

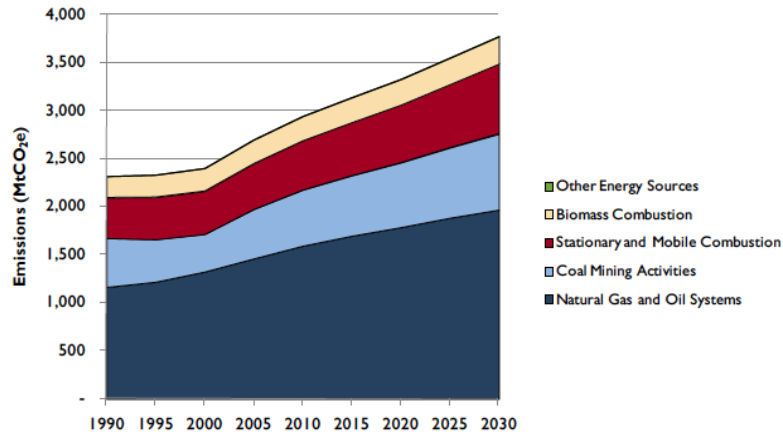
# General background on methane emissions: EDGAR, CDIAC, EPA, other sources

Background calculations on ancillary emissions of methane and carbon dioxide

Heede, CMS  
15-Jan-13

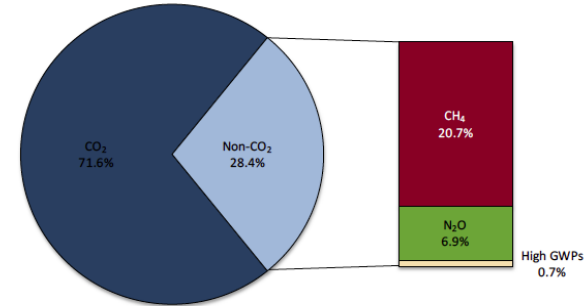
Copyright Climate Mitigation Services

**Exhibit 3-1: Total Non-CO<sub>2</sub> Emissions from the Energy Sector, by Source (MtCO<sub>2</sub>e)**



EPA (2011), page 3-2.

**Exhibit 1-1: Contribution of Anthropogenic Greenhouse Gas Emissions to Global Radiative Forcing (W/m<sup>2</sup>)**



Source: IPCC, 2007: Table 2.1

EPA (2011), page 1-2.

**Table 2-2: Comparison of non-CO<sub>2</sub> Emission Estimates in this Report (EPA 2011) to Other Global Inventories (MtCO<sub>2</sub>e)**

Source	2000	2010	2020	2030
EPA (2011)	10,060	11,702	13,337	15,800
EMF-22 (2009) <sup>a</sup>	7,164-10,826	8,538-12,857	7,891-14,758	8,685-17,188
CCSP SAP 2.1 (2007) <sup>b</sup>	9,438-11,327	9,939-12,687	11,348-15,205	12,268-17,064
EDGAR 4.1 2010 <sup>c</sup>	9,804 <sup>d</sup>	NE	NE	NE

Codes: NE indicates "not estimated."

Notes:

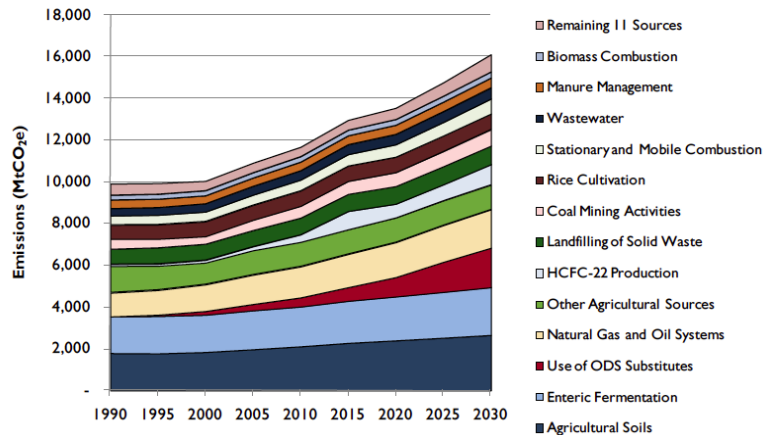
<sup>a</sup> Energy Management Forum 22 (EMF-22) Analysis (EMF-22, 2009).

<sup>b</sup> CCSP Synthesis and Assessment Product 2.1 - Scenarios of Greenhouse Gas Emissions and Atmospheric Concentrations (CCSP, 2007) - Ranges depicted include estimates for the three reference scenarios (IGSM, MERGE, and MINICAM).

<sup>c</sup> Emission Database for Global Atmospheric Research (EDGAR) 4.1 (EC-JRC, 2010).

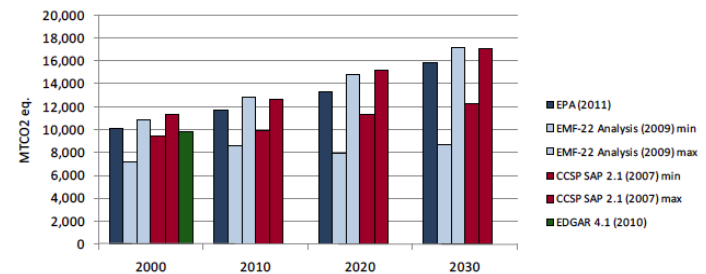
<sup>d</sup> 97 metric tons of C<sub>2</sub>F<sub>16</sub> not included in total; unknown GWP.

**Exhibit 2-4: Global Non-CO<sub>2</sub> Emissions, by Source (MtCO<sub>2</sub>e)**



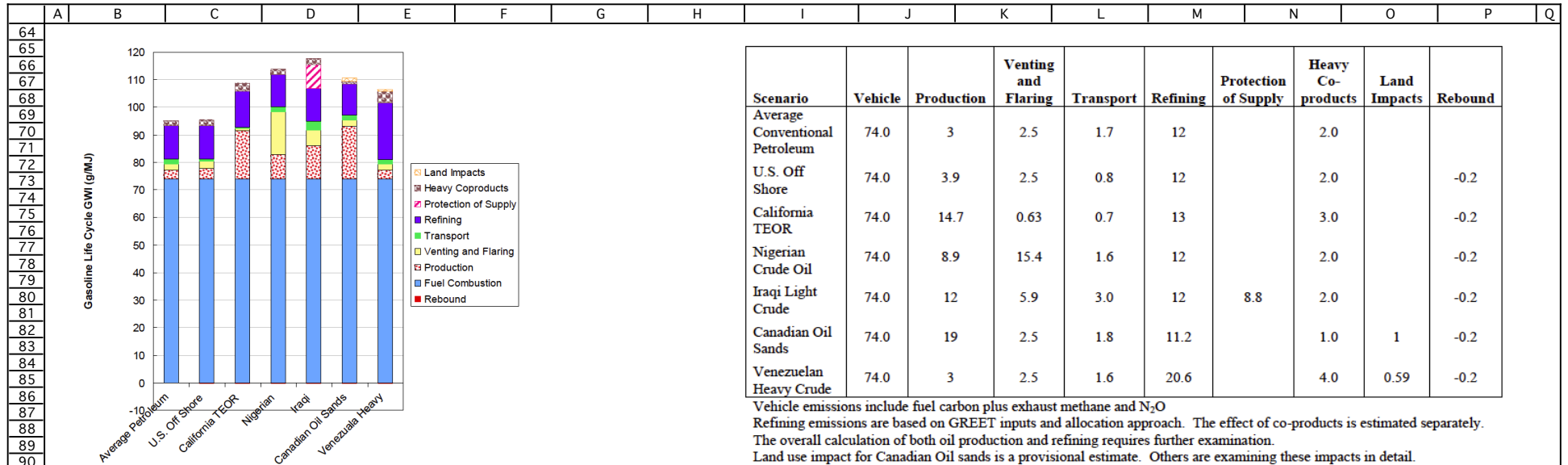
US EPA (2011) Draft Global Anthropogenic Non-CO2 Greenhouse Gas Emissions: 1990-2030, Offc Atm Programs, Aug11, 182 pp, page 2-7.

**Exhibit 2-5: Comparison of non-CO<sub>2</sub> Emission Estimates in EPA (2011) to Other Global Inventories (MtCO<sub>2</sub>e)**



EPA (2011), page 2-8.

General Non-CO2 data



Scenario	Vehicle	Production	Venting and Flaring	Transport	Refining	Protection of Supply	Heavy Co-products	Land Impacts	Rebound
Average Conventional Petroleum	74.0	3	2.5	1.7	12		2.0		
U.S. Off Shore	74.0	3.9	2.5	0.8	12		2.0		-0.2
California TEOR	74.0	14.7	0.63	0.7	13		3.0		-0.2
Nigerian Crude Oil	74.0	8.9	15.4	1.6	12		2.0		-0.2
Iraqi Light Crude	74.0	12	5.9	3.0	12	8.8	2.0		-0.2
Canadian Oil Sands	74.0	19	2.5	1.8	11.2		1.0	1	-0.2
Venezuelan Heavy Crude	74.0	3	2.5	1.6	20.6		4.0	0.59	-0.2

Vehicle emissions include fuel carbon plus exhaust methane and N<sub>2</sub>O  
 Refining emissions are based on GREET inputs and allocation approach. The effect of co-products is estimated separately.  
 The overall calculation of both oil production and refining requires further examination.  
 Land use impact for Canadian Oil sands is a provisional estimate. Others are examining these impacts in detail.

Life Cycle Associates (2009) Assessment of Direct and Indirect GHG Emissions Associated with Petroleum Fuels, Stefan Unnasch, Ralf Wiesenberg, & Susan Tarka Sanchez, for New Fuels Alliance, 94 pp., www.lifecycleassociates.com

Life Cycle Associates (2009), page 61.  
 Table 21. Summary of GHG Emissions for Different Crude Oil Production Scenarios (g/CO<sub>2</sub>e/MJ).

Table 1

**Global emissions of methane 1990-2030**

US EPA (2011) Draft Global Anthropogenic Non-CO<sub>2</sub> Greenhouse Gas Emissions: 1990-2030, Offc Atm Programs, Aug11, 182 pp.  
 www.epa.gov/nonco2/econ-inv/international.html

Country	MtCO <sub>2</sub> e									MtCH <sub>4</sub>	All Sources: Waste Energy Industrial Processes Agriculture
	1990	1995	2000	2005	2010	2015	2020	2025	2030	2010	
Afghanistan	9.39	9.91	11.87	13.02	14.58	16.25	18.01	19.93	21.99	0.69	
Albania	3.60	2.54	2.41	2.14	2.04	2.04	2.05	2.06	2.07	0.10	
Algeria	18.28	19.54	23.10	27.06	29.07	34.12	36.84	38.47	40.01	1.38	
Andorra	0.02	0.03	0.03	0.04	0.05	0.06	0.06	0.07	0.07	0.00	
Angola	63.94	62.19	66.28	87.34	125.34	133.44	130.45	134.80	142.82	5.97	
Antigua and Barbuda	0.11	0.11	0.12	0.13	0.14	0.15	0.16	0.17	0.18	0.01	
Argentina	80.40	85.22	87.83	92.46	96.79	102.06	106.62	111.31	116.11	4.61	
Armenia	3.21	2.95	2.90	3.02	3.24	3.47	3.58	3.66	3.69	0.15	
Australia	122.09	116.11	123.86	112.89	116.57	122.56	127.39	132.97	139.18	5.55	
Austria	9.24	8.57	7.65	7.19	6.93	6.95	6.97	7.00	7.02	0.33	
Azerbaijan	15.18	11.36	14.14	18.40	31.35	38.67	41.26	42.97	45.44	1.49	
Bahamas	0.16	0.17	0.18	0.19	0.21	0.22	0.23	0.25	0.26	0.01	
Bahrain	2.64	3.00	3.37	3.71	4.06	4.40	4.62	4.88	5.05	0.19	
Bangladesh	37.86	39.42	41.97	44.09	47.51	50.96	55.38	60.40	65.97	2.26	
Barbados	1.73	1.86	1.91	1.92	1.96	2.00	2.03	2.05	2.07	0.09	
Belarus	16.16	12.35	12.16	13.97	14.78	14.48	14.32	14.11	13.85	0.70	
Belgium	9.98	9.54	8.49	6.93	6.60	6.56	6.51	6.45	6.37	0.31	
Belize	5.06	5.75	6.53	7.39	8.39	9.24	10.09	10.93	11.73	0.40	
Benin	4.90	4.55	5.40	5.84	6.30	6.74	7.17	7.63	8.10	0.30	
Bhutan	0.57	0.59	0.73	0.61	0.65	0.71	0.77	0.83	0.91	0.03	
Bolivia	19.70	19.17	18.23	25.75	27.15	28.52	29.73	31.12	32.47	1.29	
Bosnia and Herzegovina	3.18	3.04	4.49	4.51	4.68	4.83	4.93	5.04	5.17	0.22	
Botswana	5.04	4.69	3.33	3.35	3.58	3.81	3.96	4.12	4.25	0.17	
<b>Brazil</b>	<b>283.29</b>	<b>285.78</b>	<b>280.69</b>	<b>413.25</b>	<b>383.76</b>	<b>398.54</b>	<b>403.83</b>	<b>406.54</b>	<b>408.52</b>	<b>18.27</b>	
Brunei	9.06	9.73	10.84	11.79	11.57	12.53	13.03	13.29	14.09	0.55	
Bulgaria	20.28	16.07	13.70	11.99	11.35	11.05	10.72	10.40	10.10	0.54	

## General Non-CO2 data

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
128		Burkina Faso		4.66	5.49	6.64	7.99	9.45	10.54	11.51	12.59	13.77					0.45
129		Burma		86.19	94.30	71.74	81.06	87.06	90.84	95.11	99.69	104.65					4.15
130		Burundi		1.04	1.06	1.03	1.10	1.32	1.42	1.51	1.61	1.73					0.06
131		Cambodia		18.57	20.41	19.82	26.86	26.62	27.62	27.38	27.28	27.31					1.27
132		Cameroon		12.08	11.36	12.31	10.39	10.76	11.38	11.95	12.51	13.07					0.51
133		Canada		76.63	107.01	99.63	104.53	110.79	120.35	125.71	132.47	138.95					5.28
134		Cape Verde		0.09	0.10	0.11	0.13	0.15	0.16	0.18	0.19	0.20					0.01
135		Central African Republic		43.92	41.57	30.61	29.20	29.92	30.59	31.25	31.96	32.70					1.42
136		Chad		13.04	13.73	16.61	24.44	25.04	26.74	28.09	29.65	30.96					1.19
137		Chile		11.98	12.80	12.93	13.70	13.97	14.71	15.41	16.15	16.91					0.67
138		<b>China</b>		<b>727.13</b>	<b>798.66</b>	<b>767.78</b>	<b>878.97</b>	<b>924.52</b>	<b>967.18</b>	<b>1,016.17</b>	<b>1,073.10</b>	<b>1,116.10</b>					<b>44.02</b>
139		Colombia		47.52	51.01	50.96	58.19	62.51	67.25	71.85	75.30	80.69					2.98
140		Comoros		0.09	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10					0.00
141		Congo (Brazzaville)		3.89	3.24	3.17	2.96	3.05	3.16	3.29	3.42	3.55					0.15
142		Congo (Kinshasa)		98.94	81.92	64.36	58.40	60.31	62.14	64.13	66.31	68.58					2.87
143		Cook Islands		0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02					0.00
144		Costa Rica		3.33	3.76	3.66	3.32	3.97	4.20	4.37	4.55	4.71					0.19
145		Cote d'Ivoire		23.30	24.65	29.84	29.12	31.39	33.75	36.21	38.77	41.29					1.49
146		Croatia		3.46	2.89	2.71	3.17	3.00	2.92	2.87	2.86	2.86					0.14
147		Cuba		12.26	9.41	8.59	7.84	8.02	8.32	8.67	9.19	9.77					0.38
148		Cyprus		0.47	0.53	0.57	0.64	0.66	0.70	0.75	0.79	0.84					0.03
149		Czech Republic		18.53	13.67	12.11	11.62	11.19	11.13	11.11	11.07	11.08					0.53
150		Denmark		5.72	6.00	5.91	5.69	5.71	5.70	5.71	5.79	5.81					0.27
151		Djibouti		0.25	0.29	0.33	0.33	0.35	0.39	0.44	0.50	0.55					0.02
152		Dominica		0.07	0.07	0.07	0.07	0.07	0.07	0.08	0.08	0.08					0.00
153		Dominican Republic		3.53	5.35	5.66	5.97	6.59	7.07	7.47	7.87	8.26					0.31
154		Ecuador		9.26	10.72	10.32	11.09	11.30	11.91	12.47	13.08	13.65					0.54
155		Egypt		22.01	25.03	27.69	31.15	35.36	38.56	41.87	45.36	48.99					1.68
156		El Salvador		3.40	3.49	3.55	3.94	4.34	4.61	4.83	5.07	5.31					0.21
157		Equatorial Guinea		0.09	0.29	6.40	14.61	14.98	15.64	16.32	17.49	18.11					0.71
158		Eritrea		2.03	2.02	2.79	2.68	2.84	3.13	3.37	3.62	3.87					0.14
159		Estonia		3.16	2.00	2.02	2.08	2.11	2.00	1.98	1.96	1.94					0.10
160		Ethiopia		44.27	43.96	48.89	58.72	71.48	79.31	85.89	92.69	99.62					3.40
161		Fiji		0.44	0.51	0.49	0.48	0.50	0.51	0.52	0.53	0.54					0.02
162		Finland		6.33	6.12	5.45	4.52	4.44	4.47	4.49	4.51	4.51					0.21
163		France		65.44	65.67	61.45	54.98	54.09	53.99	53.87	53.76	53.55					2.58
164		Gabon		11.62	15.38	13.35	12.18	11.80	12.62	12.54	12.70	12.88					0.56
165		Gambia		3.21	3.82	4.47	5.18	5.88	6.62	7.39	8.20	9.03					0.28
166		Georgia		11.13	6.83	6.89	6.99	6.28	6.29	6.33	6.38	6.43					0.30
167		Germany		96.12	77.82	61.21	46.24	40.61	37.53	35.27	33.72	32.17					1.93
168		Ghana		7.67	8.73	10.13	10.34	11.35	12.06	12.82	13.67	14.58					0.54
169		Greece		9.07	9.08	8.97	8.14	7.90	7.50	7.10	6.89	6.70					0.38
170		Grenada		1.44	1.50	1.56	1.60	1.65	1.70	1.73	1.76	1.77					0.08
171		Guatemala		5.05	5.54	19.40	8.80	9.96	10.57	11.11	11.69	12.26					0.47
172		Guinea		6.89	7.26	7.27	8.30	9.06	9.55	10.00	10.51	11.10					0.43
173		Guinea-Bissau		0.78	0.84	0.90	0.98	1.08	1.15	1.22	1.28	1.36					0.05
174		Guyana		1.23	1.36	1.22	1.58	1.54	1.58	1.56	1.54	1.53					0.07
175		Haiti		2.71	2.91	3.53	3.70	3.83	4.08	4.27	4.48	4.69					0.18
176		Holy See		0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					0.00
177		Honduras		6.41	6.57	6.42	7.97	8.58	9.31	9.97	10.63	11.27					0.41
178		Hungary		11.27	9.31	9.46	8.90	8.21	8.12	8.05	8.01	7.97					0.39
179		Iceland		0.45	0.45	0.45	0.44	0.50	0.53	0.56	0.59	0.62					0.02
180		<b>India</b>		<b>576.22</b>	<b>599.31</b>	<b>614.37</b>	<b>626.94</b>	<b>660.76</b>	<b>684.51</b>	<b>712.39</b>	<b>742.68</b>	<b>772.35</b>					<b>31.46</b>
181		<b>Indonesia</b>		<b>189.36</b>	<b>199.58</b>	<b>198.99</b>	<b>220.04</b>	<b>234.56</b>	<b>247.14</b>	<b>258.84</b>	<b>271.30</b>	<b>287.39</b>					<b>11.17</b>
182		Iran		46.49	53.47	57.58	66.95	69.86	71.07	71.88	74.76	78.87					3.33
183		Iraq		7.87	8.15	8.82	9.81	10.85	12.15	13.60	15.14	16.76					0.52
184		Ireland		13.48	13.80	13.54	13.25	12.82	12.70	12.61	12.64	12.63					0.61
185		Israel		7.37	8.83	9.33	6.11	6.74	7.27	7.72	8.18	8.58					0.32
186		Italy		41.96	44.27	44.30	39.67	37.06	36.69	36.59	36.41	36.26					1.76
187		Jamaica		1.19	1.29	1.23	1.21	1.30	1.31	1.31	1.31	1.31					0.06
188		Japan		32.80	30.40	26.38	23.40	22.37	21.72	21.18	20.49	19.80					1.07
189		Jordan		6.80	8.76	9.64	10.80	13.33	13.88	15.27	16.70	18.14					0.63
190		Kazakhstan		64.76	43.15	34.72	38.55	43.92	47.08	48.75	50.44	52.79					2.09
191		Kenya		17.60	17.03	16.91	19.06	21.22	22.68	24.07	25.54	27.07					1.01

General Non-CO2 data

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
192	Kiribati			0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.02	0.02					0.00
193	Kuwait			48.62	83.33	86.20	104.84	106.98	108.07	105.14	109.71	117.67					5.09
194	Kyrgyzstan			6.31	3.22	2.93	3.02	3.28	3.53	3.75	3.98	4.21					0.16
195	Laos			6.49	6.90	5.60	8.82	9.53	10.02	10.47	11.00	11.61					0.45
196	Latvia			3.66	2.08	1.83	1.88	1.89	1.88	1.86	1.83	1.80					0.09
197	Lebanon			1.44	1.55	1.61	1.66	1.74	1.77	1.83	1.88	1.93					0.08
198	Lesotho			1.10	1.16	1.41	1.31	1.43	1.53	1.63	1.72	1.82					0.07
199	Liberia			0.61	0.53	0.66	0.69	0.85	0.96	1.08	1.20	1.33					0.04
200	Libya			56.44	57.27	58.71	69.75	79.58	73.11	66.81	67.76	68.65					3.79
201	Liechtenstein			0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02					0.00
202	Lithuania			5.95	3.58	3.14	3.15	3.08	3.01	2.97	2.92	2.86					0.15
203	Luxembourg			0.48	0.48	0.48	0.47	0.48	0.48	0.48	0.48	0.48					0.02
204	Macedonia			1.73	1.76	1.75	1.96	1.99	2.03	2.07	2.11	2.17					0.09
205	Madagascar			14.63	14.62	15.01	15.81	16.33	17.27	17.77	18.27	18.76					0.78
206	Malawi			8.15	5.10	4.56	4.48	5.10	5.53	6.02	6.63	7.41					0.24
207	Malaysia			49.16	55.47	58.42	65.36	69.14	74.67	79.73	84.52	90.31					3.29
208	Maldives			0.04	0.05	0.06	0.07	0.08	0.08	0.08	0.08	0.08					0.00
209	Mali			8.70	9.01	9.94	12.30	14.94	17.20	19.63	22.81	27.08					0.71
210	Malta			0.17	0.20	0.23	0.24	0.26	0.27	0.27	0.27	0.27					0.01
211	Marshall Islands			0.02	0.02	0.03	0.03	0.03	0.04	0.04	0.04	0.04					0.00
212	Mauritania			3.14	3.27	4.14	4.62	4.40	4.64	4.91	5.25	5.63					0.21
213	Mauritius			0.18	0.19	0.20	0.20	0.21	0.22	0.22	0.23	0.23					0.01
214	Mexico			110.69	128.80	146.56	154.42	155.62	156.63	160.72	168.33	177.25					7.41
215	Micronesia (Federated States of)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02					0.00
216	Moldova			4.09	2.80	1.66	1.47	1.24	1.22	1.20	1.18	1.16					0.06
217	Monaco			0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					0.00
218	Mongolia			6.87	7.29	7.54	5.55	7.61	9.11	11.11	13.84	17.63					0.36
219	Montenegro			1.15	1.13	1.19	1.14	1.28	1.41	1.61	1.88	2.19					0.06
220	Morocco			7.81	7.57	8.44	8.93	9.38	9.90	10.45	11.05	11.69					0.45
221	Mozambique			9.52	9.36	12.96	13.60	14.20	14.70	14.96	15.19	15.43					0.68
222	Namibia			3.51	3.26	4.33	4.91	4.46	4.74	4.93	5.11	5.27					0.21
223	Nauru			0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01					0.00
224	Nepal			19.90	22.15	24.71	25.96	27.86	30.86	33.78	37.24	41.28					1.33
225	Netherlands			25.39	24.02	19.69	17.15	16.97	16.94	16.91	16.87	16.82					0.81
226	New Zealand			25.41	25.70	27.02	27.23	27.11	28.04	28.95	29.92	31.02					1.29
227	Nicaragua			4.79	4.47	5.53	5.95	6.29	6.74	7.08	7.44	7.79					0.30
228	Niger			4.12	4.85	5.79	7.00	8.35	9.44	10.51	11.71	13.04					0.40
229	<b>Nigeria</b>			<b>116.34</b>	<b>121.03</b>	<b>139.14</b>	<b>157.07</b>	<b>167.03</b>	<b>186.17</b>	<b>200.69</b>	<b>214.33</b>	<b>227.24</b>					<b>7.95</b>
230	Niue			0.02	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03					0.00
231	North Korea			21.72	16.98	15.42	17.24	18.16	18.56	19.47	21.37	24.67					0.86
232	Norway			4.59	4.84	4.75	4.43	4.21	4.24	4.28	4.36	4.45					0.20
233	Oman			27.62	34.42	40.28	36.25	36.59	40.18	36.14	37.45	36.24					1.74
234	Pakistan			60.19	67.05	77.77	89.02	106.72	117.57	128.48	140.71	154.71					5.08
235	Palau			0.01	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02					0.00
236	Panama			4.02	4.28	4.23	4.79	5.04	5.41	5.67	5.93	6.18					0.24
237	Papua New Guinea			3.18	6.89	5.92	4.76	5.15	5.51	5.80	6.03	6.37					0.25
238	Paraguay			18.32	19.69	18.78	19.72	21.56	23.34	24.78	26.30	27.71					1.03
239	Peru			16.01	16.97	19.44	19.81	20.90	22.32	23.47	24.68	25.88					1.00
240	Philippines			31.29	35.10	38.15	40.17	42.90	45.45	48.27	51.37	54.79					2.04
241	Poland			52.97	49.15	38.07	36.25	34.87	35.78	36.78	37.23	38.57					1.66
242	Portugal			10.18	11.28	11.76	13.72	13.71	13.81	13.88	13.93	13.97					0.65
243	Qatar			19.50	23.32	41.60	55.02	71.53	94.16	104.27	114.38	122.89					3.41
244	Romania			40.59	30.69	25.21	26.46	25.66	25.20	24.81	24.70	24.71					1.22
245	<b>Russia</b>			<b>582.70</b>	<b>446.21</b>	<b>440.51</b>	<b>468.22</b>	<b>483.23</b>	<b>495.68</b>	<b>532.55</b>	<b>548.28</b>	<b>563.06</b>					<b>23.01</b>
246	Rwanda			1.81	2.20	2.34	2.67	2.96	3.28	3.61	3.97	4.36					0.14
247	Saint Kitts and Nevis			0.07	0.07	0.07	0.08	0.08	0.08	0.08	0.09	0.09					0.00
248	Saint Lucia			0.58	0.62	0.65	0.67	0.68	0.70	0.71	0.72	0.72					0.03
249	Saint Vincent and the Grenadines			0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.06	0.06					0.00
250	Samoa			0.17	0.17	0.17	0.19	0.19	0.19	0.19	0.20	0.20					0.01
251	San Marino			0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.04	0.04					0.00
252	Sao Tome and Principe			0.04	0.05	0.05	0.05	0.05	0.05	0.06	0.06	0.06					0.00
253	Saudi Arabia			16.48	20.34	22.69	25.78	27.74	30.01	31.86	33.85	36.26					1.32
254	Senegal			5.85	6.44	7.43	8.16	8.94	9.81	10.67	11.56	12.47					0.43
255	Serbia			10.98	10.31	9.23	8.37	8.01	8.14	8.31	8.54	8.82					0.38

## General Non-CO2 data

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
256	Seychelles			0.06	0.06	0.06	0.06	0.06	0.07	0.07	0.07	0.07		0.00			
257	Sierra Leone			3.07	3.04	2.44	2.99	3.34	3.67	4.03	4.46	4.97		0.16			
258	Singapore			0.94	1.14	1.87	2.27	2.61	2.95	3.32	3.67	4.06		0.12			
259	Slovakia			4.84	4.28	4.44	4.61	4.46	4.35	4.31	4.30	4.29		0.21			
260	Slovenia			2.31	2.17	2.23	2.19	2.15	2.16	2.15	2.14	2.13		0.10			
261	Solomon Islands			0.18	0.21	0.25	0.29	0.32	0.36	0.39	0.42	0.45		0.02			
262	Somalia			14.63	14.37	15.31	16.37	15.91	16.44	17.07	17.87	18.76		0.76			
263	South Africa			46.37	46.60	49.18	52.23	53.84	54.98	55.81	57.21	58.57		2.56			
264	South Korea			28.87	28.72	31.84	33.82	36.06	36.64	36.92	37.14	36.87		1.72			
265	Spain			28.92	31.87	36.70	37.97	37.85	37.94	37.98	37.99	37.96		1.80			
266	Sri Lanka			21.28	22.04	21.22	22.54	23.09	24.32	25.13	26.03	27.07		1.10			
267	Sudan			44.47	53.19	69.87	85.67	93.66	98.99	103.87	109.65	114.65		4.46			
268	Suriname			1.03	1.11	0.94	0.91	1.01	1.00	1.01	1.08	1.18		0.05			
269	Swaziland			1.06	1.08	1.17	1.20	1.29	1.38	1.44	1.51	1.58		0.06			
270	Sweden			7.35	7.30	6.71	6.25	5.86	5.74	5.63	5.71	5.78		0.28			
271	Switzerland			4.45	4.02	3.67	3.51	3.57	3.56	3.54	3.53	3.51		0.17			
272	Syria			20.70	28.45	28.97	27.27	27.28	29.73	28.06	29.52	29.81		1.30			
273	Tajikistan			3.70	2.72	2.39	3.97	5.09	5.40	5.69	6.01	6.33		0.24			
274	Tanzania			30.65	30.32	32.19	36.74	37.91	39.69	40.90	42.08	43.22		1.81			
275	Thailand			66.71	70.38	71.36	78.96	86.32	88.32	90.39	92.30	94.88		4.11			
276	Timor-Leste			0.57	0.73	0.73	1.11	1.13	1.20	1.23	1.27	1.32		0.05			
277	Togo			2.71	2.51	2.68	2.86	3.02	3.22	3.44	3.67	3.92		0.14			
278	Tonga			0.13	0.13	0.14	0.15	0.15	0.16	0.16	0.17	0.17		0.01			
279	Trinidad and Tobago			0.69	0.67	0.66	0.66	0.67	0.68	0.68	0.68	0.68		0.03			
280	Tunisia			3.73	3.93	4.51	4.63	4.95	5.28	5.63	6.00	6.37		0.24			
281	Turkey			38.09	51.88	59.10	58.54	64.03	67.33	70.53	73.51	76.29		3.05			
282	Turkmenistan			25.72	19.06	27.59	37.26	40.40	46.21	49.61	51.08	52.90		1.92			
283	Tuvalu			0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01		0.00			
284	Uganda			7.98	8.55	8.37	10.61	11.50	12.09	12.64	13.22	13.83		0.55			
285	Ukraine			151.69	96.14	77.57	74.29	70.32	69.43	69.39	69.12	69.22		3.35			
286	United Arab Emirates			10.45	12.30	14.37	16.73	18.81	20.09	20.86	21.84	22.56		0.90			
287	United Kingdom			104.28	91.18	69.85	51.15	45.75	44.35	43.24	42.45	41.72		2.18			
288	<b>United States</b>			<b>636.80</b>	<b>635.79</b>	<b>614.63</b>	<b>599.90</b>	<b>642.27</b>	<b>656.47</b>	<b>681.52</b>	<b>709.46</b>	<b>725.00</b>		<b>30.58</b>			
289	Uruguay			14.05	15.62	14.72	15.01	15.98	17.51	18.78	20.15	21.49		0.76			
290	Uzbekistan			56.73	74.35	81.72	89.39	99.20	111.05	118.63	121.56	124.70		4.72			
291	Vanuatu			0.26	0.31	0.29	0.32	0.34	0.35	0.36	0.36	0.37		0.02			
292	Venezuela			50.33	60.65	67.70	64.34	60.35	63.08	69.83	75.53	81.03		2.87			
293	Vietnam			47.66	55.90	63.81	72.22	76.05	79.55	82.86	86.97	92.03		3.62			
294	Yemen			2.55	2.70	3.19	3.76	4.23	4.76	5.32	5.95	6.64		0.20			
295	Zambia			27.95	23.27	16.82	20.03	20.35	20.74	21.08	21.40	21.69		0.97			
296	Zimbabwe			5.48	5.29	5.45	4.97	5.00	5.24	5.42	5.63	5.83		0.24			
297	<b>World Totals</b>			<b>6,304.2</b>	<b>6,322.4</b>	<b>6,342.4</b>	<b>6,837.0</b>	<b>7,193.7</b>	<b>7,532.7</b>	<b>7,844.7</b>	<b>8,186.4</b>	<b>8,521.9</b>		<b>342.6</b>			
298																	
299	Rest of Africa			480	484	517	597	673	703	719	754	793		32.03			
300	Rest of Central and South America			77	80	95	88	96	102	108	114	120		4.57			
301	Rest of Middle East			74	93	119	128	145	175	180	194	203		6.93			
302	Rest of Non-OECD Asia			95	107	111	121	127	137	146	154	164		6.05			
303	Rest of Non-OECD Europe & Eura			16	15	16	15	15	15	16	17	17		0.71			
304																	
305	Africa			840	837	885	1,001	1,110	1,180	1,228	1,293	1,362		52.87			
306	Central and South America			598	625	644	788	775	814	845	872	899		36.89			
307	Middle East			211	280	318	363	393	430	439	466	493		18.72			
308	OECD			1,624	1,641	1,589	1,520	1,561	1,593	1,634	1,684	1,724		74.36			
309	Non-OECD Asia			1,992	2,141	2,132	2,339	2,486	2,608	2,739	2,887	3,033		118.37			
310	Non-OECD Europe & Eurasia			1,040	798	774	826	868	908	960	984	1,010		41.35			
311	EU			598	541	475	423	403	397	393	390	388		19.17			
312	OPEC			464	532	596	696	778	837	865	914	968		37.07			
313	<b>World Totals</b>			<b>6,304</b>	<b>6,322</b>	<b>6,342</b>	<b>6,837</b>	<b>7,194</b>	<b>7,533</b>	<b>7,845</b>	<b>8,186</b>	<b>8,522</b>		<b>343</b>			
314																	
315	Africa			13.3%	13.2%	14.0%	14.6%	15.4%	15.7%	15.7%	15.8%	16.0%					
316	Central and South America			9.5%	9.9%	10.2%	11.5%	10.8%	10.8%	10.8%	10.6%	10.6%					
317	Middle East			3.3%	4.4%	5.0%	5.3%	5.5%	5.7%	5.6%	5.7%	5.8%					
318	OECD			25.8%	26.0%	25.0%	22.2%	21.7%	21.1%	20.8%	20.6%	20.2%					
319	Non-OECD Asia			31.6%	33.9%	33.6%	34.2%	34.6%	34.6%	34.9%	35.3%	35.6%					
320	Non-OECD Europe & Eurasia			16.5%	12.6%	12.2%	12.1%	12.1%	12.1%	12.2%	12.0%	11.8%					
321	World Totals			100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%					
322																	

General Non-CO2 data

**EDGAR estimates of global methane emissions 1970-2008**

[edgar.jrc.ec.europa.eu/overview.php?v=42](http://edgar.jrc.ec.europa.eu/overview.php?v=42)

Heede, CMS  
23-Jul-12

CMS note, 1 June 12: EMT may need to be excluded from total, get definition definition page does not explain

**Table 2**

	All sources	Energy manufac'g and transformation	Gas Production & Distribution	Fugitive from Solid Fuels	Oil Production & Refineries	Total Oil, Gas, Coal (excl manuf & trans)	Oil, Gas, Coal percent of total	Natural gas emissions	Coal emissions	Oil & NGL emissions	Methane rate				
											Natural gas methane rate	Coal methane rate	Oil & NGL methane rate	Coal methane rate	
											Tg CH4	Tg CH4	Tg CH4	Tg CH4	Tg CH4
	CK applicability											Values from SumSum.xls as of 2June12			
1970	252.66	3.15	15.42	25.66	15.45	56.53	22.4%	1,806	5,701	6,738	8.536	4.501	2.293	8.37	
1971	245.03	3.11	15.80	24.84	15.62	56.26	23.0%	1,942	5,712	7,134	8.136	4.349	2.189	8.19	
1972	255.27	3.15	16.42	24.98	16.61	58.01	22.7%	2,052	5,775	7,537	8.003	4.325	2.204	8.01	
1973	258.17	3.19	17.35	25.10	18.63	61.09	23.7%	2,155	5,793	8,211	8.053	4.333	2.269	8.03	
1974	256.16	3.31	18.09	24.78	18.35	61.22	23.9%	2,188	5,786	8,226	8.271	4.283	2.230	7.79	
1975	262.07	3.39	18.85	26.02	16.86	61.73	23.6%	2,213	6,130	7,812	8.516	4.245	2.158	7.83	
1976	269.03	3.37	19.85	26.21	18.98	65.03	24.2%	2,308	6,266	8,479	8.598	4.182	2.238	7.68	
1977	276.03	3.41	20.93	26.64	18.71	66.29	24.0%	2,382	6,471	8,787	8.789	4.117	2.130	7.66	
1978	276.01	3.57	21.99	27.06	18.90	67.96	24.6%	2,492	6,570	8,765	8.825	4.119	2.157	7.63	
1979	284.43	3.71	23.41	28.10	18.54	70.05	24.6%	2,642	6,914	9,322	8.862	4.064	1.989	7.54	
1980	286.27	3.81	24.40	27.88	16.95	69.23	24.2%	2,712	7,134	8,875	8.998	3.908	1.910	7.35	
1981	279.62	3.77	25.36	26.86	14.36	66.59	23.8%	2,770	7,039	8,387	9.155	3.816	1.713	7.01	
1982	299.49	3.77	26.30	27.92	13.85	68.07	22.7%	2,712	7,299	8,047	9.699	3.825	1.722	7.02	
1983	292.40	3.81	27.27	28.26	13.67	69.20	23.7%	2,715	7,310	7,973	10.043	3.866	1.715	7.05	
1984	285.11	4.05	28.67	28.95	12.79	70.41	24.7%	2,961	7,673	8,069	9.684	3.773	1.585	6.84	
1985	287.60	4.12	29.72	29.30	12.64	71.66	24.9%	3,067	8,197	8,017	9.689	3.575	1.577	6.60	
1986	295.19	4.20	30.82	29.98	12.79	73.59	24.9%	3,045	8,428	8,409	10.123	3.557	1.521	6.59	
1987	307.79	4.22	31.99	30.51	12.62	75.13	24.4%	3,276	8,662	8,461	9.767	3.523	1.492	6.57	
1988	299.54	4.37	33.83	31.03	13.35	78.22	26.1%	3,433	8,845	8,845	9.855	3.508	1.509	6.53	
1989	306.20	4.55	35.32	31.57	13.57	80.46	26.3%	3,565	9,003	9,021	9.907	3.506	1.504	6.55	
1990	317.55	4.46	36.27	30.19	14.09	80.55	25.4%	3,737	8,864	9,215	9.704	3.406	1.529	6.22	
1991	319.47	4.43	36.90	29.02	13.94	79.85	25.0%	3,891	8,604	9,615	9.482	3.373	1.449	6.37	
1992	326.04	4.43	36.94	28.72	14.27	79.94	24.5%	4,009	8,691	9,201	9.215	3.305	1.551	6.40	
1993	309.69	4.44	37.23	27.81	14.27	79.30	25.6%	4,100	8,431	9,311	9.079	3.298	1.533	6.32	
1994	315.13	4.55	36.87	27.54	14.39	78.80	25.0%	4,152	8,651	9,402	8.881	3.184	1.530	6.15	
1995	312.24	4.58	37.57	28.60	14.95	81.12	26.0%	4,228	8,963	9,483	8.885	3.191	1.576	6.21	
1996	311.99	4.59	38.90	28.42	15.84	83.16	26.7%	4,426	9,062	9,626	8.787	3.137	1.646	6.15	
1997	343.40	4.57	38.91	28.55	16.19	83.65	24.4%	4,434	9,160	9,904	8.775	3.117	1.635	6.14	
1998	318.16	4.56	39.40	27.73	15.90	83.02	26.1%	4,555	8,776	10,095	8.650	3.160	1.575	6.07	
1999	309.69	4.60	39.86	27.27	15.50	82.63	26.7%	4,654	8,633	9,904	8.565	3.158	1.565	6.13	
2000	308.62	4.79	41.22	27.85	16.37	85.44	27.7%	4,719	8,684	10,326	8.734	3.207	1.586	6.27	
2001	313.90	4.85	41.99	28.66	16.22	86.86	27.9%	4,804	9,138	10,359	8.740	3.136	1.565	6.12	
2002	323.33	5.09	43.26	29.76	15.75	88.76	27.5%	4,932	9,252	10,296	8.770	3.216	1.530	6.22	
2003	325.34	5.33	44.90	33.04	16.51	94.46	29.0%	5,097	10,066	10,754	8.810	3.283	1.535	6.43	
2004	337.55	5.50	46.00	36.61	16.72	99.32	29.4%	5,243	10,886	11,092	8.773	3.362	1.507	6.48	
2005	346.49	5.67	46.72	39.80	16.86	103.38	29.8%	5,397	11,586	11,253	8.657	3.435	1.498	6.69	
2006	362.77	5.82	48.53	41.94	16.91	107.39	29.6%	5,566	12,213	11,286	8.719	3.434	1.499	6.83	
2007	366.56	6.09	50.26	43.60	16.35	110.20	30.1%	5,683	12,707	11,264	8.844	3.431	1.451	6.78	
2008	363.98	6.17	52.13	46.66	16.57	115.36	31.7%	5,921	13,110	11,341	8.804	3.559	1.461	6.85	
2009	357.10	6.06	50.82	46.15	16.21	113.18	extrapolated by CM	5,772	12,969	11,091					
2010	381.57	6.47	54.59	49.65	16.70	120.94	Jan-13	6,200	13,950	11,430					

sum 1970-2010	12,545	181	1,381	1,259	644	3,284	10	141,984	326,186	358,842	350	142	67	268
Average	<b>305.97</b>	<b>4.42</b>	<b>33.68</b>	<b>30.71</b>	<b>15.70</b>	<b>80.10</b>		<b>39-yr average methane rate</b>			<b>8.98</b>	<b>3.64</b>	<b>1.73</b>	<b>6.86</b>
Percent of total (energy only)			42.1%	38.3%	19.6%	100.0%		<b>Rates adopted for this study</b>			<b>9.88</b>	<b>4.03</b>	<b>1.92</b>	

linked from Oil, Gas, and Coal ancillary CH4 worksheets

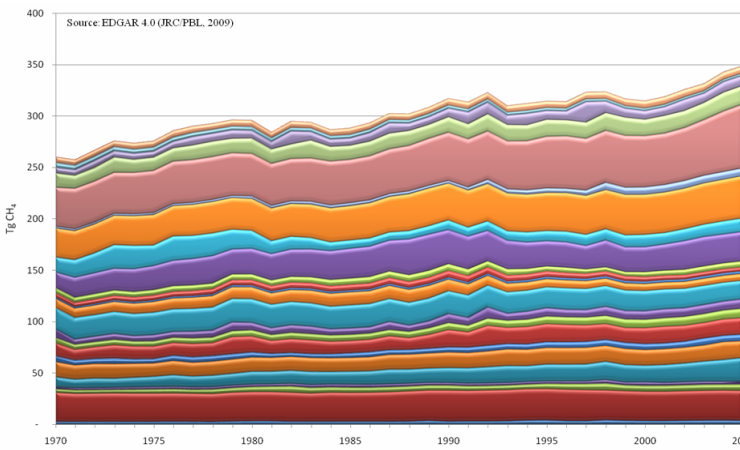
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
--	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---

385
386
387
388
389
390
391
392
393
394
395
396
397
398
399
400
401
402
403
404
405
406
407
408
409
410
411
412
413
414
415
416
417
418
419
420
421
422
423
424
425
426
427
428
429
430
431
432
433
434
435
436
437
438
439
440
441
442
443
444
445
446
447
448
449

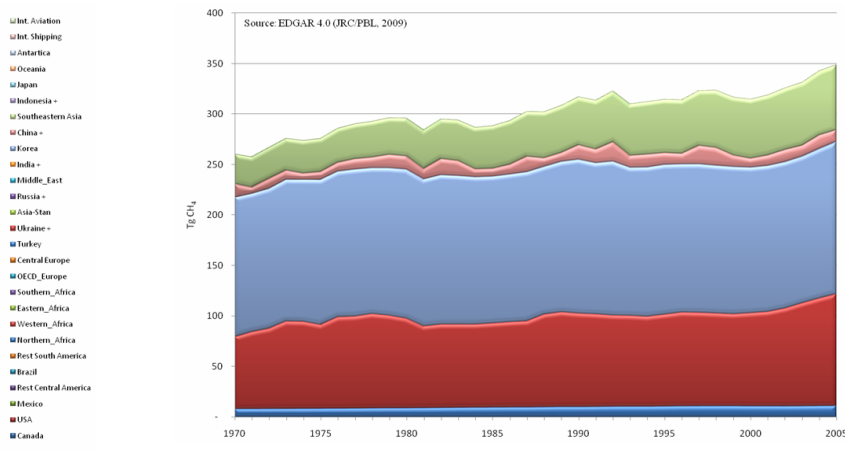
**EDGAR estimates of global methane emissions 1970-2008**

[edgar.jrc.ec.europa.eu/overview.php?v=42](http://edgar.jrc.ec.europa.eu/overview.php?v=42)

Heede, CMS  
2-Jun-12



EDGAR, European Commission's Joint Research Centre  
[edgar.jrc.ec.europa.eu/part\\_CH4.php](http://edgar.jrc.ec.europa.eu/part_CH4.php)



EDGAR, European Commission's Joint Research Centre  
[edgar.jrc.ec.europa.eu/part\\_CH4.php](http://edgar.jrc.ec.europa.eu/part_CH4.php)

**CDIAC (Stern & Kaufmann) and EDGAR global energy-related methane emissions**

15-Jan-13

**Global historical anthropogenic CH4 emissions expressed in Tg**  
(teragrams; 1 Tg = 10<sup>12</sup> g) of methane = million tonnes per year.

Stern & Kaufmann (1998)  
and CMS estimates for 1995-2005 (March 2006)

Final methane estimates 1860-2010  
CDIAC 1860-1970  
CDIAC/EDGAR average 1970-1994  
EDGAR 1995-2010  
2009-2010 extrapolated by CMS

Year	Gas Flaring	Gas Supply	Coal Mining	Biomass Burning	Livestock	Rice etc.	Landfills	Total	Total Gas & Coal	
1860	0.002	0.000	2.22	9.8	25.6	40.1	1.6	79.3	2.22	2.22
1861	0.004	0.000	2.34	10.0	25.7	40.3	1.6	80.0	2.35	2.35
1862	0.006	0.000	2.33	10.1	25.8	40.4	1.7	80.4	2.34	2.34
1863	0.006	0.000	2.51	10.3	25.9	40.6	1.7	81.0	2.51	2.51
1864	0.004	0.000	2.72	10.4	26.0	40.7	1.7	81.6	2.73	2.73
1865	0.005	0.000	2.88	10.5	26.1	40.9	1.8	82.2	2.89	2.89
1866	0.007	0.000	3.04	10.5	26.2	41.1	1.8	82.7	3.04	3.04
1867	0.007	0.000	3.25	10.6	26.3	41.2	1.9	83.3	3.26	3.26
1868	0.007	0.000	3.22	10.6	26.4	41.4	1.9	83.6	3.22	3.22
1869	0.009	0.000	3.33	10.7	26.5	41.6	2.0	84.1	3.34	3.34
1870	0.011	0.000	3.40	10.8	26.6	41.7	2.0	84.6	3.41	3.41
1871	0.011	0.000	3.79	11.0	26.7	41.9	2.1	85.5	3.80	3.80
1872	0.013	0.000	4.11	11.1	26.8	42.1	2.1	86.3	4.13	4.13
1873	0.021	0.000	4.39	11.2	27.0	42.2	2.2	87.0	4.41	4.41
1874	0.021	0.000	4.28	11.2	27.1	42.4	2.2	87.2	4.30	4.30
1875	0.019	0.000	4.40	11.3	27.2	42.6	2.3	87.8	4.42	4.42
1876	0.021	0.000	4.45	11.4	27.4	42.9	2.4	88.5	4.47	4.47
1877	0.030	0.000	4.54	11.5	27.6	43.3	2.4	89.3	4.57	4.57
1878	0.033	0.000	4.54	11.5	27.8	43.6	2.5	90.0	4.57	4.57
1879	0.044	0.000	4.78	11.6	28.0	44.0	2.5	90.9	4.82	4.82
1880	0.056	0.000	5.21	11.6	28.3	44.3	2.6	92.0	5.26	5.26
1881	0.059	0.000	5.59	12.3	28.5	44.7	2.7	93.7	5.65	5.65
1882	0.066	0.000	5.99	12.5	28.7	45.0	2.7	95.0	6.06	6.06
1883	0.055	0.000	6.40	12.6	28.9	45.4	2.8	96.2	6.46	6.46
1884	0.065	0.010	6.43	12.8	29.2	45.7	2.9	97.0	6.50	6.50
1885	0.065	0.013	6.28	12.8	29.4	46.1	3.0	97.7	6.36	6.36

General Non-CO2 data

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
450	1886	0.085	0.017	6.30	12.9	29.6	46.5	3.0	98.5		6.40				6.40	
451	1887	0.085	0.022	6.72	13.0	29.8	46.9	3.1	99.6		6.83				6.83	
452	1888	0.093	0.025	7.25	13.0	30.1	47.2	3.2	100.9		7.37				7.37	
453	1889	0.110	0.028	7.37	13.0	30.3	47.6	3.3	101.7		7.51				7.51	
454	1890	0.136	0.033	7.80	13.0	30.6	48.0	3.3	102.9		7.97				7.97	
455	1891	0.161	0.033	8.12	13.1	30.8	48.4	3.4	104.0		8.31				8.31	
456	1892	0.157	0.035	8.19	13.1	31.0	48.8	3.5	104.8		8.38				8.38	
457	1893	0.162	0.037	8.01	13.1	31.3	49.2	3.6	105.3		8.21				8.21	
458	1894	0.156	0.038	8.35	13.1	31.5	49.5	3.7	106.4		8.55				8.55	
459	1895	0.180	0.040	8.80	13.1	31.8	49.9	3.8	107.6		9.02				9.02	
460	1896	0.200	0.045	9.05	13.1	32.0	50.3	3.9	108.6		9.30				9.30	
461	1897	0.210	0.050	9.47	13.1	32.3	50.7	4.0	109.8		9.73				9.73	
462	1898	0.216	0.054	9.97	13.0	32.5	51.2	4.1	111.1		10.24				10.24	
463	1899	0.225	0.059	10.91	13.0	32.8	51.6	4.2	112.8		11.19				11.19	
464	1900	0.257	0.062	11.47	13.1	33.1	52.0	4.3	114.2		11.79				11.79	
465	1901	0.287	0.069	11.75	14.5	33.3	52.2	4.4	116.5		12.11				12.11	
466	1902	0.308	0.074	11.99	14.8	33.6	52.5	4.5	117.8		12.37				12.37	
467	1903	0.330	0.079	13.14	15.2	33.9	52.7	4.6	119.9		13.55				13.55	
468	1904	0.369	0.082	13.23	15.4	34.1	52.9	4.8	121.0		13.68				13.68	
469	1905	0.363	0.094	13.95	15.7	34.4	53.2	4.9	122.6		14.41				14.41	
470	1906	0.358	0.102	15.04	15.9	34.7	53.4	5.0	124.5		15.50				15.50	
471	1907	0.441	0.107	16.59	16.0	35.0	53.7	5.1	126.9		17.13				17.13	
472	1908	0.475	0.105	15.74	16.1	35.3	53.9	5.3	126.8		16.32				16.32	
473	1909	0.496	0.125	16.39	16.2	35.5	54.1	5.4	128.2		17.01				17.01	
474	1910	0.541	0.134	17.09	16.2	35.8	54.4	5.5	129.7		17.77				17.77	
475	1911	0.567	0.135	17.41	15.0	36.1	54.6	5.7	129.5		18.11				18.11	
476	1912	0.577	0.149	18.35	14.7	36.4	54.8	5.8	130.8		19.07				19.07	
477	1913	0.64	0.15	19.63	14.1	36.7	55.1	6.0	132.3		20.42				20.42	
478	1914	0.66	0.16	17.54	14.0	37.0	55.3	6.1	130.8		18.36				18.36	
479	1915	0.70	0.17	17.28	13.8	37.3	55.5	6.3	131.1		18.15				18.15	
480	1916	0.74	0.20	18.58	13.9	37.6	55.8	6.4	133.2		19.52				19.52	
481	1917	0.81	0.21	19.56	13.9	37.9	56.0	6.6	135.0		20.58				20.58	
482	1918	0.81	0.19	19.26	13.9	38.2	56.2	6.7	135.4		20.26				20.26	
483	1919	0.90	0.20	16.80	14.0	38.5	56.4	6.9	133.8		17.90				17.90	
484	1920	1.15	0.21	19.27	14.0	38.8	56.7	7.1	137.3		20.63				20.63	
485	1921	1.24	0.17	16.26	15.1	39.2	56.9	7.3	136.1		17.68				17.68	
486	1922	1.38	0.20	17.38	15.5	39.5	57.1	7.5	138.5		18.96				18.96	
487	1923	1.62	0.26	19.44	15.8	39.8	57.3	7.6	141.9		21.33				21.33	
488	1924	1.62	0.30	19.22	16.1	40.1	57.5	7.8	142.7		21.14				21.14	
489	1925	1.69	0.32	19.22	16.3	40.4	57.8	8.0	143.8		21.23				21.23	
490	1926	1.73	0.35	19.08	16.5	40.8	58.0	8.2	144.7		21.16				21.16	
491	1927	1.98	0.38	20.64	16.5	41.2	58.3	8.4	147.5		23.00				23.00	
492	1928	2.07	0.42	20.28	16.6	41.6	58.6	8.7	148.2		22.76				22.76	
493	1929	2.31	0.51	21.53	16.1	42.0	58.9	8.9	150.2		24.35				24.35	
494	1930	2.19	0.47	19.65	16.0	42.4	59.2	9.1	148.9		22.32				22.32	
495	1931	2.11	0.46	17.38	16.2	42.8	59.4	9.3	147.7		19.94				19.94	
496	1932	2.00	0.43	15.48	16.1	43.2	59.7	9.6	146.5		17.91				17.91	
497	1933	2.17	0.43	16.16	16.0	43.6	60.0	9.8	148.1		18.77				18.77	
498	1934	2.29	0.49	17.58	16.0	44.0	60.2	10.1	150.6		20.35				20.35	
499	1935	2.48	0.50	18.00	15.9	44.4	60.5	10.3	152.0		20.98				20.98	
500	1936	2.67	0.58	20.06	16.0	44.8	60.8	10.6	155.4		23.31				23.31	
501	1937	3.04	0.65	21.09	15.9	45.2	61.0	10.8	157.8		24.78				24.78	
502	1938	2.95	0.62	19.82	15.8	45.6	61.3	11.1	157.2		23.38				23.38	
503	1939	3.07	0.67	21.07	15.7	46.0	61.6	11.4	159.5		24.81				24.81	
504	1940	3.13	0.72	22.33	15.5	46.5	61.8	11.7	161.6		26.18				26.18	
505	1941	2.98	0.76	23.26	15.4	46.9	62.1	12.0	163.3		26.99				26.99	
506	1942	2.79	0.83	23.35	15.2	47.3	62.3	12.3	164.1		26.97				26.97	
507	1943	3.04	0.92	23.42	15.1	47.8	62.6	12.6	165.4		27.39				27.39	
508	1944	3.41	1.00	22.44	15.0	48.2	62.8	12.9	165.8		26.85				26.85	
509	1945	3.58	1.10	18.81	14.9	48.7	63.0	13.2	163.4		23.49				23.49	
510	1946	3.92	1.13	19.61	16.1	49.1	63.3	13.6	166.8		24.67				24.67	
511	1947	4.30	1.25	22.04	16.4	49.6	63.5	13.9	171.1		27.60				27.60	
512	1948	4.84	1.41	22.98	16.7	50.0	63.8	14.3	174.0		29.23				29.23	
513	1949	4.80	1.49	21.86	16.8	50.5	64.0	14.6	174.1		28.15				28.15	
514	1950	6.13	1.62	22.61	16.9	51.0	64.2	15.0	177.5		30.37				30.37	
515	1951	6.40	1.92	23.86	21.6	51.9	65.0	15.4	186.1		32.19				32.19	
516	1952	6.93	2.07	23.71	22.7	52.9	65.8	15.8	189.9		32.72				32.72	
517	1953	7.20	2.19	23.75	22.9	53.8	66.6	16.2	192.6		33.14				33.14	
518	1954	7.20	2.31	23.59	23.4	54.8	67.4	16.6	195.3		33.09				33.09	
519	1955	8.27	2.51	25.17	24.3	55.8	68.2	17.0	201.3		35.94				35.94	
520	1956	8.53	2.69	26.47	24.7	56.8	69.0	17.4	205.7		37.70				37.70	





General Non-CO2 data

**Cell:** H420

**Comment:** Rick Heede:

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>

**Cell:** P580

**Comment:** Rick Heede:

At CH4 21 x CO2, per IPCC SAR.