

# Energy Consumption by Source

Source: International Energy Agency

EarthTrends Data Tables:

Energy  
and  
Resources



	Total Consumption From:														
	All Sources			Non-Renewable Energy Sources								Renewable Energy Sources			
	(1000 metric toe) (e)	Percent Change Since 1989	Per Capita (kg oil equivalent) 1999	Solid Fuels (a)		Liquid Fuels (b)		Gaseous Fuels (c)		Nuclear Fuels		Hydroelectric		Other (d)	
				(1000 metric toe) (e)	Percent Change Since 1989	(1000 metric toe) (e)	Percent Change Since 1989	(1000 metric toe) (e)	Percent Change Since 1989	(1000 metric toe) (e)	Percent Change Since 1989	(1000 metric toe) (e)	Percent Change Since 1989	(1000 metric toe) (e)	Percent Change Since 1989
<b>WORLD</b>	<b>9,702,786</b>	<b>12.7</b>	<b>1,623</b>	<b>2,278,524</b>	<b>2.5</b>	<b>3,563,084</b>	<b>9.0</b>	<b>2,012,559</b>	<b>22.4</b>	<b>661,901</b>	<b>30.8</b>	<b>222,223</b>	<b>23.6</b>	<b>1,097,889</b>	<b>25.3</b>
<b>ASIA (EXCL. MIDDLE EAST)</b>	<b>2,919,333</b>	<b>43.1</b>	<b>867</b>	<b>1,013,218</b>	<b>30.8</b>	<b>829,930</b>	<b>64.5</b>	<b>277,374</b>	<b>166.7</b>	<b>117,291</b>	<b>91.6</b>	<b>44,424</b>	<b>43.9</b>	<b>578,643</b>	<b>12.8</b>
Armenia	1,845	..	487	1	..	0	..	994	..	542	..	103	..	1	..
Azerbaijan	12,574	..	1,575	0	..	9,515	..	5,105	..	0	..	130	..	4	..
Bangladesh	17,935	44.4	133	46	(63.2)	1,098	(8.4)	6,861	86.3	0	..	72	(9.5)	7,469	13.7
Bhutan	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Cambodia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
China (f)	1,088,349	29.2	861	624,117	23.6	189,645	60.5	26,058	106.8	3,896	..	17,527	72.1	212,938	7.7
Georgia	2,573	..	487	12	..	64	..	690	..	0	..	554	..	70	..
India	480,418	38.1	484	157,169	52.8	79,557	51.5	20,754	133.5	3,409	182.8	7,004	31.2	198,107	14.4
Indonesia	136,121	57.3	650	11,573	240.1	47,300	29.2	27,829	119.8	0	..	806	25.8	49,094	19.8
Japan	515,447	23.6	4,064	87,593	19.7	223,494	24.5	62,110	52.9	82,512	73.1	7,432	(5.8)	8,325	10.6
Kazakhstan	35,439	..	2,180	20,113	..	7,484	..	6,874	..	0	..	527	..	73	..
Korea, Dem People's Rep	58,925	1.2	2,665	52,630	5.6	2,029	(30.5)	0	..	0	..	1,815	(33.5)	1,001	6.0
Korea, Rep	181,365	128.2	3,908	36,998	49.0	123,298	202.8	15,160	540.1	26,859	117.6	358	(9.4)	270	..
Kyrgyzstan	2,451	..	506	510	..	184	..	503	..	0	..	1,044	..	4	..
Lao People's Dem Rep	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Malaysia	42,650	109.3	1,957	801	1.7	21,248	130.6	16,583	156.8	0	..	647	70.7	2,470	20.9
Mongolia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Myanmar	12,897	17.9	274	27	(51.7)	1,049	42.1	1,301	46.7	0	..	65	(38.8)	9,504	3.8
Nepal	8,051	37.1	358	211	2825.0	0	..	0	..	0	..	98	58.2	6,937	25.0
Pakistan	59,830	43.6	435	2,147	21.8	6,904	19.0	14,164	40.2	74	846.4	1,931	32.3	23,462	28.8
Philippines	40,728	49.5	549	3,718	232.9	16,729	67.3	6	..	0	..	674	20.9	18,474	30.3
Singapore	22,693	130.5	5,791	0	..	45,324	30.3	1,423	..	0	..	0	..	0	..
Sri Lanka	7,728	41.7	412	1	12.9	1,890	52.8	0	..	0	..	359	48.8	4,189	6.3
Tajikistan	3,344	..	555	53	..	13	..	640	..	0	..	1,327	..	0	..
Thailand	70,415	85.3	1,136	7,316	162.4	38,107	244.2	15,028	221.2	0	..	278	(41.9)	13,844	(2.5)
Turkmenistan	13,644	..	2,943	0	..	6,838	..	10,711	..	0	..	0	..	0	..
Uzbekistan	49,383	..	2,017	1,021	..	7,748	..	40,288	..	0	..	489	..	0	..
Viet Nam	35,209	48.1	457	3,232	24.8	0	..	920	13832.0	0	..	1,185	258.9	22,340	20.9
<b>EUROPE</b>	<b>2,559,701</b>	<b>..</b>	<b>3,516</b>	<b>480,313</b>	<b>..</b>	<b>906,066</b>	<b>..</b>	<b>786,787</b>	<b>..</b>	<b>303,885</b>	<b>..</b>	<b>60,847</b>	<b>..</b>	<b>64,845</b>	<b>..</b>
Albania	1,052	(63.5)	336	8	(99.2)	340	(72.0)	12	(95.8)	0	..	451	70.2	60	(84.1)
Austria	28,432	18.0	3,516	3,053	(17.8)	9,200	14.1	6,829	43.6	0	..	3,482	14.8	3,062	14.4
Belarus	23,895	..	2,337	790	..	11,495	..	13,966	..	0	..	2	..	794	..
Belgium	58,642	21.2	5,731	7,479	(28.0)	32,840	20.6	13,336	66.4	12,774	18.9	29	11.8	373	75.2
Bosnia and Herzegovina	2,008	..	522	393	..	0	..	245	..	0	..	138	..	175	..
Bulgaria	18,203	(41.0)	2,264	6,453	(31.2)	5,773	(56.9)	2,685	(47.4)	4,128	8.8	237	2.3	406	123.6
Croatia	8,156	..	1,753	231	..	5,935	..	2,189	..	0	..	567	..	278	..
Czech Rep	38,584	(21.8)	3,751	18,559	(40.1)	6,206	(31.2)	7,727	52.9	3,481	7.6	144	2.3	514	..
Denmark (g)	20,070	13.4	3,783	4,635	(16.4)	9,113	11.5	4,423	163.0	0	..	3	18.5	1,176	61.9
Estonia	4,557	..	3,231	2,618	..	0	..	576	..	0	..	0	..	507	..
Finland	33,372	13.9	6,463	5,289	6.4	12,193	35.7	3,337	79.3	5,987	20.3	1,099	(1.9)	6,146	45.1
France (h)	255,043	14.8	4,321	15,267	(26.7)	82,404	6.4	34,471	41.6	102,742	29.7	6,227	55.3	10,001	14.1
Germany (i)	337,196	(6.4)	4,111	79,383	(41.6)	109,463	17.4	71,975	30.7	44,304	4.9	1,671	6.7	2,075	(18.6)
Greece	26,894	23.8	2,539	8,808	10.3	17,229	9.3	1,218	800.8	0	..	395	141.7	1,052	98.0
Hungary	25,289	(16.5)	2,524	4,217	(39.7)	7,466	(17.7)	9,902	5.7	3,674	1.5	16	14.6	333	(30.9)
Iceland	3,173	57.2	11,452	57	(7.0)	0	..	0	..	0	..	520	42.0	1,753	85.0
Ireland	13,979	43.9	3,715	2,489	(34.5)	2,886	88.7	2,996	62.7	0	..	73	22.3	184	367280.0
Italy	169,041	12.0	2,938	11,755	(14.5)	93,123	9.4	55,553	50.8	0	..	3,901	33.2	4,403	46.6
Latvia	3,822	..	1,569	91	..	0	..	990	..	0	..	237	..	913	..
Lithuania	7,909	..	2,137	136	..	4,685	..	1,825	..	2,627	..	36	..	591	..
Macedonia, FYR	3,058	..	1,512	1,749	..	613	..	33	..	0	..	119	..	211	..
Moldova, Rep	2,813	..	653	108	..	0	..	2,028	..	0	..	7	..	59	..
Netherlands (j)	74,068	13.7	4,690	7,451	(8.5)	62,706	13.1	34,571	10.9	999	(4.7)	8	143.4	456	163.6
Norway	26,606	22.3	5,980	1,059	10.7	15,488	39.2	4,756	164.5	0	..	10,398	2.1	1,349	65.3
Poland	93,382	(23.2)	2,417	60,897	(34.8)	17,728	17.9	8,937	(6.1)	0	..	185	33.9	3,567	127.7
Portugal (k)	23,627	47.2	2,364	3,789	47.6	13,757	27.1	1,939	..	0	..	626	25.0	1,257	10.7
Romania	36,432	(47.3)	1,621	6,851	(60.2)	10,429	(65.3)	13,727	(57.2)	1,362	..	1,573	44.8	2,834	335.5
Russian Federation	602,952	..	4,124	109,082	..	175,116	..	314,473	..	32,120	..	13,802	..	4,996	..
Serbia and Montenegro	13,375	..	1,266	7,192	..	1,771	..	1,451	..	0	..	1,150	..	210	..
Slovakia	17,991	(20.4)	3,335	5,157	(39.6)	5,382	(32.4)	5,794	24.4	3,418	7.9	390	131.1	76	(41.0)
Slovenia	6,506	..	3,268	1,416	..	295	..	854	..	1,224	..	322	..	237	..
Spain (l)	118,467	32.9	2,970	19,264	(2.2)	60,854	13.9	13,286	197.9	15,337	4.9	1,966	18.2	3,981	12.9
Sweden	51,094	8.9	5,773	2,535	(8.0)	18,420	13.5	714	66.8	19,073	11.6	6,157	(0.2)	8,151	57.5
Switzerland (m)	26,689	14.3	3,722	95	(73.5)	5,269	66.3	2,446	60.5	6,753	13.1	3,440	34.4	667	131.5
Ukraine	148,389	..	2,966	46,565	..	14,146	..	63,806	..	18,790	..	1,008	..	262	..
United Kingdom	230,324	8.8	3,886	35,280	(43.9)	93,741	1.9	83,061	81.6	25,091	34.2	460	12.7	1,717	269.9
<b>MIDDLE EAST &amp; N. AFRICA</b>	<b>518,436</b>	<b>46.1</b>	<b>1,302</b>	<b>30,956</b>	<b>46.9</b>	<b>412,549</b>	<b>17.1</b>	<b>205,143</b>	<b>95.8</b>	<b>0</b>	<b>..</b>	<b>5,694</b>	<b>48.1</b>	<b>11,939</b>	<b>2.0</b>
Afghanistan	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Algeria	28,280	27.8	950	535	(40.9)	30,025	19.0	19,849	46.9	0	..	60	209.7	76	422.8
Egypt	44,490	44.7	667	898	2.6	32,104	34.0	13,816	113.0	0	..	1,315	53.3	1,282	26.5
Iran, Islamic Rep	103,635	68.4	1,497	1,271	94.8	70,184	58.6	49,671	281.1	0	..	427	(33.9)	786	19.0
Iraq	28,802	17.9	1,290	0	..	24,600	1.5	4,126	(35.5)	0	..	5			

# Energy Consumption by Source



	Total Consumption from:														
	All Sources			Non-Renewable Energy Sources								Renewable Energy Sources			
	(1000 metric toe) (e)	Percent Change Since 1989	Per Capita (kg oil equivalent) 1999	Solid Fuels (a)		Liquid Fuels (b)		Gaseous Fuels (c)		Nuclear Fuels		Hydroelectric		Other (d)	
				(1000 metric toe) (e)	Percent Change Since 1989	(1000 metric toe) (e)	Percent Change Since 1989	(1000 metric toe) (e)	Percent Change Since 1989	(1000 metric toe) (e)	Percent Change Since 1989	(1000 metric toe) (e)	Percent Change Since 1989	(1000 metric toe) (e)	Percent Change Since 1989
1999	1989	1999	1999	1989	1999	1989	1999	1989	1999	1989	1999	1989	1999	1989	
<b>SUB-SAHARAN AFRICA</b>	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Angola	7,591	28.7	595	0	..	2,268	33.2	457	227.4	0	..	77	25.9	5,482	29.8
Benin	1,973	19.5	323	0	..	0	..	0	..	0	..	0	..	1,511	(0.9)
Botswana	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Burkina Faso	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Burundi	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Cameroon	6,103	22.5	419	0	..	1,454	14.7	0	..	0	..	287	25.2	4,877	31.2
Central African Rep	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Chad	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Congo	720	(31.3)	246	0	..	0	..	0	..	0	..	8	(76.1)	571	(20.1)
Congo, Dem Rep	14,525	26.0	293	217	(0.6)	73	(80.1)	0	..	0	..	489	(17.8)	13,238	36.8
Côte d'Ivoire	6,052	34.8	386	0	..	3,697	46.3	1,267	..	0	..	101	(26.5)	4,113	34.3
Equatorial Guinea	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Eritrea (n)	681	..	193	0	..	0	..	0	..	0	..	0	..	467	..
Ethiopia (o)	18,227	24.9	297	0	..	0	..	0	..	0	..	138	122.6	17,038	25.5
Gabon	1,608	16.4	1,341	0	..	834	(7.0)	68	(4.2)	0	..	60	3.0	901	26.7
Gambia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Ghana	7,108	37.7	376	0	..	794	(17.9)	0	..	0	..	344	(23.6)	5,196	36.2
Guinea	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Guinea-Bissau	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Kenya	14,690	18.8	489	45	(44.3)	1,800	(20.6)	0	..	0	..	282	32.6	11,848	19.9
Lesotho	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Liberia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Madagascar	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Malawi	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mali	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mauritania	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Mozambique	6,985	(5.5)	389	0	..	0	..	0	246.2	0	..	588	2307.1	6,468	(5.7)
Namibia	1,108	..	643	3	..	0	..	0	..	0	..	101	..	169	..
Niger	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Nigeria	87,286	25.7	787	37	12.1	9,349	(27.9)	5,261	51.6	0	..	486	36.4	72,390	31.3
Rwanda	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Senegal	2,957	36.9	322	0	..	868	43.4	5	(21.5)	0	..	0	..	1,678	27.2
Sierra Leone	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Somalia	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
South Africa	109,334	17.3	2,557	81,524	17.4	17,636	52.4	1,518	..	3,345	15.7	62	(73.7)	12,466	20.3
Sudan	15,372	52.4	505	0	..	598	9.3	0	..	0	..	95	23.5	13,426	56.9
Tanzania, United Rep	15,033	22.7	438	3	23.2	628	11.6	0	..	0	..	187	53.6	14,079	23.5
Togo	1,373	44.8	313	0	..	0	..	0	..	0	..	0	0.0	1,014	34.5
Uganda	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Zambia	6,190	19.0	608	104	(54.8)	250	(59.3)	0	..	0	..	690	20.0	4,985	26.6
Zimbabwe	10,170	15.2	820	2,471	(16.9)	0	..	0	..	0	..	254	(11.4)	5,487	18.7
<b>NORTH AMERICA</b>	<b>2,511,765</b>	<b>15.2</b>	<b>8,075</b>	<b>567,286</b>	<b>16.2</b>	<b>962,164</b>	<b>11.6</b>	<b>592,290</b>	<b>18.4</b>	<b>221,874</b>	<b>32.4</b>	<b>54,524</b>	<b>15.8</b>	<b>94,243</b>	<b>334.4</b>
Canada	241,780	10.9	7,929	27,838	0.7	93,679	13.7	70,303	25.2	19,152	(10.2)	29,711	18.6	10,872	26.3
United States (p)	2,269,985	15.7	8,095	539,448	17.1	868,485	11.4	521,987	17.6	202,722	38.6	24,813	12.6	83,372	537.1
<b>C. AMERICA &amp; CARIBBEAN</b>	<b>205,471</b>	<b>22.9</b>	<b>1,207</b>	<b>6,773</b>	<b>95.1</b>	<b>113,220</b>	<b>2.1</b>	<b>39,308</b>	<b>53.7</b>	<b>2,607</b>	<b>2588.6</b>	<b>4,236</b>	<b>33.9</b>	<b>28,821</b>	<b>4.2</b>
Belize	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Costa Rica	3,052	56.9	776	0	..	0	..	0	..	0	..	441	54.1	881	24.5
Cuba	12,464	(26.1)	1,117	24	(83.5)	2,747	(66.6)	376	1252.7	0	..	8	19.6	2,837	(45.2)
Dominican Rep	7,451	86.4	905	144	2240.0	2,031	4.5	0	..	0	..	95	131.9	1,396	43.9
El Salvador	4,005	61.6	651	1	..	1,039	48.1	0	..	0	..	152	24.0	1,984	28.2
Guatemala	6,074	46.5	548	0	..	923	41.3	0	..	0	..	229	42.1	3,053	6.9
Haiti	2,067	27.9	258	0	..	0	..	0	..	0	..	23	(34.0)	1,555	24.7
Honduras	3,267	36.2	522	34	5198.5	0	..	0	..	0	..	183	6.8	1,633	11.9
Jamaica	4,136	68.6	1,619	44	28.6	633	(25.5)	0	..	0	..	10	(8.6)	631	111.2
Mexico	148,991	23.4	1,530	6,489	98.8	84,928	3.4	30,952	47.3	2,607	2588.6	2,819	34.7	12,908	11.7
Nicaragua	2,664	28.9	539	0	..	828	48.6	0	..	0	..	34	(31.3)	1,449	4.3
Panama	2,347	67.1	835	37	215.7	2,485	163.1	0	..	0	..	242	29.1	462	13.3
Trinidad and Tobago	8,022	56.8	6,225	0	..	6,691	77.0	7,980	76.2	0	..	0	..	32	(16.5)
<b>SOUTH AMERICA</b>	<b>383,514</b>	<b>34.4</b>	<b>1,126</b>	<b>20,749</b>	<b>15.0</b>	<b>217,212</b>	<b>26.3</b>	<b>74,583</b>	<b>62.3</b>	<b>2,888</b>	<b>61.3</b>	<b>43,346</b>	<b>50.6</b>	<b>65,288</b>	<b>0.9</b>
Argentina	63,182	38.9	1,727	678	(34.0)	28,625	21.4	31,295	56.8	1,852	41.0	1,864	62.7	2,978	90.6
Bolivia	4,572	73.9	562	0	..	1,912	54.3	1,262	116.7	0	..	154	53.6	846	21.8
Brazil	179,701	30.8	1,068	12,876	18.8	82,804	33.7	5,422	116.9	1,036	117.3	25,188	43.1	43,060	(6.8)
Chile	25,348	95.6	1,688	4,255	80.1	9,479	65.4	4,844	241.0	0	..	1,222	34.8	4,047	60.1
Colombia	28,081	17.8	678	2,505	(19.6)	15,999	27.9	4,894	53.4	0	..	2,902	26.6	5,259	(4.9)
Ecuador	8,750	45.4	705	0	..	7,228	31.8	258	88.5	0	..	620	45.6	1,383	28.3
Guyana	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Paraguay	4,140	28.9	773	0	..	116	(60.1)	0	..	0	..	4,465	113.6	2,276	2.7
Peru	13,101	15.3	519	400	129.0	6,108	(19.2)	647	54.5	0	..	1,251	38.2	4,409	16.0
Suriname	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Uruguay	3,232	32.9	976	0	..	1,601	36.6	19	..	0	..	473	40.9	488	(16.7)
Venezuela	53,406	32.9	2,253	37	(93.0)	63,341	20.7	25,944	46.1	0	..	5,208	74.7	541	5.7
<b>OCEANIA</b>	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Australia	107,930	26.6	5,701	47,364	35.3	36,291	12.6	18,207	35.0	0	..	1,434	15.4	5,177	38.5
Fiji	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
New Zealand	18,176	37.1	4,850	1,081	(7.6)	5,750	26.4	4,808	23.5	0	..	2,023	6.1	3,502	57.3
Papua New Guinea	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Solomon Islands	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
<b>DEVELOPED</b>	<b>5,962,100</b>	..	<b>4,550</b>	<b>1,292,603</b>	..	<b>2,194,548</b>	..	<b>1,531,532</b>	..	<b>612,157</b>	..	<b>130,499</b>	..	<b>189,254</b>	..
<b>DEVELOPING</b>	<b>3,597,314</b>	<b>38.5</b>	<b>771</b>	<b>959,543</b>	<b>28.7</b>	<b>1,328,884</b>	<b>35.7</b>	<b>475,546</b>							

## Technical Notes

---

### **VARIABLE DEFINITIONS AND METHODOLOGY:**

**Energy Consumption** is the total amount of primary energy consumed by each country in the year specified. 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. Primary energy includes losses from transportation, friction, heat loss and other inefficiencies. Specifically, consumption equals indigenous production plus imports, minus exports, plus stock changes, minus international marine bunkers. IEA calls this value Total Primary Energy Supply (TPES).

Consumption 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 consumption from all energy sources including fossil fuels, nuclear fuels, 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) consumed per person, regardless of source. Population data are from the United Nations Population division. Energy consumption data are from the IEA.

**Solid Fuels** shows energy consumed from coal and all coal products, such as peat and coke.

**Liquid Fuels** shows energy consumed from 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 steam cracking, aromatics plants. e.g. naphtha, liquefied petroleum gases, light and heavy gas oil, reformat, etc.

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

**Nuclear** energy consumption 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 consumed from 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 energy consumed from 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:** IEA energy balances data are primarily based on well-established and institutionalized accounting methodologies, and are therefore considered reliable. One exception is the calculation of fuel wood 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 ..) and zero values. WRI has distinguished between the two where possible, but some values represented as zero should probably be indicated by .. 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 over-enumeration and under-enumeration 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 socio-economically 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** (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.