

# Energy Consumption by Source 2005

Source: International Energy Association (IEA)

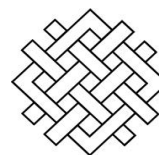
EarthTrends

Data Tables:

Energy

Consumption by

Source



	Total Energy Production (1000 metric toe) {a} 2001	Total Energy Consumption (1000 metric toe) {a} 2001	Energy Consumption (as a percent of total consumption) by Source										
			Non-Renewable Energy Sources					Renewable Energy Sources					
			Coal & Products	Oil (b)	Natural Gas	Nuclear	Hydro-electric	Solid Biomass	Biogas & Liquid Biomass	Geo-thermal	Solar	Wind	Tide, Wave & Ocean
<b>WORLD</b>	<b>10,209,142</b>	<b>10,029,096</b>	<b>25.2</b>	<b>36.8</b>	<b>26.0</b>	<b>7.5</b>	<b>2.4</b>	<b>10.0</b>	<b>0.17</b>	<b>0.43</b>	<b>0.60</b>	<b>0.03</b>	<b>0.00</b>
<b>ASIA (EXCL. MIDDLE EAST)</b>	<b>2,492,938</b>	<b>3,145,549</b>	<b>34.2</b>	<b>30.8</b>	<b>10.3</b>	<b>4.2</b>	<b>1.6</b>	<b>18.2</b>	<b>0.04</b>	<b>0.46</b>	<b>0.50</b>	<b>0.01</b>	<b>0.00</b>
Armenia	602	2,297	0.0	25.5	49.7	22.6	3.6	0.0	0.00	0.00	0.00	0.00	0.00
Azerbaijan	19,581	11,582	0.0	36.0	62.5	0.0	1.0	0.0	0.00	0.00	0.00	0.00	0.00
Bangladesh	16,200	20,410	1.7	19.4	40.6	0.0	0.4	37.9	0.00	0.00	0.00	0.00	0.00
Bhutan	..	..	..	..	..	..	..	..	..	..	..	..	..
Cambodia	..	..	..	..	..	..	..	..	..	..	..	..	..
China	1,138,617	1,139,369	55.9	19.9	2.8	0.4	2.1	18.8	0.11	0.00	0.00	0.00	0.00
Georgia	1,265	2,413	0.5	17.9	33.7	0.0	19.8	26.7	0.00	0.41	0.00	0.00	0.00
India	438,099	531,453	33.8	21.1	4.4	0.9	1.2	38.5	0.00	0.00	0.00	0.03	0.00
Indonesia	234,314	152,304	10.6	35.9	19.7	0.0	0.6	31.6	0.00	1.68	0.00	0.00	0.00
Japan	104,092	520,729	19.2	49.2	12.4	16.0	1.4	0.7	0.00	0.57	0.14	0.00	0.00
Kazakhstan	83,752	40,324	51.9	23.9	21.5	0.0	1.7	0.2	0.00	0.00	0.00	0.00	0.00
Korea, Dem People's Rep	19,251	20,440	85.1	5.5	0.0	0.0	4.5	4.9	0.00	0.00	0.00	0.00	0.00
Korea, Rep	34,207	194,780	22.1	51.9	9.6	15.0	0.2	0.1	0.02	0.00	0.00	0.00	0.00
Kyrgyzstan	1,353	2,235	14.3	18.6	26.2	0.0	47.8	0.2	0.00	0.00	0.00	0.00	0.00
Laos People's Dem Rep	..	..	..	..	..	..	..	..	..	..	..	..	..
Malaysia	77,623	51,608	4.0	50.1	40.1	0.0	1.2	4.7	0.00	0.00	0.00	0.00	0.00
Mongolia	..	..	..	..	..	..	..	..	..	..	..	..	..
Myanmar	15,275	12,159	0.3	13.0	8.0	0.0	1.3	77.4	0.00	0.00	0.00	0.00	0.00
Nepal	7,338	8,416	3.5	9.3	0.0	0.0	1.9	84.9	0.38	0.00	0.00	0.00	0.00
Pakistan	48,606	64,506	3.2	29.1	27.0	0.0	2.5	37.2	0.00	0.00	0.00	0.00	0.00
Philippines	20,006	42,151	12.1	42.0	0.0	0.0	1.4	23.1	0.00	21.30	0.00	0.00	0.00
Singapore	64	29,158	0.0	86.0	13.7	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00
Sri Lanka	4,462	7,923	0.0	43.7	0.0	0.0	3.4	52.9	0.00	0.00	0.00	0.00	0.00
Tajikistan	1,267	3,036	1.7	38.4	16.3	0.0	39.8	0.0	0.00	0.00	0.00	0.00	0.00
Thailand	40,059	75,542	11.4	43.4	27.0	0.0	0.7	17.1	0.00	0.00	0.00	0.00	0.00
Turkmenistan	50,443	15,309	0.0	26.0	75.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00
Uzbekistan	55,630	50,650	1.8	13.9	83.1	0.0	1.0	0.0	0.00	0.00	0.00	0.00	0.00
Viet Nam	50,346	39,356	12.8	21.0	4.0	0.0	4.0	58.3	0.00	0.00	0.00	0.00	0.00
<b>EUROPE</b>	<b>2,310,017</b>	<b>2,671,025</b>	<b>18.8</b>	<b>32.5</b>	<b>30.9</b>	<b>12.0</b>	<b>2.5</b>	<b>2.3</b>	<b>0.13</b>	<b>0.21</b>	<b>0.34</b>	<b>0.09</b>	<b>0.00</b>
Albania	673	1,715	1.2	64.2	0.4	0.0	17.8	7.5	0.00	0.00	0.12	0.00	0.00
Austria	9,717	30,721	12.2	42.8	22.6	0.0	11.7	9.0	0.23	0.07	0.22	0.05	0.00
Belarus	3,533	24,415	2.9	30.7	59.2	0.0	0.0	3.7	0.00	0.00	0.00	0.00	0.00
Belgium	13,082	59,001	13.1	41.1	22.3	20.5	0.1	0.6	0.07	0.00	0.00	0.01	0.00
Bosnia and Herzegovina	3,277	4,359	61.0	21.6	5.3	0.0	10.0	4.1	0.00	0.00	0.00	0.00	0.00
Bulgaria	10,325	19,476	37.4	21.8	14.1	26.2	0.8	2.8	0.00	0.00	0.00	0.00	0.00
Croatia	3,720	7,904	6.1	50.7	29.3	0.0	6.8	3.7	0.00	0.00	0.00	0.00	0.00
Czech Rep	30,489	41,396	50.9	20.3	19.4	9.3	0.4	0.9	0.20	0.00	0.00	0.00	0.00
Denmark	27,171	19,783	21.2	44.1	23.4	0.0	0.0	5.0	0.37	0.02	0.04	1.87	0.00
Estonia	2,989	4,697	58.3	16.2	15.1	0.0	0.0	11.4	0.04	0.00	0.00	0.00	0.00
Finland	15,156	33,815	18.1	27.9	11.0	17.6	3.4	18.7	0.05	0.00	0.00	0.02	0.00
France	133,195	265,570	4.8	35.3	13.8	41.3	2.4	3.6	0.17	0.05	0.01	0.00	0.02
Germany	133,745	351,092	24.2	38.3	21.5	12.7	0.5	1.3	0.28	0.00	0.04	0.26	0.00
Greece	9,965	28,704	32.4	56.2	5.9	0.0	0.6	3.3	0.11	0.01	0.35	0.23	0.00
Hungary	10,824	25,340	14.3	26.1	42.3	14.6	0.1	1.3	0.01	0.02	0.00	0.00	0.00
Iceland	2,451	3,363	2.7	24.4	0.0	0.0	16.8	0.0	0.00	56.02	0.00	0.00	0.00
Ireland	1,729	14,981	17.5	57.0	23.9	0.0	0.3	1.0	0.19	0.00	0.00	0.19	0.00
Italy	26,264	171,998	7.8	50.3	33.8	0.0	2.3	1.0	0.09	1.85	0.01	0.06	0.00
Latvia	1,717	4,297	2.3	29.4	29.6	0.0	5.7	29.3	0.00	0.00	0.00	0.00	0.00
Lithuania	4,152	8,023	1.1	30.1	27.1	37.2	0.3	8.2	0.00	0.00	0.00	0.00	0.00
Macedonia, FYR	1,572	2,608	56.7	30.5	2.8	0.0	2.1	5.7	0.00	0.88	0.00	0.00	0.00
Moldova, Rep	62	3,140	2.2	15.8	74.1	0.0	0.2	1.9	0.00	0.00	0.00	0.00	0.00
Netherlands	60,437	77,214	10.8	38.1	46.0	1.3	0.0	0.7	0.21	0.00	0.01	0.09	0.00
Norway	226,570	26,607	3.5	30.4	20.4	0.0	38.9	5.0	0.09	0.00	0.00	0.01	0.00
Poland	80,728	90,570	61.5	22.7	11.5	0.0	0.2	4.2	0.05	0.00	0.00	0.00	0.00
Portugal	3,396	24,732	12.9	64.2	9.1	0.0	4.9	7.6	0.00	0.37	0.08	0.09	0.00
Romania	28,222	36,841	22.0	28.8	35.8	3.9	3.5	5.8	0.00	0.01	0.00	0.00	0.00
Russian Federation	996,161	621,349	17.2	21.4	52.3	5.8	2.4	0.6	0.00	0.01	0.00	0.00	0.00
Serbia and Montenegro	10,774	16,061	49.3	25.3	11.9	0.0	6.2	5.0	0.00	0.00	0.00	0.00	0.00
Slovakia	6,816	18,717	23.6	16.7	32.9	24.1	2.3	1.4	0.14	0.05	0.00	0.00	0.00
Slovenia	3,161	6,838	20.9	36.8	13.1	20.0	4.8	5.9	0.06	0.00	0.00	0.00	0.00
Spain	33,022	127,381	14.7	52.7	12.9	13.0	2.8	2.9	0.15	0.01	0.03	0.47	0.00
Sweden	34,377	51,054	5.4	27.5	1.5	36.8	13.3	14.9	0.22	0.00	0.01	0.08	0.00
Switzerland	12,367	28,019	0.5	49.5	9.0	25.0	12.7	1.9	0.22	0.38	0.09	0.00	0.00
Ukraine	83,428	141,577	31.6	9.6	44.0	14.0	0.7	0.2	0.00	0.00	0.00	0.00	0.00
United Kingdom	262,186	235,158	16.9	34.6	36.9	10.0	0.1	0.4	0.38	0.00	0.01	0.04	0.00
<b>MIDDLE EAST &amp; N. AFRICA</b>	<b>1,605,209</b>	<b>577,251</b>	<b>..</b>	<b>50.4</b>	<b>40.8</b>	<b>0.0</b>	<b>0.8</b>	<b>1.8</b>	<b>0.00</b>	<b>0.12</b>	<b>0.12</b>	<b>0.00</b>	<b>0.00</b>
Afghanistan	..	..	..	..	..	..	..	..	..	..	..	..	..
Algeria	144,330	29,438	1.7	29.4	68.6	0.0	0.0	0.3	0.00	0.00	0.00	0.00	0.00
Egypt	59,301	48,012	1.5	54.1	39.1	0.0	2.5	2.8	0.00	0.00	0.00	0.00	0.00
Iran, Islamic Rep	246,644	120,000	0.9	49.3	48.8	0.0	0.4	0.7	0.00	0.00	0.00	0.00	0.00
Iraq	123,296	28,476	0.0	86.5	13.2	0.0	0.2	0.1	0.00	0.00	0.00	0.00	0.00
Israel	685	21,193	34.1	63.4	0.0	0.0	0.0	0.0	0.00	0.00	2.95	0.00	0.00
Jordan	280	5,116	0.0	94.1	4.0	0.0	0.1	0.1	0.00	0.00	1.27	0.00	0.00
Kuwait	108,851	16,368	0.0	52.0	48.0	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00
Lebanon	161	5,435	2.4	92.6	..	0.0	0.5	2.3	0.00	0.00	0.13	0.00	0.00
Libyan Arab Jamahiriya	74,363	15,992	0.0	71.5	27.6	0.0	0.0	0.9	0.00	0.00	0.00	0.00	0.00
Morocco	583	11,006	29.9	63.6	0.3	0.0	0.7	4.0	0.00	0.00	0.00	0.16	0.00
Oman	64,534	9,984	0.0	36.6	63.4	0.0	0.0	0.0	0.00	0.00	0.00	0.00	0.00
Saudi Arabia	476,831	110,586	0.0	57.6	4								

# Energy Consumption by Source 2005

	Total Energy Production (1000 metric toe) {a} 2001	Total Energy Consumption (1000 metric toe) {a} 2001	Energy Consumption (as a percent of total consumption) by Source										
			Non-Renewable Energy Sources					Renewable Energy Sources					
			Coal & Coal Products 2001	Oil {b} 2001	Natural Gas 2001	Nuclear 2001	Hydro-electric 2001	Solid Biomass 2001	Biogas & Liquid Biomass 2001	Geo-thermal 2001	Solar 2001	Wind 2001	Tide, Wave & Ocean 2001
<b>SUB-SAHARAN AFRICA</b>	<b>557,158</b>	<b>344,961</b>	..	<b>13.0</b>	<b>0.0</b>	<b>0.8</b>	<b>0.0</b>	<b>57.7</b>	<b>0.00</b>	<b>0.12</b>	<b>0.12</b>	<b>0.00</b>	<b>0.00</b>
Angola	43,559	8,454	0.0	25.2	5.1	0.0	1.0	68.7	0.00	0.00	0.00	0.00	0.00
Benin	1,483	2,028	..	27.2	..	0.0	0.0	71.2	0.00	0.00	0.00	0.00	0.00
Botswana	..	..	..	..	..	..	..	..	..	..	..	..	..
Burkina Faso	..	..	..	..	..	..	..	..	..	..	..	..	..
Burundi	..	..	..	..	..	..	..	..	..	..	..	..	..
Cameroon	12,485	6,445	0.0	16.3	0.0	0.0	4.6	79.0	0.00	0.00	0.00	0.00	0.00
Central African Rep	..	..	..	..	..	..	..	..	..	..	..	..	..
Chad	..	..	..	..	..	..	..	..	..	..	..	..	..
Congo	13,668	931	..	29.2	..	0.0	3.1	64.9	0.00	0.00	0.00	0.00	0.00
Congo, Dem Rep	15,707	15,039	1.4	3.0	0.0	0.0	3.3	93.0	0.00	0.00	0.00	0.00	0.00
Côte d'Ivoire	6,177	6,497	0.0	12.9	19.6	0.0	2.4	66.6	0.00	0.00	0.00	0.00	0.00
Equatorial Guinea	..	..	..	..	..	..	..	..	..	..	..	..	..
Eritrea	531	771	0.0	31.1	0.0	0.0	0.0	68.9	0.00	0.00	0.00	0.00	0.00
Ethiopia	18,000	19,161	0.0	6.1	0.0	0.0	0.8	93.1	0.00	0.02	0.00	0.00	0.00
Gabon	14,788	1,702	0.0	35.1	4.8	0.0	4.5	55.7	0.00	0.00	0.00	0.00	0.00
Gambia	..	..	..	..	..	..	..	..	..	..	..	..	..
Ghana	5,995	8,180	0.0	26.5	0.0	0.0	6.9	66.3	0.00	0.00	0.00	0.00	0.00
Guinea	..	..	..	..	..	..	..	..	..	..	..	..	..
Guinea-Bissau	..	..	..	..	..	..	..	..	..	..	..	..	..
Kenya	12,644	15,377	0.3	17.4	0.0	0.0	1.3	78.2	0.00	2.69	0.00	0.00	0.00
Lesotho	..	..	..	..	..	..	..	..	..	..	..	..	..
Liberia	..	..	..	..	..	..	..	..	..	..	..	..	..
Madagascar	..	..	..	..	..	..	..	..	..	..	..	..	..
Malawi	..	..	..	..	..	..	..	..	..	..	..	..	..
Mali	..	..	..	..	..	..	..	..	..	..	..	..	..
Mauritania	..	..	..	..	..	..	..	..	..	..	..	..	..
Mozambique	7,560	7,687	0.0	6.0	0.0	0.0	9.8	88.3	0.00	0.00	0.00	0.00	0.00
Namibia	294	1,159	0.2	65.3	..	0.0	10.2	15.2	0.00	0.00	0.00	0.00	0.00
Niger	..	..	..	..	..	..	..	..	..	..	..	..	..
Nigeria	207,024	95,444	0.0	14.8	7.0	0.0	0.6	77.5	0.00	0.00	0.00	0.00	0.00
Rwanda	..	..	..	..	..	..	..	..	..	..	..	..	..
Senegal	1,765	3,179	0.0	44.5	0.0	0.0	0.0	55.5	0.00	0.00	0.00	0.00	0.00
Sierra Leone	..	..	..	..	..	..	..	..	..	..	..	..	..
Somalia	..	..	..	..	..	..	..	..	..	..	..	..	..
South Africa	145,287	107,738	74.4	9.5	1.6	2.6	0.2	11.9	0.00	0.00	0.00	0.00	0.00
Sudan	21,551	13,525	0.0	18.9	0.0	0.0	0.8	80.3	0.00	0.00	0.00	0.00	0.00
Tanzania, United Rep	13,001	13,917	0.3	6.6	0.0	0.0	1.6	91.5	0.00	0.00	0.00	0.00	0.00
Togo	1,056	1,422	..	22.7	..	..	0.0	74.3	0.00	0.00	0.00	0.00	0.00
Uganda	..	..	..	..	..	..	..	..	..	..	..	..	..
Zambia	6,052	6,423	1.2	8.9	0.0	0.0	10.9	81.5	0.00	0.00	0.00	0.00	0.00
Zimbabwe	8,531	9,882	24.8	11.5	..	0.0	2.6	57.4	0.00	0.00	0.00	0.00	0.00
<b>NORTH AMERICA</b>	<b>2,091,021</b>	<b>2,529,598</b>	<b>22.7</b>	<b>39.2</b>	<b>23.3</b>	<b>9.1</b>	<b>1.8</b>	<b>2.5</b>	<b>0.24</b>	<b>0.51</b>	<b>0.74</b>	<b>0.02</b>	<b>0.00</b>
Canada	379,207	248,184	12.4	35.8	28.8	8.1	11.5	4.2	0.00	0.00	0.00	0.01	0.00
United States	1,711,814	2,281,414	23.9	39.6	22.7	9.2	0.8	2.3	0.26	0.56	0.06	0.02	0.00
<b>C. AMERICA &amp; CARIBBEAN</b>	<b>271,836</b>	<b>214,218</b>	<b>..</b>	<b>58.7</b>	<b>0.0</b>	<b>1.1</b>	<b>1.7</b>	<b>11.1</b>	<b>0.03</b>	<b>3.10</b>	<b>3.13</b>	<b>0.01</b>	<b>0.00</b>
Belize	..	..	..	..	..	..	..	..	..	..	..	..	..
Costa Rica	1,733	3,481	0.0	50.8	0.0	0.0	14.0	11.0	0.00	24.36	0.00	0.46	0.00
Cuba	6,656	13,651	0.1	71.9	3.6	0.0	0.0	24.0	0.40	0.00	0.00	0.00	0.00
Dominican Rep	1,485	7,810	1.6	79.4	0.0	0.0	0.6	18.4	0.00	0.00	0.00	0.00	0.00
El Salvador	2,329	4,269	0.0	44.7	..	0.0	2.3	32.7	0.00	19.44	0.00	0.00	0.00
Guatemala	5,230	7,313	1.7	43.0	0.0	0.0	2.3	53.3	0.00	0.00	0.00	0.00	0.00
Haiti	1,542	2,088	0.0	26.2	0.0	0.0	1.1	72.7	0.00	0.00	0.00	0.00	0.00
Honduras	1,535	3,236	2.3	49.4	..	0.0	6.3	41.1	0.00	0.00	0.00	0.00	0.00
Jamaica	487	4,009	0.8	87.0	0.0	0.0	0.2	11.9	0.00	0.00	0.00	0.00	0.00
Mexico	230,236	152,273	5.1	60.8	22.4	1.5	1.6	5.4	0.00	3.14	0.04	0.00	0.00
Nicaragua	1,540	2,792	0.0	44.8	0.0	0.0	0.6	48.2	0.00	6.34	0.00	0.00	0.00
Panama	678	3,180	1.2	77.7	0.0	0.0	6.8	14.6	0.00	0.00	0.00	0.00	0.00
Trinidad and Tobago	18,385	8,693	0.0	-4.0 {c}	103.8 {d}	0.0	0.0	0.3	0.00	0.00	0.00	0.00	0.00
<b>SOUTH AMERICA</b>	<b>573,869</b>	<b>382,156</b>	<b>5.2</b>	<b>46.0</b>	<b>19.7</b>	<b>1.5</b>	<b>11.3</b>	<b>14.9</b>	<b>1.58</b>	<b>0.00</b>	<b>1.58</b>	<b>0.00</b>	<b>0.00</b>
Argentina	82,862	57,601	0.9	35.6	49.3	3.2	5.5	5.2	0.00	0.00	0.01	0.01	0.00
Bolivia	6,938	4,271	0.0	55.2	23.7	0.0	4.4	16.8	0.00	0.00	0.00	0.00	0.00
Brazil	145,933	185,083	7.3	48.4	4.7	2.0	12.4	20.3	3.25	0.00	0.00	0.00	0.00
Chile	8,673	23,801	10.8	37.8	25.8	0.0	7.8	17.7	0.01	0.00	0.00	0.00	0.00
Colombia	73,920	29,245	9.3	43.7	19.8	0.0	9.4	17.9	0.00	0.00	0.00	0.00	0.00
Ecuador	22,872	8,727	0.0	81.3	3.3	0.0	7.0	8.4	0.00	0.00	0.00	0.00	0.00
Guyana	..	..	..	..	..	..	..	..	..	..	..	..	..
Paraguay	6,077	3,756	..	27.8	..	0.0	103.8 {e}	57.9	0.11	0.00	0.00	0.00	0.00
Peru	9,363	12,113	4.7	59.9	3.8	0.0	12.5	18.7	0.00	0.00	0.45	0.00	0.00
Suriname	..	..	..	..	..	..	..	..	..	..	..	..	..
Uruguay	1,211	2,703	0.0	58.0	1.0	0.0	29.3	15.5	0.00	0.00	0.00	0.00	0.00
Venezuela	216,020	54,856	0.1	45.0	44.4	0.0	9.5	1.0	0.00	0.00	0.00	0.00	0.00
<b>OCEANIA</b>	<b>265,368</b>	<b>133,921</b>	<b>42.3</b>	<b>29.5</b>	<b>19.1</b>	<b>0.0</b>	<b>2.4</b>	<b>4.2</b>	<b>0.19</b>	<b>1.75</b>	<b>1.94</b>	<b>0.02</b>	<b>0.00</b>
Australia	250,436	115,627	47.9	28.7	17.6	0.0	1.2	4.1	0.19	0.00	0.09	0.02	0.00
Fiji	..	..	..	..	..	..	..	..	..	..	..	..	..
New Zealand	14,932	18,294	7.0	34.3	29.1	0.0	10.1	4.4	0.16	12.79	0.00	0.07	0.00
Papua New Guinea	..	..	..	..	..	..	..	..	..	..	..	..	..
Solomon Islands	..	..	..	..	..	..	..	..	..	..	..	..	..
<b>DEVELOPED</b>	<b>5,133,896</b>	<b>6,136,465</b>	<b>21.9</b>	<b>36.1</b>	<b>26.0</b>	<b>10.4</b>	<b>2.1</b>	<b>2.4</b>	<b>0.16</b>	<b>0.39</b>	<b>0.55</b>	<b>0.05</b>	<b>0.00</b>
<b>DEVELOPING</b>	<b>5,037,053</b>	<b>3,886,629</b>	<b>26.0</b>	<b>33.4</b>	<b>14.1</b>	<b>1.5</b>	<b>2.4</b>	<b>21.8</b>	<b>0.19</b>	<b>0.50</b>	<b>0.69</b>	<b>0.01</b>	<b>0.00</b>

a. Toe is tons of oil equivalent. b. Comprised of crude oil, petroleum products, natural gas liquids, refinery feedstocks, and other hydrocarbons. c. IEA treats oil imported for processing as exports of product to the receiving nation. d. Includes natural gas converted into electricity. e. Although Paraguay exports approximately 90% of the electricity it generates, IEA counts electricity transited through the country as both an import and an export.

### DEFINITIONS AND METHODOLOGY

Basic energy statistics are collected by the International Energy Agency (IEA) from a variety of sources. In OECD member countries, national administrations fill out five annual questionnaires. In non-OECD countries, statistics are collected from questionnaires, international organizations such as United Nations, co-operation with national statistical bodies, and direct communication with energy consultants and companies. If data are not available from any of these sources, they are estimated by the IEA.

To facilitate comparisons among different sources of energy, the IEA measures the heat content of all energy commodities in metric tons of oil equivalent (toe). A toe measures the energy contained in a metric ton (1000 kg) of crude oil. One toe is equal to 10 Exp. 7 kilocalories, 41.868 gigajoules, or 11,628 gigawatt-hours (GWh).

The energy produced by fossil fuels is calculated using conversion factors per unit mass of fuel (eg. 10,000 kcal/kg of oil). Since energy sources such as coal and crude oil may vary in quality, the IEA uses specific conversion factors supplied by national administrations for the main categories of energy sources and uses (i.e. production, imports, exports).

The energy produced by non-fossil fuels is more complicated to measure; the IEA must first assume a primary form of energy to measure, and then calculate the primary energy equivalent. Total heat is the primary form of energy for nuclear heat and electricity, geothermal heat and electricity, and solar heat production. For hydro, wind, wave and photovoltaic solar electricity production, total electricity is the primary form of energy. The IEA determines the physical energy content of the primary energy source using global or regional efficiency averages.

**Total Energy Production** is defined as the total production of primary energy. Primary energy includes hard coal, lignite, peat, crude oil, natural gas liquids (NGLs), natural gas, nuclear, hydro, geothermal, solar and the heat from heat pumps that is extracted from the ambient environment. Primary energy includes losses from transportation, friction, heat loss and other inefficiencies. Production is calculated after impurities are removed.

**Total Energy Consumption** is defined as the amount of primary energy used by a particular country or region. Consumption equals indigenous production plus imports minus exports plus stock changes minus energy delivered to international marine bunkers. IEA refers to these data as Total Primary Energy Supply (TPES). Energy losses from transportation, friction, heat, and other inefficiencies are included in these totals. The total amount of primary energy refers to the energy consumed from all sources including fossil, nuclear, hydroelectric, modern renewables, traditional renewables, and all renewable fuels and waste.

**Energy Consumption (as a percent of total consumption) by Source** is the percentage of the total amount of primary energy consumed from a given energy source.

**Non-Renewable Energy Sources** include coal and coal products, oil, and natural gas.

**Coal and Coal Products** includes energy in the form of both primary and derived coal fuels: hard coal, lignite, patent fuel, coke, blast furnace gas, and peat.

**Oil** includes the amount of primary energy in the form of crude oil, petroleum products, natural gas liquids, refinery feedstocks, and other hydrocarbons. The inclusion of petroleum products accounts for domestic processing of crude oil as well as assorted petroleum imports. Petroleum products refers to refinery gas, ethane, liquefied petroleum gas, aviation gasoline, motor gasoline, jet fuels, kerosene, gas/diesel oil, heavy fuel oil, naphtha, white spirit, lubricants, bitumen, paraffin waxes, and petroleum coke.

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**Natural Gas** includes primary energy from fossil fuels in the gaseous state. Natural gas liquids (NGLs) are excluded.

**Nuclear** energy shows the primary heat equivalent of the electricity produced by nuclear power plants. Heat-to-electricity conversion efficiency is assumed to be 33% (the average thermal efficiency in Europe).

**Renewable Energy Sources** consist of fuels obtained from sources that are essentially inexhaustible and include wood, waste, geothermal, wind, photovoltaic, and solar thermal energy.

**Hydroelectric** includes the energy content of the electricity produced in hydro power plants, excluding output from pumped storage tanks.

**Solid Biomass** includes the amount of primary energy from plant matter used directly as fuel or converted into other forms before combustion. Solid Biomass includes fuel wood, vegetal waste (including wood waste and crops used for energy production), animal materials/wastes, sulphite lyes (also known as "black liquor"), and other solid biomass. Inputs to charcoal production are included here. However, since charcoal is a secondary product, the IEA excludes final charcoal production numbers to avoid double counting.

**Biogas & Liquid Biomass** is the amount of primary energy produced by liquid biomass, which includes bio-additives such as ethanol (alcohol), and biogas, which is produced by the fermentation of animal dung, human sewage or crop residues.

**Geothermal** energy is generated using trapped underground heat and includes energy used directly for heat and for electricity generation. Unless the actual efficiency of the electricity generation is known, the quantity of geothermal energy entering electricity generation is inferred using an average thermal efficiency of 10 per cent.

**Solar** includes the production of electricity from solar photovoltaic cells as well as solar thermal energy. Solar thermal (heat) energy is used for both hot water production and electricity generation. Solar heat is collected with flat plate collectors for water heating or in solar thermal-electric plants. Passive solar energy for the direct heating, cooling and lighting of dwellings or other buildings is not included here.

**Wind** uses the mechanical energy of the wind for generating electricity.

**Tide, Wave & Ocean** includes the production of electricity from the mechanical energy of ocean waves and tides or from the thermal energy (heat) stored in the ocean.

### FREQUENCY OF UPDATE BY DATA PROVIDERS

The IEA updates energy data each year in June for OECD countries and in September for non-OECD countries, often revising data from earlier years.

### DATA RELIABILITY AND CAUTIONARY NOTES

The energy balances data are primarily based on well-established and institutionalized accounting methodologies, and are therefore considered reliable.

Energy production estimates from nuclear power and renewable sources (hydroelectric, solar, geothermal, and wind power) are calculated using a number of assumptions about primary energy forms and plant efficiencies. As a result, these values may be less reliable than estimates of energy produced from fossil fuels, and the share of renewables in total energy supply may appear different here than it would from other providers.

These statistics are expressed in terms of "net" calorific value, so the values reported here may be slightly lower than those in other statistical compendia which report energy in terms of "gross" calorific value. The data as received from the provider do not distinguish between no data and zero values. WRI has

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distinguished between the two where possible, but some values represented as zero should probably be indicated as missing 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 consumption.

### **SOURCE**

International Energy Agency (IEA), 2005. *Energy Balances of OECD Countries (2003 Edition)* and *Energy Balances of non-OECD Countries (2003 Edition)*. Electronic database available online at: <http://www.iea.org/Textbase/subjectqueries/index.asp> Paris: Organization for Economic Cooperation and Development (OECD).