32	28	30	31	39	39	39	49	79	94	45
																											8
	0.3	1	2	3	2	3	4	5	6	5	6	6	7	6	6	6	7	7	9	11	15	17	17	17	18	23	25
																36	42	48	46	25	27	25	26	25	28	30	33
																					8	7	7	7	7	7	9
	116	124	132	129	131	130	126	127	122	117	108	111	115	122	123	128	118	114	126	138	128	133	131	135	165	158	153
	1	2	7	6	7	8	18	21	24	30	23	22	33	38	48	40	48	58	61	64	70	70	77	79	81	83	86
	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
	4	6	8	14	15	16	17	18	19	36	45	64	68	69	69	79	82	124	85	86	98	95	95	98	108	112	110
						1	4	6	7	8	7	7	8	8	7	13	11	12	10	11	11	13	14	14	19	35	51
																15	11	12	11	10	10	11	14	14	18	20	19
	0.3	0.2	0.2	0.2	0.3	0.3	0.4	0.5	0.5	0.3	0.3	0.3	0.3	0.2	0.3	1	1	1	3	4	4	4	4	4	5	6	8
																					4	7	10	13	13	13	15
	0.9	0.6	0.3	0.6	1.0	2	6	9	10	11	10	11	11	43	40	45	50	50	50	53	55	55	60	61	66	66	61
	1,408	1,486	1,553	1,578	1,663	1,716	1,776	1,850	1,838	1,878	1,893	1,988	2,187	2,352	2,437	2,630	2,779	2,683	2,732	2,737	2,753	2,764	2,826	2,855	2,992	3,108	3,184
	384	406	424	431	454	468	485	505	502	512	517	543	597	642	665	718	759	732	746	747	751	754	771	779	817	848	869
	2,052	2,155	2,188	2,213	2,308	2,382	2,492	2,642	2,712	2,770	2,712	2,715	2,961	3,067	3,045	3,276	3,433	3,609	3,734	3,895	4,012	4,137	4,174	4,239	4,430	4,426	4,555
	560	588	597	604	630	650	680	721	740	756	740	741	808	837	831	894	937	985	1,019	1,063	1,095	1,129	1,139	1,157	1,209	1,208	1,243
	68.6%	69.0%	71.0%	71.3%	72.0%	72.0%	71.3%	70.0%	67.8%	67.8%	69.8%	73.2%	73.9%	76.7%	80.0%	80.3%	81.0%	74.3%	73.2%	70.3%	68.6%	66.8%	67.7%	67.3%	67.5%	70.2%	69.9%

Summary of emissions from identified gas production

Coefficient 0.053434 Million tonnes CO2/Billion cubic feet (MtCO2/Bcf)

linked to "Gas Emission Factor Calc"

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15-Oct-14

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Emissions

	2000s										2010s							Sum to 2013	Natural Gas Emissions	
	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	Million tonnes CO2	
	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	0.0534	MtCO2/Bcf	Entity
	55	55	58	64	66	68	68	72	75	74	70	74	76	76	78				1,602	Abu Dhabi National Oil (ADNOC), UAE
	52	39	54	56	56	55	51	34	37	40	43	44	46	49	52				1,621	Anadarko, USA
	13	16	22	21	24	24	25	31	35	32	34	37	44	45	41				526	Apache, USA
	12	21	21	21	22	22	25	20	22	23	24	24	19	19	19				511	Bahrain Petroleum Corporation
	23	23	24	28	34	38	43	51	47	52	54	55	56	57	52				1,116	BG Group (British Gas), UK
	14	14	15	15	16	17	19	19	19	20	19	20	22	44	47				493	BHP Billiton, Australia
	118	148	168	170	168	166	164	164	159	163	165	164	127	144	138				6,116	BP, UK
	14	15	18	24	25	27	28	29	33	29	26	24	24	23	22				416	Canadian Natural Resources, Canada
	129	125	128	121	117	107	83	97	98	100	97	98	96	99	101				8,762	Chevron, USA
	14	9	10	11	12	13	18	14	15	17	17	24	25	23	23				284	CNOOC (China National Offshore Oil), China
	130	110	104	113	109	111	101	97	99	95	135	124	88	83	79				5,676	ConocoPhillips, USA
		1	2	2	2	3	3	3	3	5	5	7	8	8	9				62	CONSOL Energy, USA
	40	49	43	49	46	47	44	43	46	50	52	50	51	50	47				963	Devon Energy, USA
	10	6	6	11	12	7	7	7	8	9	10	11	11	12	12				245	Ecopetrol, Colombia
	14	18	24	24	29	31	41	43	45	57	60	59	59	58	58				764	Egyptian General Petroleum, Egypt
	32	39	44	49	49	58	63	66	70	75	55	62	66	58	54				1,054	EnCana, Canada
	46	51	60	64	68	69	77	77	80	86	85	89	73	80	75				2,189	ENI, Italy
	207	208	209	214	210	209	201	205	211	215	225	237	257	240	231				11,427	ExxonMobil, USA
																			17,937	Former Soviet Union
	1,032	990	969	987	1,023	1,046	1,049	1,049	1,035	1,037	871	960	990	943	946				26,262	Gazprom, Russian Federation
	13	13	16	15	13	11	11	12	12	13	13	13	12	12	11				643	Hess, USA
	5	7	11	11	12	13	13	13	12	12	11	10	12	11	10				213	Husky, Canada
	4	4	3	3	1	2	3	3	7	9	10	10	9	9	9				162	Iraq National Oil Company, Iraq
	10	14	13	17	18	17	19	20	20	27	23	22	23	17	18				537	Kuwait Petroleum Corp., Kuwait
	7	8	8	8	7	11	15	17	20	21	21	22	10	16	16				443	Libya National Oil Corp., Libya
	7	9	6	7	7	9	11	26	26	32	28	35	34	38	38				327	Lukoil, Russian Federation
	24	24	25	24	23	20	18	17	18	20	19	17	17	17	17				842	Marathon, USA
	5	4	5	6	4	3	2	1	1	1	4	7	9	10	8				140	Murphy Oil, USA
																				Nexen, Canada (acq. By CNOOC)
	198	114	125	142	87	139	171	172	159	188	182	259	323	302	298				4,181	National Iranian Oil Company (NIOC), Iran
	7	7	7	19	17	28	43	45	46	51	57	45	49	45	45				620	Nigerian National Petroleum, Nigeria
	17	17	18	16	13	16	9	15	14	18	19	23	24	25	24				534	Occidental, USA
	36	46	48	48	49	48	43	45	47	48	53	53	48	48	48				1,122	Oil and Gas Corporation, India
	3	3	3	4	5	6	6	17	17	16	16	16	16	16	15				161	OMV Group, Austria
	73	68	61	12	18	21	22	22	22	23	27	28	30	30	30				1,336	Pertamina, Indonesia
	46	35	40	44	50	59	75	91	109	125	139	156	128	137	150				1,720	PetroChina (CNPC), China
	22	27	28	30	37	40	41	42	43	47	46	48	50	52	53				865	Petroleo Brasileiro (Petrobras), Brazil
	51	52	57	50	43	48	50	46	51	49	48	51	52	53	53				1,561	Petroleos de Venezuela, Venezuela
	93	91	88	86	88	89	94	104	118	135	137	137	129	125	124				3,734	Petroleos Mexicanos (PEMEX), Mexico
	6	14	22	26	27	31	31	40	43	42	44	48	60	62	64				679	Petroleum Development Oman, Oman
	98	77	86	97	101	101	104	103	112	118	119	121	147	152	159				2,327	Petronas, Malaysia
	8	8	8	8	8	8	8	8	8	8	8	8	8	8	9				128	Polish Oil & Gas, Poland
	29	37	35	38	41	50	59	64	79	93	108	140	169	180	180				1,536	Qatar Petroleum, Qatar
	25	43	40	46	59	66	67	66	61	56	51	49	22	21	23				1,084	Repsol, Spain
	10	11	12	13	15	17	25	26	30	23	24	23	24	31	79				407	Rosneft, Russian Federation
	156	161	177	181	173	172	161	163	160	167	165	181	175	184	188				6,963	Royal Dutch Shell plc, The Netherlands
								4	4	4	4	4	5	5	5				36	Sasol, South Africa
	86	94	104	114	127	104	153	160	156	163	167	183	193	209	215				3,337	Saudi Aramco, Saudi Arabia
	4	4	9	10	10	11	12	14	15	16	16	24	28	32	35				239	Sinopec, China
	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1				22	Sonangol, Angola
	114	123	123	142	152	159	170	176	177	176	157	159	146	146	147				3,930	Sonatrach, Algeria
	55	37	39	47	52	58	69	71	72	78	81	81	77	93	84				1,273	Statoil, Norway
	21	20	17	20	21	21	20	18	16	16	9	11	7	6	4				390	Suncor / Petro-Canada, Canada
	8	8	7	8	8	9	7	8	7	7	8	10	9	8	8				171	Syrian Petroleum, Syria
	18	19	20	20	21	25	26	26	25	24	25	27	29	31	28				437	Talisman, Canada
	62	73	79	88	93	106	107	105	107	113	104	125	119	115	121				2,348	Total, France
		3	3	5	11	11	10												41	Yukos, Russian Federation
	3,273	3,214	3,324	3,451	3,502	3,650	3,784	3,883	3,951	4,118	3,991	4,311	4,329	4,357	4,400				132,514	Emissions from identified gas prod'n (MtCO2/yr)
	893	877	907	942	956	996	1,033	1,060	1,078	1,124	1,089	1,176	1,182	1,189	1,201				36,164	Emissions from identified gas prod'n (MtC/yr)
	4,654	4,719	4,807	4,925	5,097	5,265	5,423	5,588	5,760	5,976	5,808	6,236	6,339	6,491	6,563				195,831	CDIAC emissions from annual gas prod'n (MtCO2/yr)
	1,270	1,288	1,312	1,344	1,391	1,437	1,480	1,525	1,572	1,631	1,585	1,702	1,730	1,772	1,791				53,445	CDIAC emissions from annual gas prod'n (MtC/yr)
	70.3%	68.1%	69.2%	70.1%	68.7%	69.3%	69.8%	69.5%	68.6%	68.9%	68.7%	69.1%	68.3%	67.1%	67.0%				67.7%	Percent of total CDIAC gas emissions identified

Total emissions from identified gas production 1900-2013 (million tonnes CO2) 132,514

Cell: EN2
Comment: Rick Heede:
See the "Gas Emissions Factor Calc" worksheet for details, which accounts for carbon content, heating values, and final emission factor per billion cubic feet (Bcf) of gas production, including deducting for non-energy uses of natural gas (see "non-energy uses" worksheet).
Ancillary emissions of fugitive methane, vented CO2, and CO2 from flaring are estimated and applied in the summary entity worksheet.

Cell: C13
Comment: Rick Heede:
ADNOC details both gas production and utilization rates from 1974 through 1994 in its annual reports; see ADNOC gas production worksheet for details.

Cell: C17
Comment: Rick Heede:
CMS estimated the CO2-equivalent of Apache Corporation's 1981-1983 gas blow-out (assuming all of the gas was vented and none of it was flared). The company reported a blow rate of 35 million cf per day, which we use as the average over the sixteen month event: 35 million cf/d = 0.0168 Tcf over 30d*16months = 0.01858 QBtu (at 1,106 Btu per cf for wet gas), which, at 14.92 MtC/QBtu, equals 0.2772 MtC (1.01581 MtCO2) and thus (at CH4 at 23xCO2) = 6.3762 MtC-eq (23.3636 MtCO2-eq). This represents a significant additional impact of Apache's total estimated emissions from natural gas and oil production. See cell comment at Apache Corporation worksheet for details.

This amount is added to Apache's estimated emissions in 1982.

Cell: ES17
Comment: Rick Heede:
26Jan06 estimate of the CO2-equiv of the Apache's blow-out (assuming none of it was flared, and using only 50 percent of the 35 million cf per day): 17.5 Mcf = 0.0084 Tcf over 30d*16 months = 0.00929 QBtu (at 1,106 Btu per cf for wet gas), which, at 14.92 MtC/QBtu, equals 0.139 MtC (0.508 MtCO2) and thus (at CH4 at 23xCO2) = 3.19 MtC-eq (11.7 MtCO2-eq). These emissions are NOT included in this summary.

Cell: ES19
Comment: Rick Heede (Jan10):
Bahrain: Banagas annual emissions of CO2-equivalent if the reported 3 million SCM per of natural gas vented to the atmosphere (prior to 1979 only) is estimated by CMS to total 56.3 million tonnes of CO2e per year (MtCO2e/yr). If the natural gas (assumed to be all methane, since CMS does not have data on entrained CO2 and other entrained gases) is assumed to be flared rather than vented, then emissions would total 2.25 MtCO2/yr.

Cell: ES131
Comment: Rick Heede:
CDIAC data in million tonnes of carbon converted to CO2, which is 3.664191 times Carbon if carbon and oxygen isotopes are accounted for, per Kevin Baumert May05, then at World resources Institute: CO2 conversion is, precisely: C=12.0107 + O=15.9994 x 2 = 44.0095/12.0107 = 3.664191.

Cell: ES133
Comment: Rick Heede:
From the associated "Methods" paper: CDIAC's emissions are estimated for each fuel using the following formula: CO2 = (P) (FO) (C).
From primary and secondary gas fuel production and trade:
CO2 = CO2 emissions in 10^6 metric tonnes of carbon;
P = annual production or consumption in thousands of 10^12 joules;
FO = 0.98 ± 1%;
C = carbon content in 10^6 tonnes per thousand 10^12 joules = 0.0137 ± 2%.
Boden, T.A., G. Marland, and R.J. Andres. 2009. Global, Regional, and National Fossil-Fuel CO2 Emissions. Carbon Dioxide Information Analysis Center, Oak Ridge National Laboratory, U.S. Department of Energy, Oak Ridge, Tenn., U.S.A. doi 10.3334/CDIAC/00001.
Jan10: CMS added CDIAC extrapolations for gas emissions from their dataset "Preliminary 2007-08 Global & National Estimates by Extrapolation" (undated) to the main file cited above.
Updated emissions data for 2011-2013 from Global Carbon Project/CDIAC Global emissions 1959-2013, on 22Sep14.

Cell: ES138
Comment: Rick Heede:

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