

# Energy Production by Source

Source: International Energy Agency

EarthTrends Data Tables:

Energy  
and  
Resources



	Energy Production From:														
	All Sources			Non-Renewable Energy Sources								Hydroelectric		Renewables	
	(1000 Metric TOE) (d)	Percent Change Since 1989	Per Capita (kg oil equivalent) 1999	Solid Fuels (a)		Liquid Fuels (b)		Gaseous Fuels (c)		Nuclear Fuels		Plants		(excl. Hydroelectric)	
				(1000 Metric TOE) (d)	Percent Change Since 1989	(1000 Metric TOE) (d)	Percent Change Since 1989	(1000 Metric TOE) (d)	Percent Change Since 1989	(1000 Metric TOE) (d)	Percent Change Since 1989	(1000 Metric TOE) (d)	Percent Change Since 1989	(1000 Metric TOE) (d)	Percent Change Since 1989
<b>WORLD</b>	<b>9,820,862</b>	<b>12.8</b>	<b>1,643</b>	<b>2,273,262</b>	<b>2.9</b>	<b>3,526,390</b>	<b>10.9</b>	<b>2,014,696</b>	<b>21.4</b>	<b>660,051</b>	<b>30.4</b>	<b>222,992</b>	<b>23.6</b>	<b>1,095,519</b>	<b>20.1</b>
<b>ASIA (EXCL. MIDDLE EAST)</b>	<b>2,362,223</b>	<b>40.5</b>	<b>702</b>	<b>947,639</b>	<b>39.2</b>	<b>400,017</b>	<b>36.2</b>	<b>272,284</b>	<b>168.2</b>	<b>117,365</b>	<b>91.7</b>	<b>44,165</b>	<b>40.2</b>	<b>577,942</b>	<b>11.3</b>
Armenia	646	..	170	0	..	0	..	0	..	542	..	103	..	1	..
Azerbaijan	19,035	..	2,385	0	..	13,875	..	5,029	..	0	..	130	..	2	..
Bangladesh	14,474	38.5	108	0	..	72	(40.2)	6,861	86.3	0	..	72	(9.5)	7,469	12.1
Bhutan	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Cambodia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
China (e)	1,090,937	25.0	863	670,344	31.6	160,172	14.3	26,058	67.4	3,896	..	17,527	72.1	212,938	7.2
Georgia	739	..	140	7	..	108	..	0	..	0	..	554	..	70	..
India	412,356	27.8	415	149,447	50.1	33,237	(3.5)	21,129	137.7	3,453	186.5	6,944	30.1	198,147	12.6
Indonesia	231,607	49.3	1,107	44,282	717.1	75,541	2.8	61,884	79.1	0	..	806	25.8	49,094	16.5
Japan	104,331	45.7	823	2,152	(62.7)	745	13.7	2,010	13.5	82,512	73.1	7,432	(5.8)	8,341	9.7
Kazakhstan	65,237	..	4,013	25,743	..	30,267	..	8,626	..	0	..	527	..	73	..
Korea, Dem People's Rep	42,773	(12.4)	1,935	39,957	(10.2)	0	..	0	..	0	..	1,815	(45.9)	1,001	5.6
Korea, Rep	31,588	44.3	681	2,060	(77.5)	446	..	0	..	26,859	117.6	358	(9.4)	258	..
Kyrgyzstan	1,301	..	268	155	..	77	..	21	..	0	..	1,044	..	4	..
Lao People's Dem Rep	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Malaysia	73,411	55.9	3,369	67	129.6	37,286	21.9	32,942	134.2	0	..	647	70.7	2,470	17.3
Mongolia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Myanmar	13,629	24.9	289	81	224.3	446	(39.6)	3,900	339.9	0	..	89	(16.3)	9,113	(0.5)
Nepal	6,708	24.9	298	0	..	0	..	0	..	0	..	121	97.3	6,587	19.4
Pakistan	45,316	36.4	329	1,417	24.9	2,962	28.6	15,712	55.5	104	..	1,659	13.7	23,462	22.4
Philippines	19,681	25.8	265	480	(24.8)	47	(82.4)	6	..	0	..	674	20.9	18,474	23.3
Singapore	64	..	16	0	..	0	..	0	..	0	..	0	..	0	..
Sri Lanka	4,547	8.7	243	0	..	0	..	0	..	0	..	359	48.8	4,189	5.9
Tajikistan	1,381	..	229	7	..	19	..	29	..	0	..	1,327	..	0	..
Thailand	38,525	61.2	621	5,297	105.2	4,076	109.8	15,004	220.7	0	..	304	(36.6)	13,844	(2.6)
Turkmenistan	26,331	..	5,679	0	..	7,742	..	18,588	..	0	..	0	..	0	..
Uzbekistan	55,146	..	2,252	1,046	..	8,356	..	45,256	..	0	..	489	..	0	..
Viet Nam	44,858	93.2	582	5,098	77.2	15,316	909.9	920	#####	0	..	1,185	258.9	22,340	17.3
<b>EUROPE</b>	<b>2,228,407</b>	<b>103.8</b>	<b>3,061</b>	<b>391,517</b>	<b>..</b>	<b>648,678</b>	<b>..</b>	<b>741,413</b>	<b>..</b>	<b>303,542</b>	<b>..</b>	<b>61,526</b>	<b>..</b>	<b>67,725</b>	<b>..</b>
Albania	889	(69.4)	284	7	(99.1)	328	(73.0)	14	(95.2)	0	..	481	81.5	60	(528.3)
Austria	9,682	14.0	1,198	266	(50.6)	1,037	(10.6)	1,478	29.9	0	..	3,482	14.8	3,104	16.0
Belarus	3,475	..	340	618	..	1,849	..	212	..	0	..	2	..	794	..
Belgium	13,571	4.7	1,326	192	(89.2)	0	..	0	(96.7)	12,774	18.9	29	11.8	212	(1.4)
Bosnia and Herzegovina	2,824	..	734	2,174	..	0	..	0	..	0	..	476	..	175	..
Bulgaria	9,056	(10.7)	1,127	4,227	(27.7)	39	(52.2)	21	217.1	4,128	8.8	237	2.3	413	55.8
Croatia	3,602	..	774	9	..	1,426	..	1,266	..	0	..	567	..	331	..
Czech Rep	28,023	(34.0)	2,725	23,081	(40.2)	377	67.9	177	(12.4)	3,481	7.6	144	2.3	536	..
Denmark (f)	23,894	136.5	4,504	0	..	14,856	175.3	7,022	158.9	0	..	3	34.8	1,209	(34.9)
Estonia	2,762	..	1,958	2,252	..	0	..	0	..	0	..	0	..	509	..
Finland	15,402	32.2	2,983	1,965	35.4	59	..	0	..	5,987	20.3	1,099	(1.9)	6,146	33.7
France (g)	127,523	17.8	2,160	3,413	(61.5)	1,919	(48.7)	1,669	(36.0)	102,742	29.7	6,222	55.1	9,778	10.3
Germany (h)	136,535	(31.9)	1,665	62,183	(53.1)	3,430	(35.4)	16,703	15.6	44,304	4.9	1,690	7.8	5,495	53.6
Greece	9,535	7.6	900	8,036	12.8	15	(98.4)	3	(98.1)	0	..	395	141.7	1,024	49.8
Hungary	11,453	(28.6)	1,143	3,004	(37.7)	1,781	(24.6)	2,623	(44.4)	3,674	1.5	16	14.6	329	(52.4)
Iceland	2,274	73.1	8,208	0	..	0	..	0	..	0	..	520	42.0	1,753	45.9
Ireland	2,503	(33.4)	665	1,153	(37.9)	0	..	1,103	(40.1)	0	..	73	22.3	174	100.0
Italy	27,740	12.4	482	13	(95.5)	5,139	10.5	14,309	4.0	0	..	3,901	33.2	4,030	28.3
Latvia	1,491	..	612	71	..	0	..	0	..	0	..	237	..	1,183	..
Lithuania	3,523	..	952	23	..	239	..	0	..	2,594	..	36	..	620	..
Macedonia, FYR	1,644	..	813	1,319	..	0	..	0	..	0	..	119	..	206	..
Moldova, Rep	63	..	15	0	..	0	..	0	..	0	..	8	..	55	..
Netherlands (i)	59,538	0.0	3,770	0	..	2,615	(33.0)	54,102	(0.2)	999	(4.7)	8	143.4	456	62.1
Norway	209,637	82.5	47,120	271	19.2	153,303	99.4	44,125	65.2	0	..	10,445	2.6	1,340	39.4
Poland	84,171	(28.2)	2,179	76,050	(31.6)	851	396.3	3,101	(10.4)	0	..	185	33.9	3,571	56.1
Portugal (j)	2,657	6.6	266	0	..	0	..	0	..	0	..	627	25.2	1,974	4.4
Romania	27,859	(43.9)	1,239	4,646	(62.6)	6,252	(29.8)	11,189	(58.0)	1,362	..	1,573	44.8	2,837	77.0
Russian Federation	950,590	..	6,501	115,342	..	304,755	..	477,097	..	32,119	..	13,802	..	4,927	..
Serbia and Montenegro	9,778	..	925	7,093	..	733	..	592	..	0	..	1,150	..	210	..
Slovakia	5,135	(7.9)	952	1,022	(33.8)	65	(34.1)	164	(65.0)	3,418	7.9	390	131.1	76	(69.5)
Slovenia	2,874	..	1,444	1,090	..	1	..	5	..	1,224	..	322	..	233	..
Spain (k)	30,696	(11.2)	769	8,603	(27.6)	305	(77.6)	131	(90.8)	15,337	4.9	1,966	18.2	3,979	11.6
Sweden	33,832	16.7	3,823	249	26.9	0	..	0	..	19,073	11.6	6,165	(0.1)	7,469	30.7
Switzerland (l)	11,805	26.1	1,646	0	..	0	..	0	..	6,753	13.1	3,440	34.4	665	58.8
Ukraine	80,873	..	1,617	41,071	..	4,342	..	15,171	..	18,781	..	1,247	..	262	..
United Kingdom	281,451	34.6	4,748	22,075	(61.1)	142,962	49.6	89,136	140.6	24,792	32.6	461	12.9	1,574	70.5
<b>MIDDLE EAST &amp; N. AFRICA</b>	<b>1,532,806</b>	<b>34.1</b>	<b>3,850</b>	<b>14,229</b>	<b>4.5</b>	<b>1,240,170</b>	<b>26.5</b>	<b>260,613</b>	<b>95.3</b>	<b>0</b>	<b>..</b>	<b>5,653</b>	<b>47.1</b>	<b>12,124</b>	<b>3.5</b>
Afghanistan	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Algeria	144,363	45.7	4,852	0	..	66,870	16.7	77,400	85.3	0	..	17	(10.2)	76	80.9
Egypt	58,460	9.6	877	0	..	42,029	(6.6)	13,816	113.0	0	..	1,315	53.3	1,300	22.1
Iran, Islamic Rep	229,406	42.8	3,313	822	55.8	179,490	23.1	47,880	267.3	0	..	427	(33.9)	786	16.0
Iraq	131,799	(13.4)	5,901	0	..	127,552	(10.6)	4,169	(55.4)	0	..	52	(76.7)	26	17.4
Israel	615	57.6	104	50	..	12	(25.1)	8	(74.0)	0	..	3	1,032.0	543	36.9
Jordan	286	430.0	60	0	..	2									



	Energy Production from:																
	All Sources			Non-Renewable Energy Sources										Hydroelectric		Renewables	
	(1000 Metric TOE) {d}	Percent Change Since 1989	Per Capita (kg oil equivalent) 1999	Solid Fuels (a)		Liquid Fuels (b)		Gaseous Fuels (c)		Nuclear Fuels		Plants		(excl. Hydroelectric)			
				(1000 Metric TOE) {d}	Percent Change Since 1989	(1000 Metric TOE) {d}	Percent Change Since 1989	(1000 Metric TOE) {d}	Percent Change Since 1989	(1000 Metric TOE) {d}	Percent Change Since 1989	(1000 Metric TOE) {d}	Percent Change Since 1989	(1000 Metric TOE) {d}	Percent Change Since 1989		
1999	1989	1999	1999	1989	1999	1989	1999	1989	1999	1989	1999	1989	1999	1989			
<b>SUB-SAHARAN AFRICA</b>	<b>528,894</b>	<b>29.4</b>	<b>834</b>	..	..	..	..	..	..	..	..	..	..	..	..		
Angola	43,644	60.5	3,421	0	..	37,627	65.3	457	227.4	0	..	77	25.9	5,482	23.0		
Benin	1,781	3.6	292	0	..	45	(77.0)	0	..	0	..	0	..	1,736	12.2		
Botswana	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Burkina Faso	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Burundi	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Cameroon	12,109	(3.9)	832	0	..	6,945	(19.8)	0	..	0	..	287	25.2	4,877	23.8		
Central African Rep	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Chad	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Congo	14,079	57.9	4,805	0	..	13,500	65.3	0	..	0	..	8	(76.1)	571	(25.2)		
Congo, Dem Rep	14,860	25.4	300	58	(23.2)	1,075	(28.7)	0	..	0	..	489	(17.8)	13,238	26.9		
Côte d'Ivoire	6,023	82.2	384	0	..	493	365.4	1,267	..	0	..	151	10.1	4,113	25.5		
Equatorial Guinea	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Eritrea (m)	467	..	132	0	..	0	..	0	..	0	..	0	..	467	..		
Ethiopia (n)	17,176	25.9	280	0	..	0	..	0	..	0	..	138	122.6	17,038	20.3		
Gabon	17,842	59.9	14,881	0	..	16,813	62.9	68	(4.2)	0	..	60	3.0	901	21.1		
Gambia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Ghana	5,640	32.2	299	0	..	0	..	0	..	0	..	445	(1.2)	5,196	26.6		
Guinea	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Guinea-Bissau	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Kenya	12,051	19.4	401	0	..	0	..	0	..	0	..	209	(1.4)	11,842	16.6		
Lesotho	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Liberia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Madagascar	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Malawi	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Mali	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Mauritania	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Mozambique	7,067	2.3	394	11	(64.0)	0	..	0	246.2	0	..	588	2,307.1	6,468	(6.0)		
Namibia	270	..	156	0	..	0	..	0	..	0	..	101	..	169	..		
Niger	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Nigeria	183,796	24.6	1,658	36	(29.8)	106,759	20.7	5,888	69.7	0	..	481	35.1	70,632	22.0		
Rwanda	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Senegal	1,684	26.9	183	0	..	1	(50.0)	5	(21.5)	0	..	0	..	1,678	21.4		
Sierra Leone	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Somalia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
South Africa	143,993	25.7	3,368	126,253	24.9	348	..	1,518	..	3,345	15.7	62	(73.7)	12,466	16.9		
Sudan	16,631	92.6	547	0	..	3,512	..	0	..	0	..	104	35.2	13,015	34.2		
Tanzania, United Rep	14,267	23.8	416	3	66.5	0	..	0	..	0	..	185	51.9	14,079	19.0		
Togo	1,022	35.4	233	0	..	0	..	0	..	0	..	0	(32.0)	1,022	26.2		
Uganda	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Zambia	5,770	21.8	566	112	(54.0)	0	..	0	..	0	..	663	19.3	4,995	21.1		
Zimbabwe	8,723	10.8	703	2,983	0.8	0	..	0	..	0	..	254	(11.4)	5,487	15.7		
<b>NORTH AMERICA</b>	<b>2,053,057</b>	<b>8.6</b>	<b>6,600</b>	<b>600,275</b>	<b>8.6</b>	<b>489,867</b>	<b>(9.2)</b>	<b>585,206</b>	<b>18.7</b>	<b>220,291</b>	<b>31.5</b>	<b>54,923</b>	<b>16.6</b>	<b>91,945</b>	<b>76.4</b>		
Canada	366,607	33.8	12,023	39,154	0.5	122,963	30.3	144,385	68.5	19,152	(10.2)	29,718	18.6	11,235	23.4		
United States (o)	1,686,450	4.3	6,014	561,121	9.2	366,904	(17.6)	440,821	8.3	201,139	37.5	25,205	14.4	80,709	83.8		
<b>C. AMERICA &amp; CARIBBEAN</b>	<b>260,434</b>	<b>17.0</b>	<b>1,529</b>	<b>4,868</b>	<b>60.8</b>	<b>179,261</b>	<b>9.7</b>	<b>40,297</b>	<b>60.0</b>	<b>2,607</b>	<b>2,589</b>	<b>4,199</b>	<b>34.1</b>	<b>29,201</b>	<b>5.1</b>		
Belize	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Costa Rica	1,323	33.1	336	0	..	0	..	0	..	0	..	442	54.3	881	19.7		
Cuba	5,359	(9.0)	480	0	..	2,100	194.2	376	1,253	0	..	9	25.5	2,875	(78.9)		
Dominican Rep	1,491	47.5	181	0	..	0	..	0	..	0	..	95	131.9	1,396	30.5		
El Salvador	2,048	22.6	333	0	..	0	..	0	..	0	..	152	24.0	1,896	18.4		
Guatemala	5,367	65.0	484	0	..	1,288	597.8	0	..	0	..	179	15.1	3,900	25.3		
Haiti	1,619	26.3	202	0	..	0	..	0	..	0	..	35	(0.2)	1,584	21.3		
Honduras	1,476	(9.5)	236	0	..	0	..	0	..	0	..	183	6.8	1,293	(12.9)		
Jamaica	481	55.4	188	0	..	0	..	0	..	0	..	10	(8.7)	471	36.6		
Mexico	223,004	16.1	2,291	4,868	60.8	168,861	9.2	30,887	49.8	2,607	2,589	2,819	34.7	12,961	10.8		
Nicaragua	1,482	3.3	300	0	..	0	..	0	..	0	..	34	(26.6)	1,449	4.1		
Panama	704	19.8	250	0	..	0	..	0	..	0	..	242	49.2	462	7.9		
Trinidad and Tobago	16,079	30.3	12,477	0	..	7,013	(9.7)	9,034	99.4	0	..	0	..	32	(19.8)		
<b>SOUTH AMERICA</b>	<b>555,962</b>	<b>51.6</b>	<b>1,632</b>	<b>29,025</b>	<b>61.1</b>	<b>345,297</b>	<b>65.0</b>	<b>72,900</b>	<b>57.7</b>	<b>2,888</b>	<b>61.3</b>	<b>43,298</b>	<b>50.4</b>	<b>62,553</b>	<b>(0.4)</b>		
Argentina	80,423	74.0	2,199	198	(34.6)	41,511	73.5	32,020	78.2	1,852	41.0	1,864	62.7	2,978	47.5		
Bolivia	5,197	9.3	638	0	..	1,918	54.8	2,393	(12.0)	0	..	154	53.6	732	5.0		
Brazil	134,472	34.2	799	2,148	(25.5)	57,811	84.1	5,088	103.6	1,036	117.3	25,198	43.1	43,190	(5.0)		
Chile	7,614	2.3	507	329	(75.4)	412	(67.0)	1,657	16.6	0	..	1,168	28.8	4,047	37.5		
Colombia	77,142	75.1	1,863	21,240	79.2	42,848	102.2	4,894	53.4	0	..	2,902	26.6	5,259	(5.1)		
Ecuador	21,147	32.1	1,704	0	..	19,470	35.5	258	88.5	0	..	617	44.9	802	(34.3)		
Guyana	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Paraguay	6,741	56.5	1,258	0	..	0	..	0	..	0	..	4,465	113.6	2,276	2.6		
Peru	9,687	(11.1)	384	15	(82.3)	5,494	(17.1)	647	23.8	0	..	1,250	38.3	2,280	(20.9)		
Suriname	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Uruguay	920	2.3	278	0	..	0	..	0	..	0	..	473	40.9	447	(26.1)		
Venezuela	212,620	61.0	8,969	5,095	228.4	175,833	61.0	25,944	46.1	0	..	5,208	74.7	541	5.4		
<b>OCEANIA</b>	<b>227,112</b>	<b>44.9</b>	<b>7,545</b>	..	..	..	..	..	..	..	..	..	..	..	..		
Australia	211,913	46.0	11,193	153,291	52.3	25,059	(3.0)	27,064	100.6	0	..	1,434	15.4	4,886	23.5		
Fiji	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
New Zealand	15,198	31.8	4,056	2,071	35.2	2,126	12.3	4,809	23.1	0	..	2,024	6.2	3,779	41.1		
Papua New Guinea	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Solomon Islands	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
<b>DEVELOPED</b>	<b>4,927,331</b>	<b>48.1</b>	<b>3,760</b>	<b>1,302,566</b>	..	<b>1,227,279</b>	..	<b>1,439,576</b>	..	<b>610,232</b>	..	<b>131,578</b>	..	<b>189,834</b>	..		
<b>DEVELOPING</b>	<b>4,821,563</b>	<b>32.6</b>	<b>1,033</b>	<b>969,806</b>	<b>36.0</b>	<b>2,290,314</b>	<b>28.2</b>	<b>574,213</b>	<b>86.3</b>								

# Technical Notes

## VARIABLE DEFINITIONS AND METHODOLOGY:

**Energy Production** is the production of primary energy that is extracted from the ambient environment. In addition to solid, liquid, and gaseous fuels and nuclear electricity, the total also includes hydropower, geothermal, solar, combustible renewables and waste, and indigenous heat production from heat pumps. These data show the amount of electricity and heat produced specifically for human consumption.

Production is measured in a common unit of 1,000 metric tons of oil equivalent (toe). One metric toe is equal to the net heat content of a metric ton of crude oil and can also be expressed as 10 Exp. 7 kilocalories (equivalent to a food calorie) or 41.868 gigajoules.

**Total From All Sources** is total production from all energy sources including fossil fuels, nuclear electricity, hydroelectric plants, modern renewables, and renewable fuels and wastes.

**Per capita** values are calculated by the World Resources Institute as the amount of energy (in kilograms of oil equivalent) produced per person, regardless of source. Population data are from the United Nations Population Division. Energy production data are from the IEA.

**Solid Fuels** shows the energy produced by coal and all coal products, such as peat and coke.

**Liquid Fuels** shows the energy produced by crude oil or natural gas liquids. These include motor and aviation gasoline, kerosene, diesel oil, and petrochemical feedstocks, which refer to all oil products used as raw material in the petrochemical industry for steamcracking, aromatics plants. e.g. naphtha, liquefied petroleum gases, light and heavy gasoil, reformat, etc.

**Gaseous Fuels** shows the amount of energy produced by natural gases, occurring in underground deposits, whether liquefied or gaseous, consisting mainly of methane. Gaseous Fuels include "non-associated" gas from fields producing gaseous hydrocarbons, and "associated" gas produced in association with crude oil, and methane recovered from coal mines (colliery gas).

**Nuclear** energy production shows the primary heat equivalent of the electricity produced by nuclear power plants. Heat-to-electricity conversion efficiency is assumed to be 33 percent.

**Hydroelectric** refers to the energy content of the electricity produced in hydroelectric power plants, which convert the potential and kinetic energy of water into electricity. This variable excludes output from pumped storage.

**Other Renewables** shows the amount of energy produced by renewable sources such as wind; tide, wave and ocean; thermal and photovoltaic solar; primary solid biomass from plant matter; liquid biomass fuels such as ethanol; biogas from digesters; and geothermal systems.

The energy production values presented here are calculated by the International Energy Agency (IEA). Their energy balance methodology is based on the calorific content of energy commodities, measured in a common unit of account known as the metric ton of oil equivalent (toe). This quantity of energy, defined as 10 Exp. 7 kilocalories or 41.868 gigajoules, is equal to the net heat content of 1 metric ton of crude oil. To account for the differences in quality between types of coal and other energy sources, the IEA has applied specific conversion factors supplied by national administrations for the main categories of energy sources and flows or uses (i.e. production, imports, exports, industry). Energy statistics are expressed in terms of net calorific value and therefore may be slightly lower than statistics presented elsewhere using gross calorific value. For oil and coal, net calorific value is 5 percent less than gross; for most forms of natural and manufactured gas, the difference is 9-10 percent. Using net calorific values is consistent with the United Nations and European Community statistical offices.

When calculating the primary energy equivalent for sources such as nuclear, geothermal, solar, hydro, wind, etc., the IEA uses the physical energy content of the source's primary energy form. The IEA assumes that a source's primary energy form is the first energy form for which multiple energy uses are practical. In the case

of nuclear energy, for instance, the quantity of heat generated in the reactors, rather than the energy content of the nuclear fuel, is reported as the primary energy form. Heat is also the chosen form for geothermal heat and electricity production, and solar heat production. Electricity is the chosen form for hydro, wind, wave/ocean and photovoltaic solar electricity production.

The IEA has two primary methods of obtaining data. Firstly, the IEA sends out 5 annual questionnaires to each OECD member country to collect energy data for the preceding two years. The questionnaires address each of the following subjects: crude oil and petroleum products; natural gas; electricity and heat; solid fuels and manufacture gases; and renewables and wastes. The IEA gathers further data through its Monthly Oil Statistics questionnaires and various mini-questionnaires. Data for non-OECD countries are collected by way of other international organizations, i.e. United Nations, OLADE; close cooperation with national statistical bodies; direct contacts with energy consultants and companies; publications; and questionnaires for UN-ECE countries (identical to those sent to OECD member countries).

#### **FREQUENCY OF UPDATE BY DATA PROVIDERS:**

IEA updates their energy data annually. The UN Population Division updates the figures used for per capita calculations every other year. These updates also often include revisions of past data. Data may therefore differ from those reported in prior EarthTrends data tables.

#### **DATA RELIABILITY AND CAUTIONARY NOTES:**

**Energy:** The energy balances data are primarily based on well-established and institutionalized accounting methodologies, and are therefore considered reliable. One exception is the calculation of fuelwood and other biomass fuel use, which are estimated by the IEA based on small sample surveys or other incomplete information. These data give only a broad impression of trends and should not be strictly compared between countries. The IEA also reports that it can be difficult to distinguish between agriculture, commercial, and public sectors, and there may be some overlap in these sectors.

IEA data do not distinguish between no data (denoted in these tables with X) and zero values. WRI has distinguished between the two where possible, but some values represented as zero should probably be indicated by X and vice versa.

Extreme caution should be exercised if considering using the data to extrapolate into the future. Energy usage is extremely variable from year to year due to short-term factors such as the weather and the economy that significantly impact any one year's production.

**Population** (per capita calculations): United Nations demographic models are based on recent surveys and censuses with well-understood qualities, which make these data fairly reliable, although accuracy varies. Data are adjusted for overenumeration and underenumeration of certain age and sex groups (e.g., infants, female children, and young males), misreporting of age and sex distributions, and changes in definitions, when necessary. These adjustments incorporate data from civil registrations, population surveys, earlier censuses, and, when necessary, population models based on information from socioeconomically similar countries. Historical data are used when deemed accurate, also with adjustments and scaling. However, accurate historical data do not exist for many developing countries. In such cases, the UN Population Division uses available information and demographic models to estimate the main demographic parameters.

#### **SOURCES:**

**Energy:** International Energy Agency (IEA), 2001. *Energy Balances of OECD Countries (2001 Edition)* and *Energy Balances of non-OECD Countries (2001 Edition)*. Paris: Organization for Economic Cooperation and Development (OECD). Electronic database available online at: <http://data.iea.org/>.

**Population** (for per capita calculations): Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat, 2002. *World Population Prospects: The 2000 Revision*. New York: United Nations. Dataset available on CD-ROM.