

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK	AL	AM	AN	AO
1		Royal Dutch Shell, Netherlands (acq. BG Feb 2016)			Entity emissions from combustion, venting, flaring, and fugitive methane																																				
2					Richard Heede Climate Accountability Institute 26-Jan-20																																				
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**Entity emissions from combustion, venting, flaring, and fugitive methane**

Richard Heede  
Climate Accountability Institute  
26-Jan-20

**Royal Dutch Shell, Netherlands (acq. BG Feb 2016)**

	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			
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	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			
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54	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			
55	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			
56																																											
57	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.01%	0.02%	0.02%	0.03%	0.08%	0.06%	0.02%	0.01%	0.02%	0.03%	0.03%	0.03%	0.02%	0.07%	0.09%	0.07%	0.08%	0.10%	0.10%	0.20%	0.30%	0.11%	0.07%	0.40%	0.38%	0.19%	0.39%	0.49%	0.70%	0.80%	1.14%	1.05%			
58																																											
59																																											
60	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			
61																																											
62	-	-	-	-	-	-	-	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
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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 26-Jan-20																																				
3	<b>Royal Dutch Shell, Netherlands (acq. BG Feb 2016)</b>																																				
4	<b>2000s</b>																		<b>2010s</b>										<b>Cumulative</b>								
5	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	MtCO2e		<b>Entity emissions</b>							Cumulative		Cumulative		Cumulative		Cumulative				
6	(except where noted)																		(V = verified)									(except where noted)		(except where noted)		(except where noted)		(except where noted)			
7	<b>Entity CO2 emissions</b>																																				
8	kg CO2/TCO2																																				
9	to 2015 to 2016 to 2017 to 2018																																				
10	305	284	275	257	240	239	241	226	221	209	201	205	250	247	244	V	22,987	Oil & NGLs: Shell	MtCO2	linked	22,245	22,495	22,742	22,987													
11	17	18	19	24	24	25	24	22	24	26	30	40	V	433	Oil & NGLs: BG	MtCO2	linked	433	433	433	433																
12	323	302	294	281	265	263	265	248	245	235	231	245	250	247	244	V	23,419	Oil & NGLs: RDS + BG	MtCO2	linked	22,678	22,927	23,175	23,419													
13	172	161	163	160	167	165	181	175	184	188	181	163	208	208	211	V	7,934	Natural Gas: Shell	MtCO2	linked	7,307	7,515	7,723	7,934													
14	38	43	51	47	52	54	55	56	57	52	45	48	V	1,209	Natural Gas: BG	MtCO2	linked	1,209	1,209	1,209	1,209																
15	210	204	214	207	219	219	237	231	241	239	226	211	208	208	211	V	9,142	Natural Gas: RDS + BG	MtCO2	linked	8,516	8,724	8,932	9,142													
16	533	506	508	489	483	483	502	479	486	474	457	456	457	456	455	V	978	Coal	MtCO2	linked	978	978	978	978													
17	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	V	33,540	Combustion total	MtCO2	sum	32,172	32,629	33,085	33,540													
18	5	5	5	4	4	4	4	4	4	4	4	4	4	4	4		90	Oil & NGLs: Venting	MtCO2	calculated	87	88	89	90													
19	12	12	12	12	13	13	14	13	14	14	13	12	12	12	12		373	Oil & NGLs: Flaring	MtCO2	calculated	362	366	370	373													
20	6	6	6	6	6	6	7	7	7	7	6	6	6	6	6		524	Own fuel use	MtCO2	calculated	488	500	511	524													
21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		261	Natural Gas: Venting	MtCO2	calculated	243	249	255	261													
22	25	24	25	24	24	24	26	25	26	26	24	23	23	23.11	23		16	Natural Gas: Flaring	MtCO2	calculated	15	15	16	16													
23	558	530	533	512	508	507	528	504	512	500	481	479	481	479	478	V	1,263	Venting & Flaring total	MtCO2	sum	1,194	1,217	1,240	1,263													
24	100	97	100	96	99	99	106	102	106	104	99	95	94	94	95		-	Cement	MtCO2	linked																	
25	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	V	34,803	Total CO2 emissions	MtCO2	sum	33,366	33,846	34,325	34,803													
26	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2		-																				
27	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3																						
28	17	16	16	15	14	14	13	13	13	12	13	13	13	13	13																						
29	58	56	59	57	60	61	65	64	67	66	62	58	57	58	58																						
30	76	73	75	73	75	75	80	77	80	79	75	72	71	71	71																						
31	633	603	608	585	582	582	607	582	592	578	556	551	551	550	550	V	45	<b>Entity methane emissions</b>																			
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	V	90	Methane: Oil & NGLs	MtCH4	calculated	44	44	45	45													
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	V	4	Methane: Natural Gas	MtCH4	calculated	84	88	90	90													
34	1.97%	1.81%	1.76%	1.65%	1.59%	1.61%	1.60%	1.48%	1.48%	1.43%	1.37%	1.36%	1.34%	1.31%	V	139	Methane: Coal	MtCH4	calculated	4	4	4	4														
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			Total methane emissions	MtCH4	sum	132	137	139	139													
36	2.94%	2.74%	2.72%	2.60%	2.64%	2.68%	2.71%	2.52%	2.52%	2.44%	2.26%	2.17%	2.14%	2.11%	2.08%			<b>Entity methane emissions</b>																			
37	633	603	608	585	582	582	607	582	592	578	556	551	551	550	550	V	1,261	Methane: Oil & NGLs	MtCO2e	calculated	1,221	1,235	1,248	1,261													
38	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	V	2,529	Methane: Natural Gas	MtCO2e	calculated	2,355	2,413	2,470	2,529													
39	1.97%	1.81%	1.76%	1.65%	1.59%	1.61%	1.60%	1.48%	1.48%	1.43%	1.37%	1.36%	1.34%	1.31%	V	111	Methane: Coal	MtCO2e	calculated	111	111	111	111														
40	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		3,901	Total methane emissions	MtCO2e	sum	3,687	3,758	3,829	3,901													
41	2.94%	2.74%	2.72%	2.60%	2.64%	2.68%	2.71%	2.52%	2.52%	2.44%	2.26%	2.17%	2.14%	2.11%	2.08%	V	38,704	<b>Total attributed emissions</b>	MtCO2e	sum	37,053	37,605	38,154	38,704													
42	633	603	608	585	582	582	607	582	592	578	556	551	551	550	550			<b>CDIAC CO2 emissions</b>	MtCO2	1,505,476	1,540,727	1,576,408	1,612,851														
43	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			Oil, Natural Gas, Coal, Flaring, & Cement	Mt Carbon																		
44	1.97%	1.81%	1.76%	1.65%	1.59%	1.61%	1.60%	1.48%	1.48%	1.43%	1.37%	1.36%	1.34%	1.31%			Entity percent of total CO2 emissions	Percent	2.22%	2.20%	2.18%	2.16%															
45	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	V	6,971	<b>CDIAC/EDGAR methane</b>	Tg CH4	6,610	6,728	6,848	6,971														
46	2.94%	2.74%	2.72%	2.60%	2.64%	2.68%	2.71%	2.52%	2.52%	2.44%	2.26%	2.17%	2.14%	2.11%	2.08%			Entity percent of total CH4 emissions	Percent	1.99%	2.03%	2.03%	2.00%														

**Cell:** FA14

**Comment:** Rick Heede:

"Anglo American Pty Ltd has announced it has acquired the Shell Coal assets. Price is reported to be between US\$850 to US\$900 million. While this includes all the coal mines, the 50% stake in the new Callide power station is being marketed separately."  
[www.energyminerals.com.au/news3.html](http://www.energyminerals.com.au/news3.html), undated.

**Cell:** FY54

**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, Melke Becker, Laurent Bopp, Erik Buitenhuis, Naveen Chandra, Frédéric Chevallier, Louise P. Chini, Kim I. Currie, Richard A. Feely, Marion Gehlen, Dennis Gilfillan, Thanos Gkritzalis, Daniel S. Goll, Nicolas Gruber, Søren 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 Zaehle. Global Carbon Budget 2019, Earth Syst. Sci. Data, 2019.  
<https://doi.org/10.5194/essd-11-1783-2019>  
 See also: Gilfillan, D., Marland, G., Boden, T. and Andres, R.: Global, Regional, and National Fossil-Fuel CO2 Emissions.

**Cell:** FY60

**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)