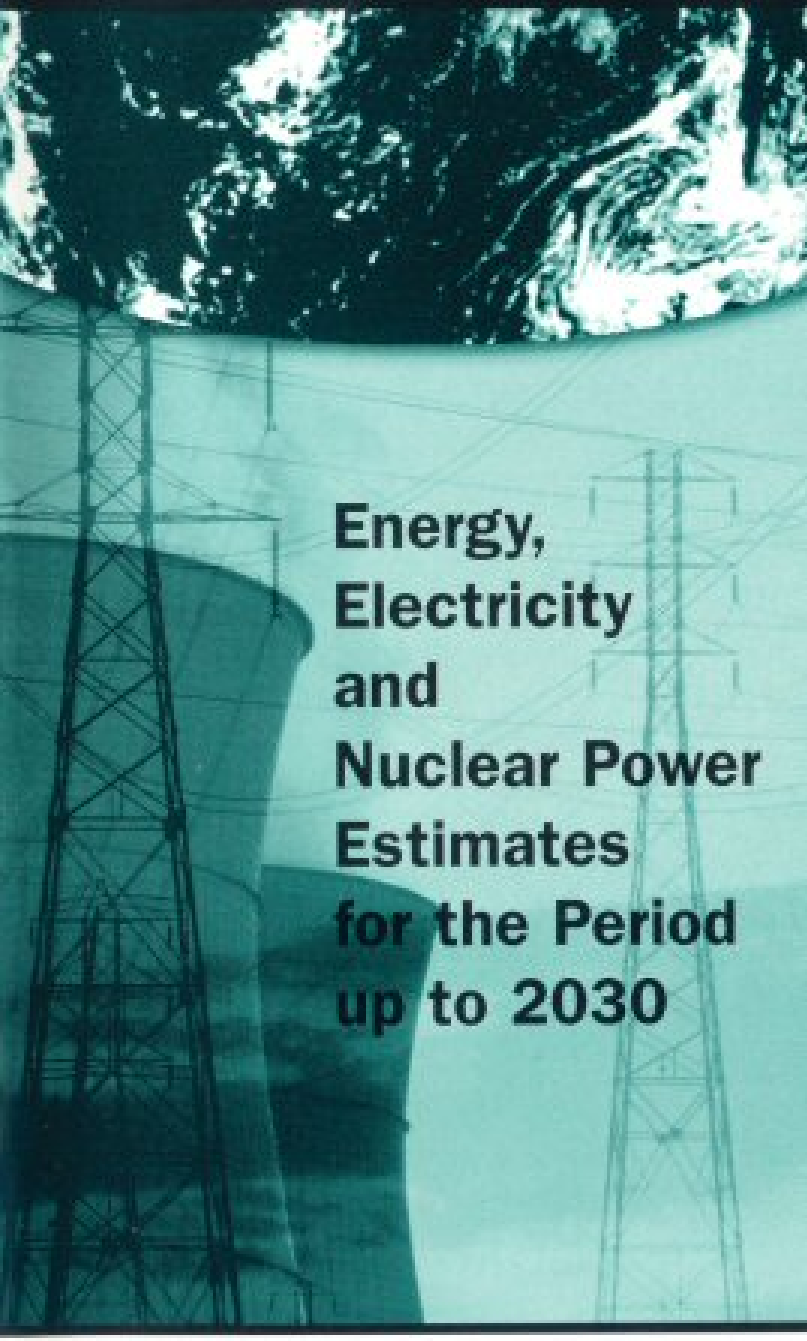
REFERENCE DATA SERIES No. 1 July 2003



Energy, Electricity and Nuclear Power Estimates for the Period up to 2030

IAEA
International Atomic Energy Agency

REFERENCE DATA SERIES No. 1

ENERGY, ELECTRICITY AND NUCLEAR POWER ESTIMATES FOR THE PERIOD UP TO 2030

July 2003 Edition

INTERNATIONAL ATOMIC ENERGY AGENCY
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INTRODUCTION

Reference Data Series No. 1 is an annual publication — currently in its twenty-third edition — containing estimates of energy, electricity and nuclear power trends up to the year 2030.

Nuclear data presented in Table 1 are based on actual statistical data collected by the IAEA's Power Reactor Information System (PRIS). Energy and electricity data for 2002, however, are estimated, since the latest available information from the Department of Economic and Social Affairs of the United Nations is for 2000. Population data originate from the "World Population Prospects" (2003 Revision), published by the Population Division of the UN Department of Economic and Social Affairs, and the 2003 values are estimates.

The future growth of energy, electricity and nuclear power up to the year 2030 is presented as low and high estimates in order to encompass the uncertainties associated with the future. These estimates should be viewed as very general growth trends whose validity must constantly be subjected to critical review.

The energy forecasts carried out in increasing numbers over the last years by international, national and private organizations are based on a multiplicity of different assumptions and different aggregating procedures, which make their comparison and synthesis very difficult. The basic differences refer to such fundamental input data as:

— World and regional scenarios of economic development;
— Correlation of economic growth and energy consumption;
— Assumptions on physical, economic and political constraints applying to energy production and consumption;
— Future prices of different energy sources.

The projections presented in this booklet are based on a compromise among:

— National projections supplied by each country for a recent OECD NEA study;
— Indicators of development published by the World Bank in its World Development Indicators;
— Estimates of energy, electricity and nuclear power growth continuously carried out by the IAEA in the wake of recent global and regional projections made by other international organizations.

The nuclear generating capacity estimates presented in Table 3 are derived from a country by country bottom-up approach. They are established by a group of experts participating each year in the IAEA's consultancy on Nuclear Capacity Projections and based upon a review of nuclear power projects and programmes in Member States.

The low and high estimates reflect contrasting but not extreme underlying assumptions on the different driving factors that have an impact on nuclear power deployment. These factors, and the ways they might evolve, vary from country to country. The estimates presented provide a plausible range of nuclear capacity growth by region and worldwide. They are not intended to be predictive nor to reflect the whole range of possible futures from the lowest to the highest feasible.

In the low estimates, the present barriers to nuclear power development are assumed to prevail in most countries during the coming two decades:

— Low economic and electricity demand growth rates in OECD countries;
— Public opposition to nuclear power, leading to policy decisions not to consider the nuclear option in spite of its competitive costs and potential contribution to reducing environmental impacts from electricity generation;
— Institutional and financing issues preventing the implementation of previously planned nuclear programmes, in particular in countries in transition and in developing countries;

— Inadequate mechanisms for nuclear technology transfer and nuclear project funding in developing countries.

The high estimates reflect a moderate revival of nuclear power development that could result in particular from a more comprehensive comparative assessment of the different options for electricity generation, integrating economic, social, health and environmental aspects. They are based upon a review of national nuclear power programmes, assessing their technical and economic feasibility. They assume that some policy measures would be taken to facilitate the implementation of these programmes, such as strengthening of international co-operation, enhanced technology adaptation and transfer, and establishment of innovative funding mechanisms. These estimates also take into account the global concern over climate change caused by the increasing concentration of greenhouse gases in the atmosphere, and the signing of the recent Kyoto Protocol.

With regard to aggregation procedures, the energy equivalence of nuclear and hydroelectric plants has been evaluated on the basis of the amounts of fossil fuel needed to produce the same amount of electricity (to produce 1 TW·h requires 0.00964 EJ input).

The total energy consumption has been calculated by summing the primary energy consumption and the net secondary energy import.

The values shown in Table 9 refer to primary energy consumed for the generation of electricity. Owing to differences in conversion efficiencies, the percentage values are different from the shares of electricity generation presented in Tables 1 and 5.

Energy Units

1 MW(e) = 10^6 watts
1 GW(e) = 1000 MW(e) = 10^9 watts
1 GJ = 1 gigajoule = 10^9 joules
1 EJ = 1 exajoule = 10^{18} joules
1 EJ = 23.9 megatonnes of oil equivalent (MTOE)
1 TW·h = 1 terrawatt-hour = 10^9 kW·h = 3.6×10^{-3} EJ

Conversion Efficiency

The conversion from TW·h(e) to EJ is based on the fossil energy consumed to produce 1 TW·h of electricity. An average fossil fired power plant (37.5% efficiency) requires an input of 0.00964 EJ (0.23 MTOE) to produce 1 TW·h(e).

GROUPING OF COUNTRIES AND AREAS

The countries and geographical areas included in each grouping are listed below
(IAEA Member States are denoted by an asterisk)

North America
Canada*
United States*

Latin America
Anguilla
Antigua and Barbuda
Argentina*
Aruba
Bahamas
Barbados
Belize
Bermuda
Bolivia*
Brazil*
Cayman Islands
Chile*
Colombia*
Costa Rica*
Cuba*
Dominica
Dominican Republic*
Ecuador*
El Salvador*
Grenada
Guadeloupe
Guatemala*
Guyana
Haiti*
Honduras*
Jamaica*
Martinique
Mexico*
Montserrat
Netherlands Antilles
Nicaragua*
Panama*
Paraguay*
Peru*
Puerto Rico
S.Georgia & S.Sandwich Islands
Saint Kitts and Nevis
Saint Lucia
Saint Pierre and Miquelon
Saint Vincent & the Grenadines
Suriname
Trinidad and Tobago
Turks and Caicos Islands
Uruguay*
Venezuela*

Western Europe
Andorra
Austria*
Belgium*
Cyprus*
Denmark*
Finland*
France*
Germany*
Gibraltar
Greece*
Greenland
Holy See*
Iceland*
Ireland*
Italy*
Liechtenstein*
Luxembourg*
Malta*
Monaco*
Netherlands*
Norway*
Portugal*
San Marino
Spain*
Svalbard and Jan Mayen Islands
Sweden*
Switzerland*
Turkey*
United Kingdom*

Eastern Europe
Albania*
Armenia*
Azerbaijan*
Belarus*
Bosnia and Herzegovina*
Bulgaria*
Croatia*
Czech Republic*
Estonia*
Georgia*
Hungary*
Kazakhstan*
Kyrgyzstan
Latvia*
Lithuania*
Poland*
Republic of Moldova*
Romania*
Russian Federation*
Serbia and Montenegro*
Slovakia*
Slovenia*
Tajikistan*
The Frmr.Yug.Rep. of Macedonia*
Turkmenistan
Ukraine*
Uzbekistan*

Africa
Algeria*
Angola*
Benin*
Botswana*
Burkina Faso*
Burundi
Cameroon*
Cape Verde
Central African Republic*
Chad
Comoros
Congo
Cote d'Ivoire*
Democratic Rep. of the Congo*
Djibouti
Egypt*
Equatorial Guinea
Eritrea*
Ethiopia*
Gabon*
Gambia
Ghana*
Guinea
Guinea-Bissau
Kenya*
Lesotho
Liberia*
Libyan Arab Jamahiriya*
Madagascar*
Malawi
Mali*
Mauritania
Mauritius*
Mayotte
Morocco*
Mozambique
Namibia*
Niger*
Nigeria*
Reunion
Rwanda
Saint Helena
Sao Tome and Principe
Senegal*
Seychelles*
Sierra Leone*
Somalia
South Africa*
Sudan*
Swaziland
Togo
Tunisia*
Uganda*
United Republic of Tanzania*
Western Sahara
Zambia*
Zimbabwe*

Middle East and South Asia
Afghanistan*
Bahrain
Bangladesh*
Bhutan
British Indian Ocean Territory
Cocos (Keeling) Islands
French Southern Territories
Heard Island&McDonald Islands
India*
Iran, Islamic Republic of*
Iraq*
Israel*
Jordan*
Kuwait*
Lebanon*
Nepal
Oman
Pakistan*
Qatar*
Saudi Arabia*
Sri Lanka*
Syrian Arab Republic*
T.T.U.T.J of T. Palestinian A.
United Arab Emirates*
Yemen*

South East Asia and the Pacific
Australia*
Brunei Darussalam
Cook Islands
Fiji
Indonesia*
Kiribati
Malaysia*
Maldives
Marshall Islands*
Micronesia (Fed. States of)
Myanmar*
New Zealand*
Niue
Norfolk Islands
Northern Mariana Islands
Palau
Papua New Guinea
Pitcairn Islands
Samoa
Singapore*
Solomon Islands
Thailand*
Timor Leste
Tokelau
Tuvalu
US Minor Outlying Islands
Vanuatu
Wallis and Futuna Islands

Far East
Cambodia
China*
Dem. P.R. of Korea
Japan*
Korea, Republic of*
Lao P.D.R.
Macau, China
Mongolia*
Philippines*
Taiwan, China
Vietnam*

TABLE 1. NUCLEAR POWER REACTORS IN THE WORLD (end of 2002)

Group and Country	In Operation		Under Construction		Electricity Supplied by Nuclear Power Reactors during 2002	
	Number of Units	Total MW(e)	Number of Units	Total MW(e)	TW.h	Percent of Total Electricity
North America						
Canada	14	10018			71.0	12.3
United States	104	98230			780.1	20.3
Latin America						
Argentina	2	935	1	692	5.4	7.2
Brazil	2	1901			13.8	4.0
Mexico	2	1360			9.4	4.1
Western Europe						
Belgium	7	5760			44.7	57.3
Finland	4	2656			21.4	29.8
France	59	63073			415.5	78.0
Germany	19	21283			162.3	29.9
Netherlands	1	450			3.7	4.0
Spain	9	7574			60.3	25.8
Sweden	11	9432			65.6	45.7
Switzerland	5	3200			25.7	39.5
United Kingdom	31	12252			81.1	22.4
Eastern Europe						
Armenia	1	376			2.1	40.5
Bulgaria	4	2722			20.2	47.3
Czech Republic	6	3468			18.7	24.5
Hungary	4	1755			12.8	36.1

TABLE 1. NUCLEAR POWER REACTORS IN THE WORLD (end of 2002) — continued

Group and Country	In Operation		Under Construction		Electricity Supplied by Nuclear Power Reactors during 2002	
	Number of Units	Total MW(e)	Number of Units	Total MW(e)	TW.h	Percent of Total Electricity
Lithuania	2	2370			12.9	80.1
Romania	1	655	1	655	5.1	10.3
Russian Federation	30	20793	3	2825	130.0	16.0
Slovakia	6	2408	2	776	18.0	54.7
Slovenia	1	676			5.3	40.7
Ukraine	13	11207	4	3800	73.4	45.7
Africa						
South Africa	2	1800			12.0	5.9
Middle East and South Asia						
India	14	2503	7	3420	17.8	3.7
Iran, Islamic Republic of			2	2111		
Pakistan	2	425			1.8	2.5
Far East						
China	7	5318	4	3275	23.4	1.4
Dem. P.R. of Korea			1	1040		
Japan	54	44287	3	3696	313.8	34.5
Korea, Republic of	18	14890	2	1920	113.1	38.6
World Total (1)	441	358661	32	26910	2574.2	16.0

Notes:

(1) Including the following data in Taiwan, China:

— 6 units in operation with total capacity of 4884 MW(e); 2 units under construction with total capacity of 2700MW(e);

— 33.9 TW.h of nuclear electricity generation, representing 20.5% of the total electricity generated.

TABLE 2. NUMBER OF COUNTRIES WITH NUCLEAR POWER REACTORS IN OPERATION OR UNDER CONSTRUCTION (end of 2002)

Country Group	Number of Countries in Group	Countries with Nuclear Power Reactors		
		In Operation	Under Construction (1)	Total (2)
North America	2	2		2
Latin America	49	3	1	3
Western Europe	30	9		9
Eastern Europe	27	10	4	10
Africa	57	1		1
Middle East and South Asia	25	2	2	3
South East Asia and the Pacific	35			
Far East	11	4	5	5
World Total	236	31	12	33

Notes:
(1) Include countries having reactors already in operation and Taiwan, China.
(2) Total number of countries in each group that have nuclear power reactors in operation, or under construction.

TABLE 3. ESTIMATES OF TOTAL AND NUCLEAR ELECTRICAL GENERATING CAPACITY

Country Group	2002			2010 (a)			2020 (a)			2030 (a)		
	Total Elect. GW(e)	Nuclear		Total Elect. GW(e)	Nuclear		Total Elect. GW(e)	Nuclear		Total Elect. GW(e)	Nuclear	
		GW(e)	%		GW(e)	%		GW(e)	%		GW(e)	%
North America	919	108.2	11.8	1019 1075	112 112	11 10	1126 1262	111 116	10 9.2	1244 1530	108 117	8.7 7.6
Latin America	245	4.2	1.7	287 339	4.2 4.9	1.5 1.4	364 527	6.1 6.4	1.7 1.2	458 801	3.9 12	0.8 1.5
Western Europe	699	125.7	18.0	745 802	124 125	17 16	823 934	119 133	14 14	918 1098	79 151	8.6 14
Eastern Europe	464	46.4	10.0	469 500	51 56	11 11	505 615	64 78	13 13	543 745	58 84	11 11
Africa	103	1.8	1.7	115 139	1.8 1.9	1.6 1.4	144 212	1.8 3.1	1.3 1.5	182 324	1.8 7.9	1.0 2.4
Middle East and South Asia	262	2.9	1.1	312 355	6.2 7.2	2.0 2.0	406 532	8.1 15	2.0 2.9	525 773	11 26	2.0 3.3
South East Asia and the Pacific	140			170 186			213 274	0.9	0.3	263 397	3.0	0.8
Far East	636	69.4	10.9	674 850	92 93	14 11	797 1178	113 149	14 13	930 1602	125 173	13 11
World Total Low Estimate	3469	358.7	10.3	3791	391	10	4378	423	10	5064	386	7.6
World Total High Estimate				4246	401	9.4	5534	501	9.1	7270	573	7.9

Note:

(a) Nuclear capacity estimates take into account the scheduled decommissioning of the older units at the end of their lifetime.

TABLE 4. ESTIMATES OF TOTAL ELECTRICITY GENERATION AND CONTRIBUTION BY NUCLEAR POWER (*)

Country Group	2002			2010			2020			2030		
	Total Elect.	Nuclear		Total Elect.	Nuclear		Total Elect.	Nuclear		Total Elect.	Nuclear	
	TW.h	TW.h	%	TW.h	TW.h	%	TW.h	TW.h	%	TW.h	TW.h	%
North America	4779	851.1	17.8	5034	874	17	5784	870	15	6451	844	13
				5444	894	16	6709	939	14	8146	944	12
Latin America	1078	28.6	2.7	1178	29	2.5	1628	47	2.9	2227	30	1.3
				1427	38	2.7	2291	50	2.2	3758	92	2.4
Western Europe	3084	880.2	28.5	3352	858	26	3634	823	23	3942	564	14
				3609	893	25	4687	961	20	6061	1090	18
Eastern Europe	1758	298.5	17.0	1884	319	17	2174	423	19	2463	378	15
				2074	399	19	2867	552	19	4133	611	15
Africa	459	12.0	2.6	538	13	2.5	699	14	2.0	876	14	1.6
				612	14	2.3	973	24	2.4	1530	60	3.9
Middle East and South Asia	1176	19.6	1.7	1342	41	3.1	1805	53	3.0	2327	70	3.0
				1626	47	2.9	2596	100	3.9	3946	194	4.9
South East Asia and the Pacific	600			736			934			1162		
				786			1119	5.5	0.5	1584	18	1.2
Far East	3157	484.3	15.3	3399	695	20	4199	855	20	5073	981	19
				4296	702	16	6605	1125	17	9830	1361	14
World Total Low Estimate	16090	2574.2	16.0	17463	2830	16	20857	3085	15	24520	2881	12
World Total High Estimate				19873	2987	15	27848	3756	13	38989	4369	11

(*) The nuclear generation data presented in this table and the nuclear capacity data presented in Table 3 cannot be used to calculate average annual capacity factors for nuclear plants, as Table 3 presents year-end capacity and not the effective capacity average over the year.

TABLE 5. ESTIMATES OF TOTAL ENERGY CONSUMPTION (EJ), PERCENTAGE USED FOR ELECTRICITY GENERATION, AND PERCENTAGE SUPPLIED BY NUCLEAR ENERGY

Country Group	2002			2010			2020			2030		
	Total Energy Consumption	% Used for Elect. Gen.	% Supplied by Nuclear	Total Energy Consumption	% Used for Elect. Gen.	% Supplied by Nuclear	Total Energy Consumption	% Used for Elect. Gen.	% Supplied by Nuclear	Total Energy Consumption	% Used for Elect. Gen.	% Supplied by Nuclear
North America	115.2	40.0	7.1	121 130	40 40	7.0 6.6	129 149	43 43	6.5 6.1	139 170	45 46	5.9 5.4
Latin America	31.1	33.4	0.9	37 41	30 34	0.8 0.9	47 63	33 35	1.0 0.8	59 93	36 39	0.5 1.0
Western Europe	71.2	41.7	11.9	75 78	43 44	11 11	79 88	44 52	10 11	84 99	45 59	6.4 11
Eastern Europe	58.7	28.9	4.9	63 68	29 29	4.9 5.6	71 87	29 32	5.7 6.1	80 108	30 37	4.6 5.5
Africa	23.2	19.1	0.5	26 29	20 20	0.5 0.5	32 40	21 24	0.4 0.6	38 53	22 28	0.3 1.1
Middle East and South Asia	40.4	28.1	0.5	49 55	27 29	0.8 0.8	62 79	28 32	0.8 1.2	78 112	29 34	0.9 1.7
South East Asia and the Pacific	23.4	24.7		27 32	26 24		34 44	27 24	 0.1	41 61	27 25	 0.3
Far East	83.2	36.6	5.6	95 109	34 38	7.0 6.2	116 154	35 41	7.1 7.0	138 212	35 45	6.8 6.2
World Total Low Estimate	446.4	34.7	5.6	493	34	5.5	571	35	5.2	659	36	4.2
World Total High Estimate				542	35	5.3	703	38	5.1	907	41	4.6

TABLE 6. TOTAL ENERGY CONSUMPTION (EJ) BY TYPE OF FUEL DURING 2002 (*)

Country Group	Solids (a)	Liquids	Gases	Hydro	Nuclear	Geothermal (b)	Total
North America	31.92	37.95	31.08	5.95	8.20	0.17	115.23
Latin America	3.33	15.29	6.39	5.81	0.28	0.08	31.10
Western Europe	12.03	27.02	18.19	6.05	8.49	0.06	71.24
Eastern Europe	17.52	10.32	25.21	2.93	2.88	0.00	58.68
Africa	14.50	5.27	2.45	0.78	0.12	0.00	23.17
Middle East and South Asia	14.14	15.06	9.83	1.14	0.19		40.36
South East Asia and the Pacific	8.53	9.68	4.32	0.75		0.06	23.37
Far East	38.87	27.57	8.32	3.65	4.67	0.15	83.23
World Total	140.86	148.16	105.79	27.05	24.81	0.53	446.39

Notes:

(*) Total energy consumption = consumption of primary energy plus net import (Import - Export) of secondary energy.

(a) Solids include commercial wood.

(b) The column headed 'Geothermal' includes wind.

TABLE 7 . FUEL SHARES (%) OF ENERGY CONSUMPTION DURING 2002 (*)

Country Group	Solids (a)	Liquids	Gases	Hydro	Nuclear	Geothermal (b)	Total
North America	27.70	32.93	26.97	5.16	7.12	0.15	100.00
Latin America	10.72	49.17	20.54	18.69	0.89	0.27	100.00
Western Europe	16.89	37.92	25.54	8.49	11.91	0.08	100.00
Eastern Europe	29.85	17.58	42.96	4.99	4.90	0.00	100.00
Africa	62.61	22.76	10.57	3.35	0.50	0.02	100.00
Middle East and South Asia	35.05	37.32	24.35	2.81	0.47		100.00
South East Asia and the Pacific	36.49	41.40	18.49	3.22		0.25	100.00
Far East	46.71	33.12	10.00	4.38	5.61	0.18	100.00
World Total	31.55	33.19	23.70	6.06	5.56	0.12	100.00

Notes:

(*) Total energy consumption = consumption of primary energy plus net import (Import - Export) of secondary energy.

(a) Solids include commercial wood.

(b) The column headed 'Geothermal' includes wind.

TABLE 8. ENERGY CONSUMPTION (EJ) FOR ELECTRICITY GENERATION BY TYPE OF FUEL DURING 2002

Country Group	Thermal (a)	Hydro	Nuclear	Geothermal (b)	Total
North America	31.68	5.95	8.20	0.23	46.07
Latin America	4.22	5.81	0.28	0.08	10.39
Western Europe	14.88	6.05	8.49	0.31	29.73
Eastern Europe	11.15	2.93	2.88	0.00	16.95
Africa	3.53	0.78	0.12	0.00	4.42
Middle East and South Asia	9.99	1.14	0.19	0.02	11.34
South East Asia and the Pacific	4.97	0.75		0.06	5.78
Far East	21.96	3.65	4.67	0.15	30.43
World Total	102.39	27.05	24.81	0.86	155.11

Notes:
(a) The column headed 'Thermal' is the total for solids, liquids and gases.
(b) The column headed 'Geothermal' includes wind.

TABLE 9. PERCENTAGE CONTRIBUTION OF EACH FUEL TYPE TO ELECTRICITY GENERATION DURING 2002

Country Group	Thermal (a)	Hydro	Nuclear	Geothermal (b)	Total
North America	68.77	12.92	17.81	0.50	100.00
Latin America	40.61	55.93	2.65	0.81	100.00
Western Europe	50.06	20.34	28.55	1.05	100.00
Eastern Europe	65.76	17.26	16.98	0.00	100.00
Africa	79.79	17.52	2.61	0.08	100.00
Middle East and South Asia	88.17	10.02	1.66	0.15	100.00
South East Asia and the Pacific	85.95	13.01		1.04	100.00
Far East	72.17	11.99	15.34	0.50	100.00
World Total	66.01	17.44	16.00	0.55	100.00

Notes:
(a) The column headed 'Thermal' is the total for solids, liquids and gases.
(b) The column headed 'Geothermal' includes wind.

TABLE 10. ESTIMATES OF POPULATION GROWTH BY REGION (*)

Country Group	2002		2010		2020		2030	
	Million Inhabitants	Growth Rate (%/a) 1991 — 2002	Million Inhabitants	Growth Rate (%/a) 2002 — 2010	Million Inhabitants	Growth Rate (%/a) 2010 — 2020	Million Inhabitants	Growth Rate (%/a) 2020 — 2030
North America	322	1.13	348	0.96	379	0.87	407	0.71
Latin America	536	1.63	595	1.31	659	1.04	711	0.76
Western Europe	463	0.53	475	0.32	484	0.19	488	0.09
Eastern Europe	409	-2.72	402	-0.21	393	-0.22	380	-0.35
Africa	832	2.49	984	2.12	1188	1.90	1398	1.64
Middle East and South Asia	1589	1.90	1816	1.68	2091	1.42	2325	1.07
South East Asia and the Pacific	389	1.43	428	1.23	469	0.91	500	0.64
Far East	1681	0.98	1778	0.71	1872	0.52	1914	0.22
World Total	6220	1.14	6827	1.17	7535	0.99	8123	0.75

(*) Projection figures are the arithmetic average between low and high estimates.

TABLE 11. ESTIMATES OF TOTAL ENERGY AND ELECTRICITY CONSUMPTION PER CAPITA

Country Group	2002		2010		2020		2030	
	Energy Consumption per Capita (GJ/cap.)	Electricity Consumption per Capita (MW.h/cap)	Energy Consumption per Capita (GJ/cap.)	Electricity Consumption per Capita (MW.h/cap)	Energy Consumption per Capita (GJ/cap.)	Electricity Consumption per Capita (MW.h/cap)	Energy Consumption per Capita (GJ/cap.)	Electricity Consumption per Capita (MW.h/cap)
North America	358	13.7	347 — 374	14.5 — 15.6	341 — 393	15.2 — 17.7	341 — 417	15.8 — 20.0
Latin America	58	1.9	63 — 69	2.0 — 2.4	72 — 95	2.5 — 3.5	84 — 130	3.1 — 5.3
Western Europe	154	6.2	158 — 165	7.1 — 7.6	164 — 181	7.5 — 9.7	173 — 202	8.1 — 12.4
Eastern Europe	144	4.0	156 — 170	4.7 — 5.2	182 — 222	5.5 — 7.3	211 — 284	6.5 — 10.9
Africa	28	0.5	27 — 30	0.5 — 0.6	27 — 33	0.6 — 0.8	27 — 38	0.6 — 1.1
Middle East and South Asia	25	0.7	27 — 30	0.7 — 0.9	30 — 38	0.9 — 1.2	34 — 48	1.0 — 1.7
South East Asia and the Pacific	60	1.5	64 — 74	1.7 — 1.8	72 — 95	2.0 — 2.4	83 — 122	2.3 — 3.2
Far East	50	1.9	54 — 61	1.9 — 2.4	62 — 82	2.2 — 3.5	72 — 111	2.7 — 5.1
World Average	72	2.4	72 — 79	2.6 — 2.9	76 — 93	2.8 — 3.7	81 — 112	3.0 — 4.8

TABLE 12. AVERAGE ANNUAL GROWTH RATES DURING THE PERIOD 1991—2002 (PERCENT)

Country Group	Population	Total Energy Consumption	Total Electricity Consumption	Nuclear Energy Consumption	Nuclear Capacity
North America	1.1	2.0	1.9	1.9	-0.5
Latin America	1.6	3.1	4.3	7.7	5.9
Western Europe	0.5	1.4	1.9	1.8	0.4
Eastern Europe	-2.7	-1.8	-1.9	1.1	0.7
Africa	2.5	4.4	3.2	2.5	
Middle East and South Asia	1.9	4.6	5.5	13.0	8.3
South East Asia and the Pacific	1.4	5.3	5.2		
Far East	1.0	2.8	5.1	4.5	4.1
World Average	1.1	1.9	2.5	2.3	0.8

TABLE 13. ESTIMATES OF AVERAGE ANNUAL GROWTH RATES DURING THE PERIOD 2002—2030 (PERCENT)

Country Group	Population	Total Energy Consumption	Total Electricity Consumption	Nuclear Energy Production	Nuclear Capacity
North America	0.8	0.7 — 1.4	1.1 — 1.9	0.0 — 0.4	0.0 — 0.3
Latin America	1.0	2.3 — 4.0	2.6 — 4.6	0.1 — 4.3	-0.3 — 3.8
Western Europe	0.2	0.6 — 1.2	0.9 — 2.4	-1.6 — 0.8	-1.6 — 0.7
Eastern Europe	-0.3	1.1 — 2.2	1.2 — 3.1	0.8 — 2.6	0.8 — 2.1
Africa	1.9	1.8 — 3.0	2.3 — 4.4	0.5 — 5.9	0.0 — 5.4
Middle East and South Asia	1.4	2.4 — 3.7	2.5 — 4.4	4.7 — 8.5	4.7 — 8.1
South East Asia and the Pacific	0.9	2.1 — 3.5	2.4 — 3.5		
Far East	0.5	1.8 — 3.4	1.7 — 4.1	2.6 — 3.8	2.1 — 3.3
World Average	1.0	1.4 — 2.6	1.7 — 3.4	0.4 — 1.9	0.3 — 1.7

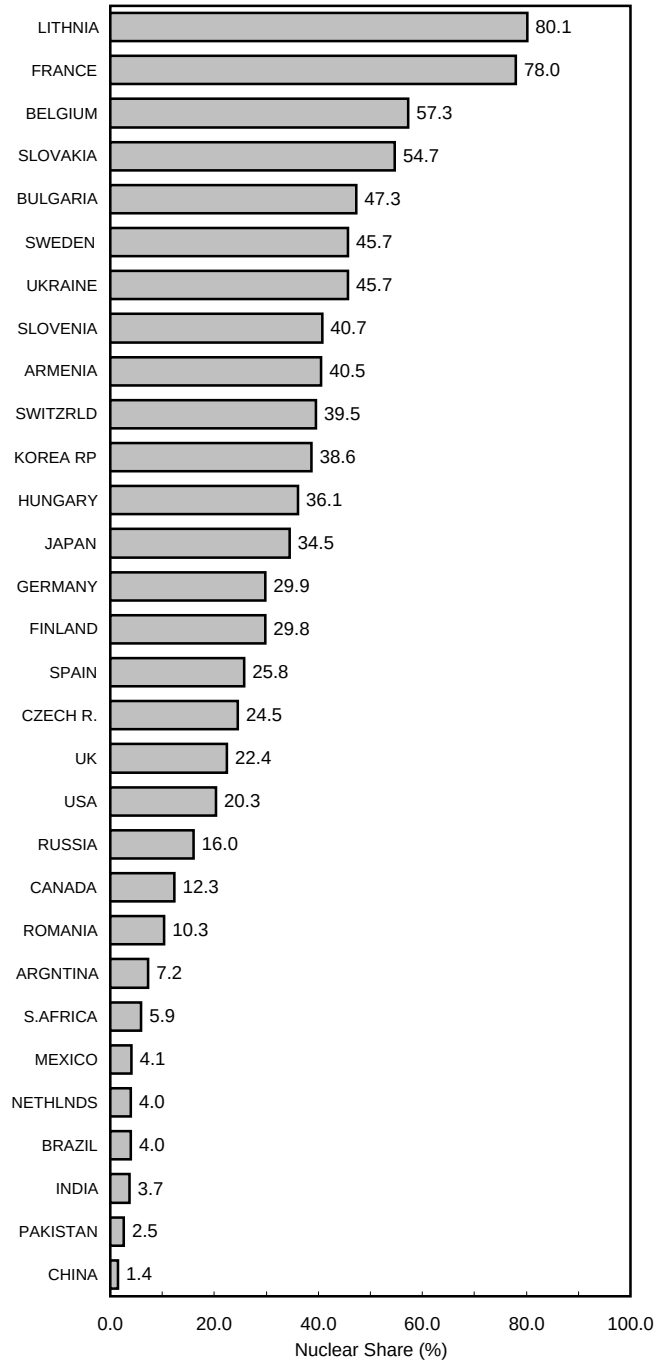

FIGURE 1. NUCLEAR SHARE OF TOTAL ELECTRICITY GENERATION DURING 2002

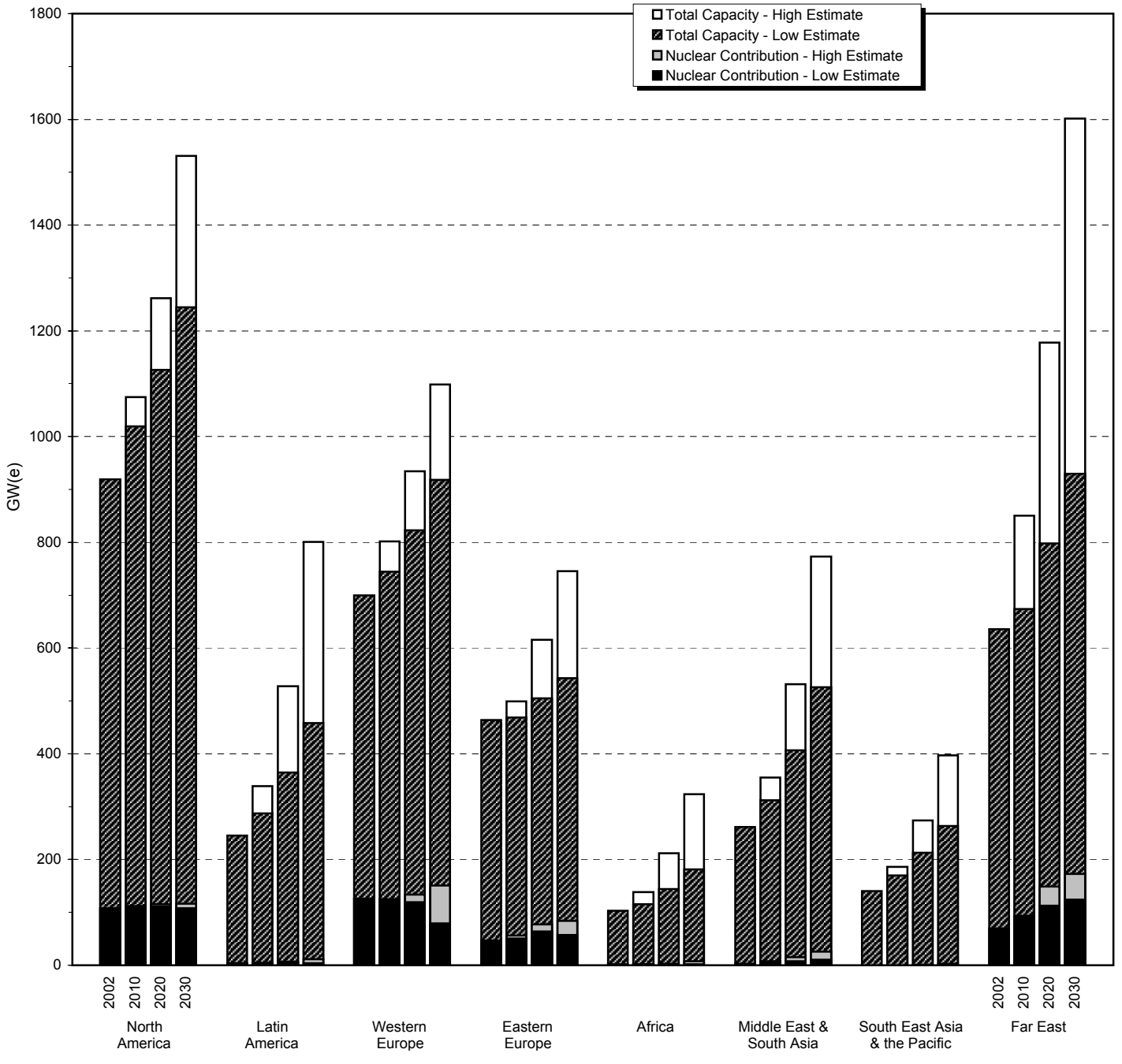

FIGURE 2. TOTAL AND NUCLEAR ELECTRICAL GENERATING CAPACITY

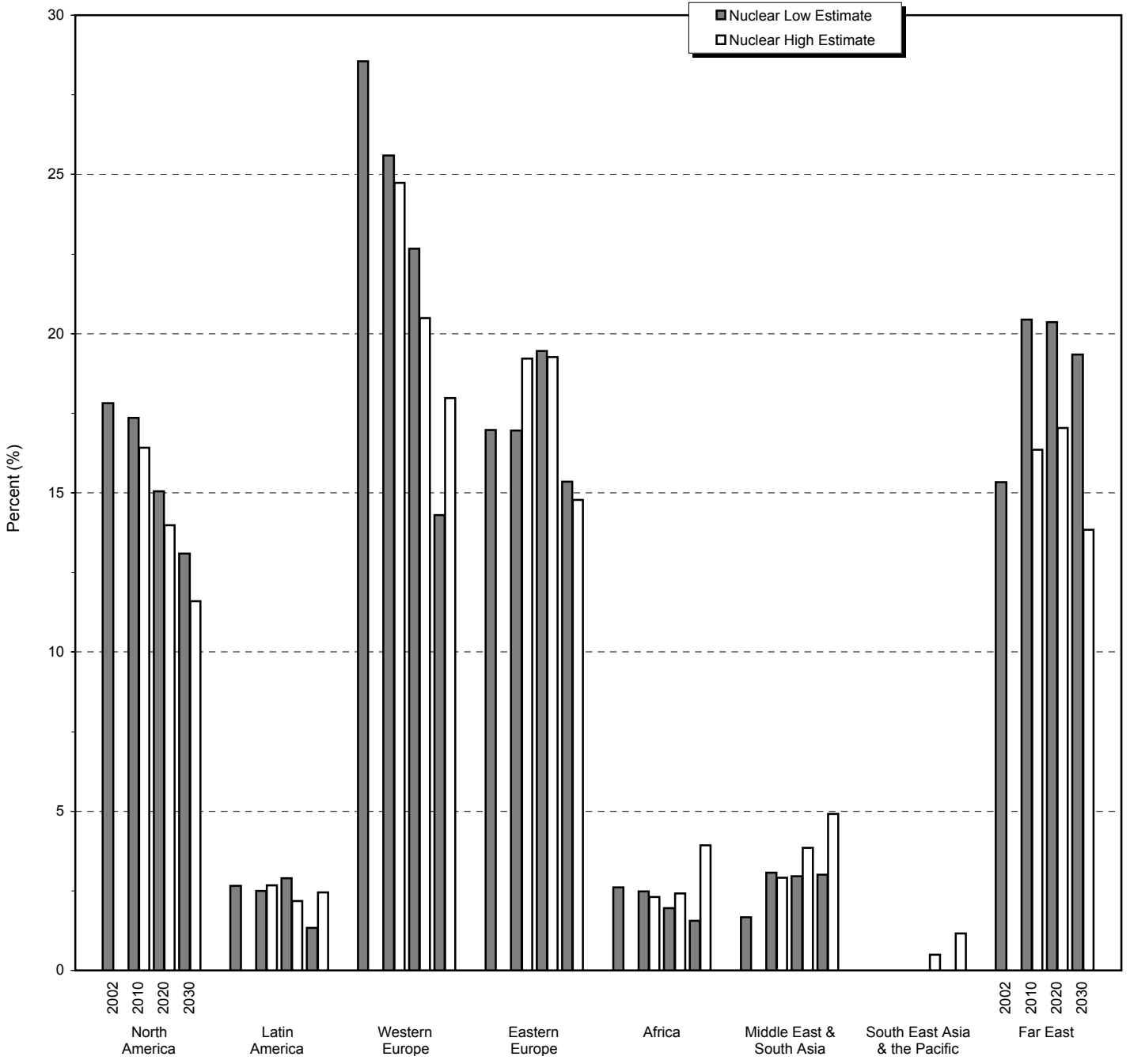

FIGURE 3. PERCENTAGE OF ELECTRICITY SUPPLIED BY NUCLEAR POWER

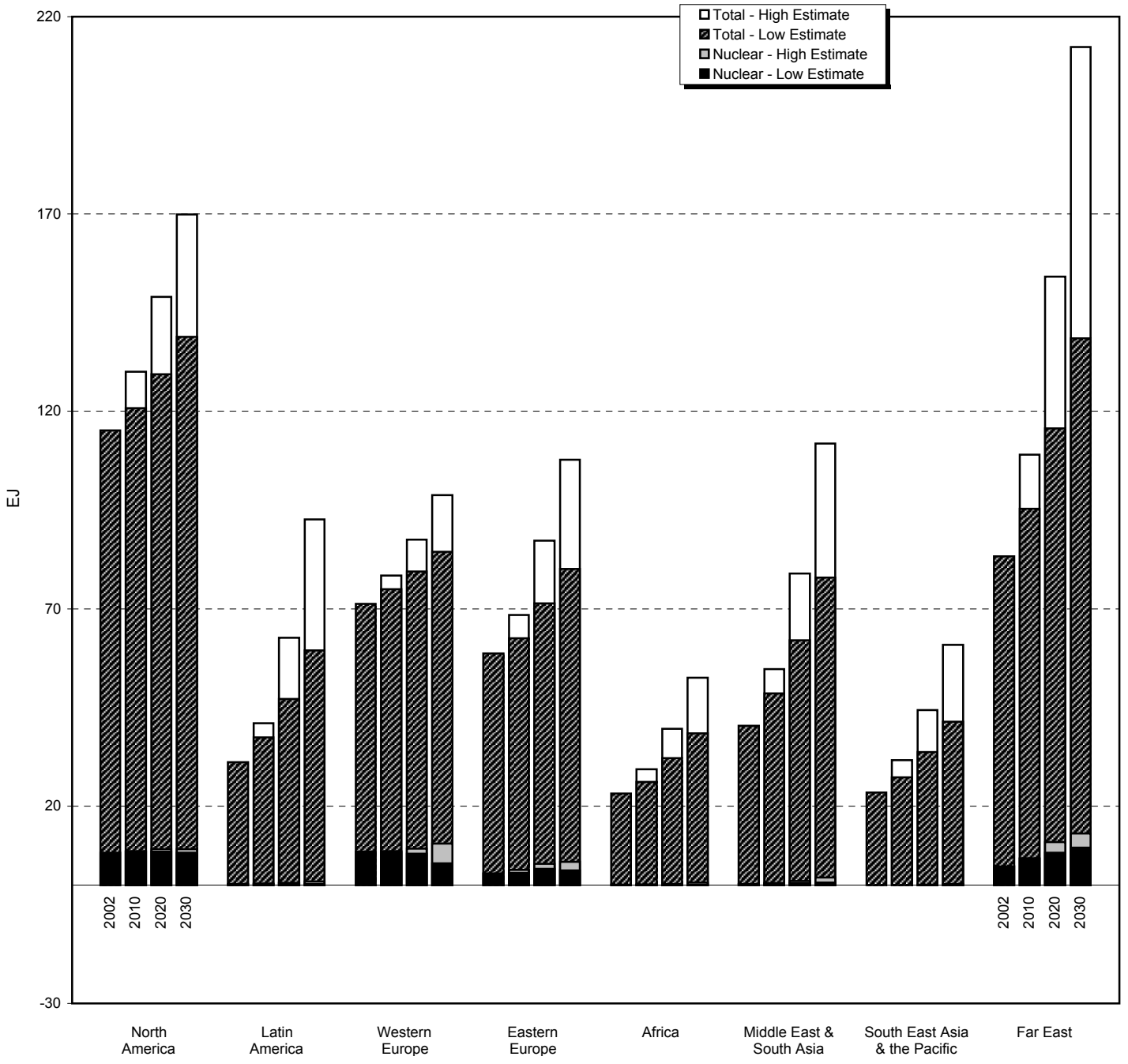

FIGURE 4. ENERGY CONSUMPTION ESTIMATES

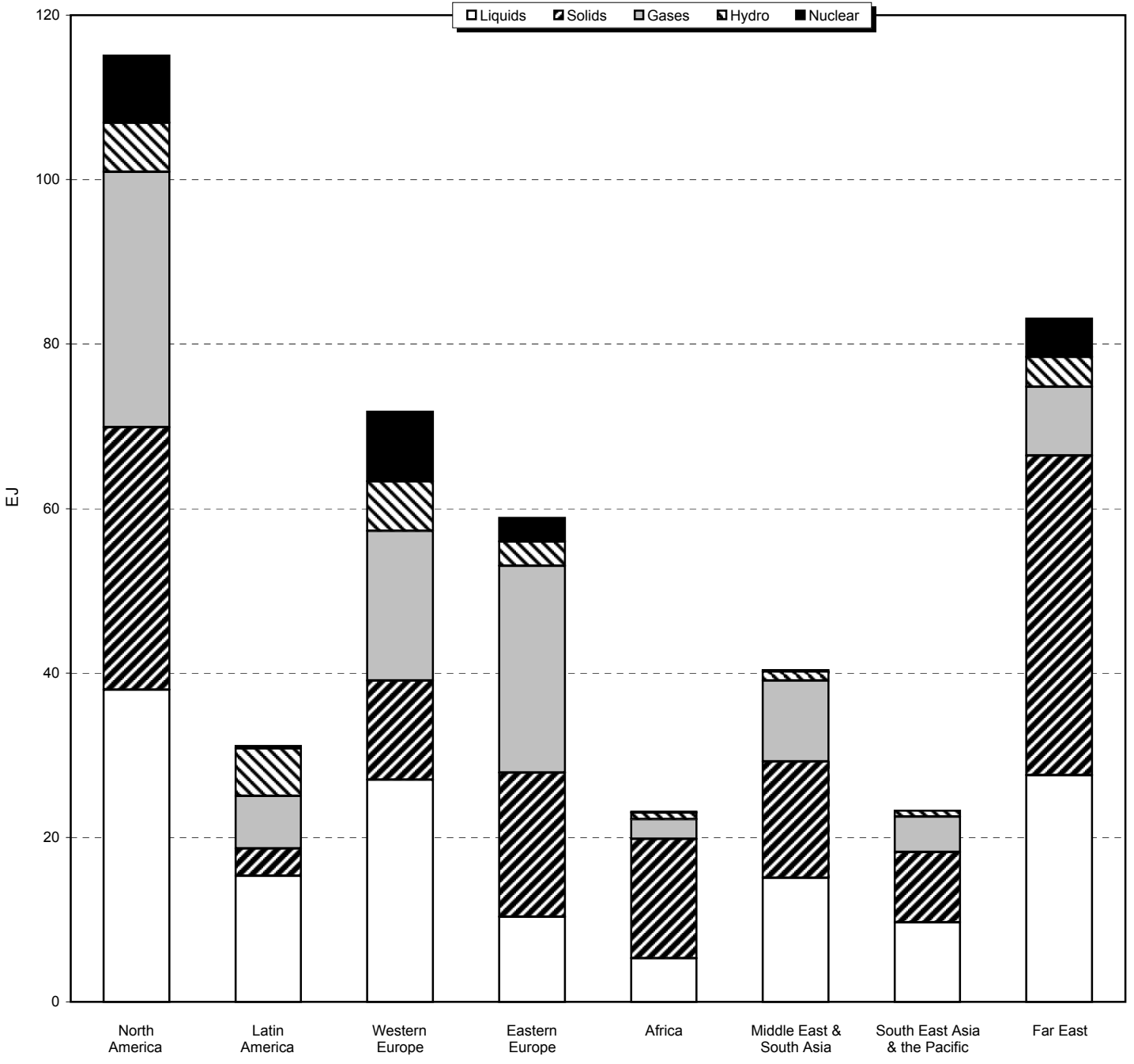

FIGURE 5. TOTAL ENERGY CONSUMPTION BY FUEL TYPE DURING 2002

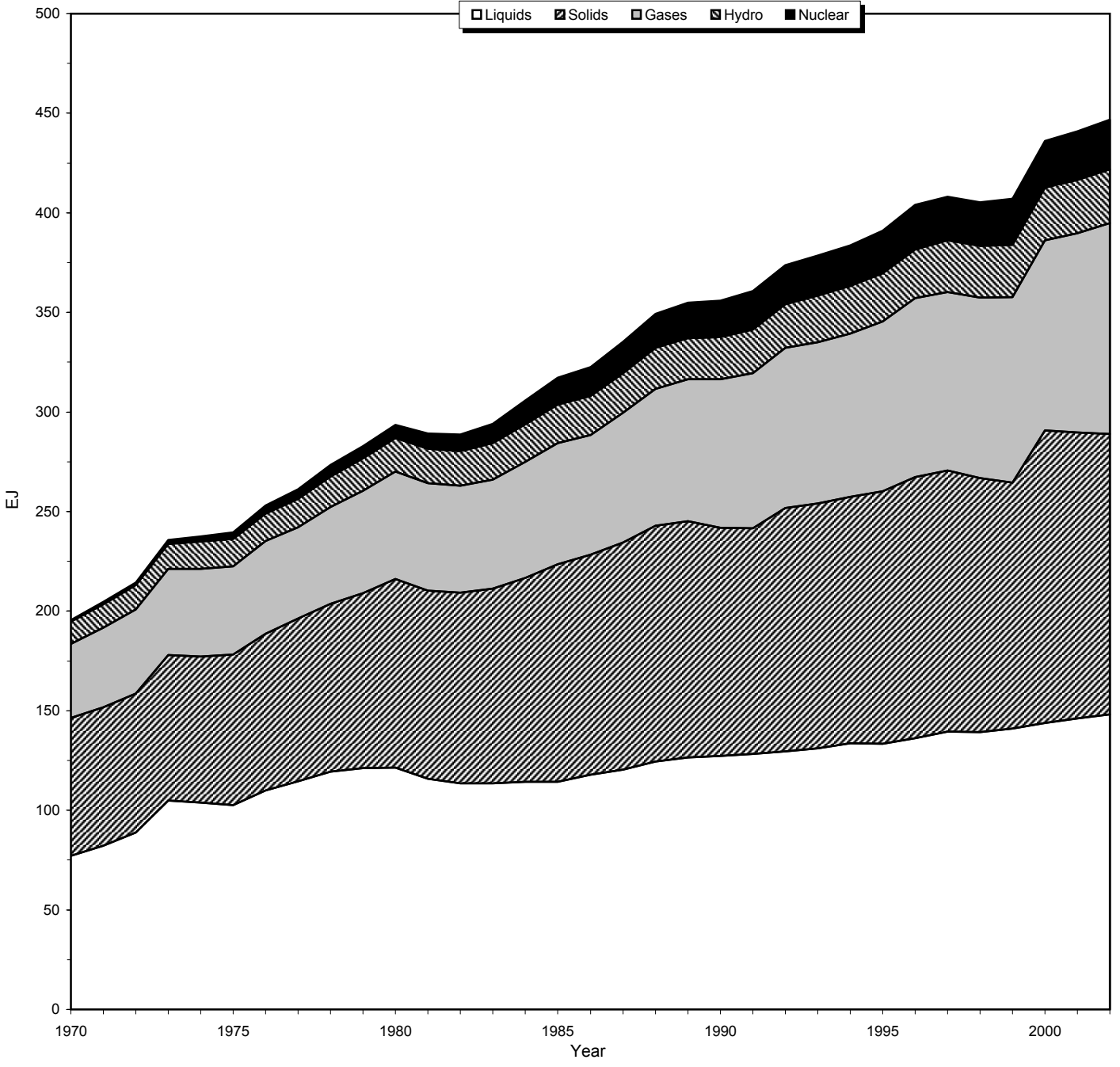

FIGURE 6. BREAKDOWN OF WORLD TOTAL ENERGY CONSUMPTION DURING THE PERIOD 1970 — 2002

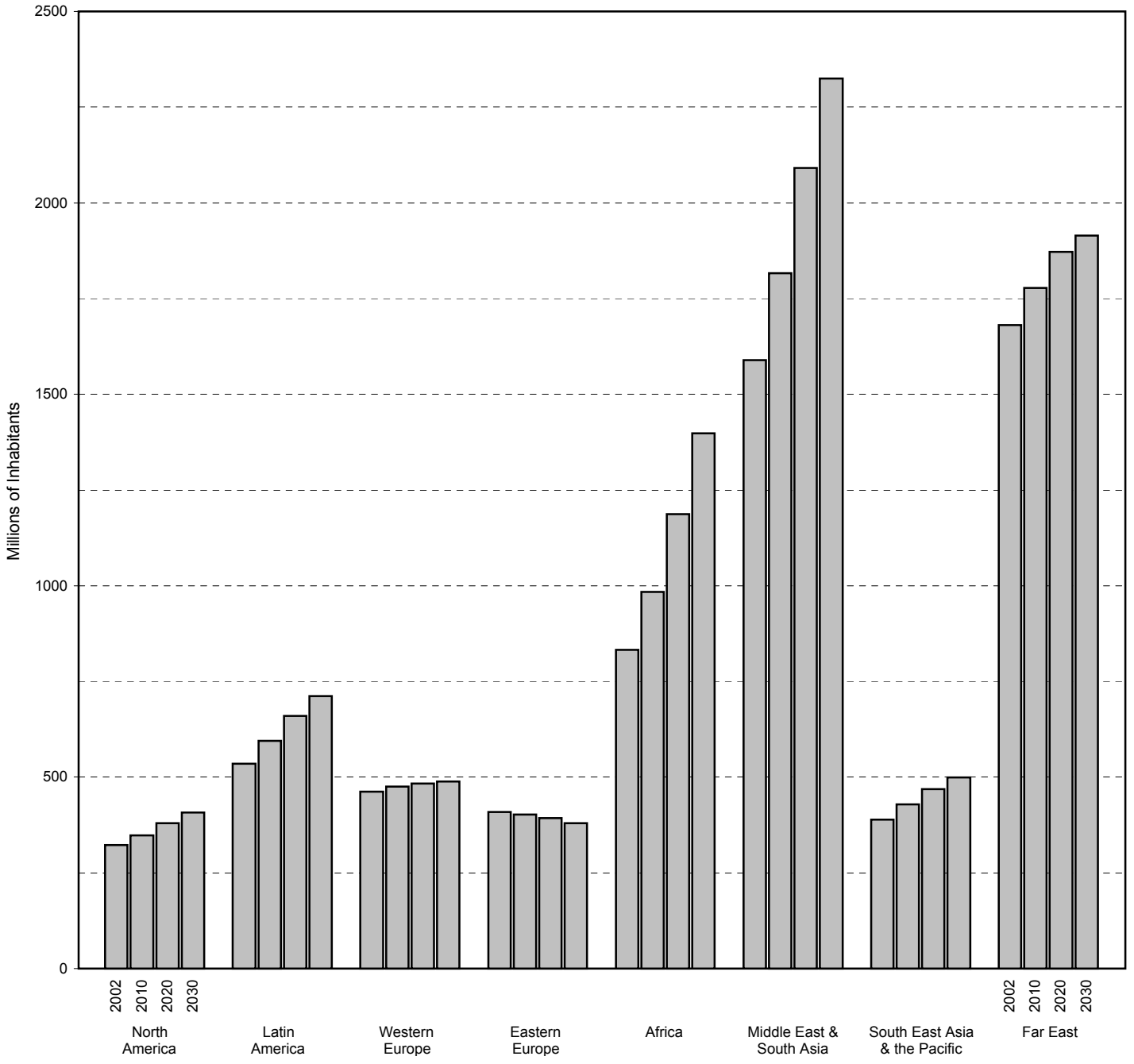

FIGURE 7. POPULATION ESTIMATES

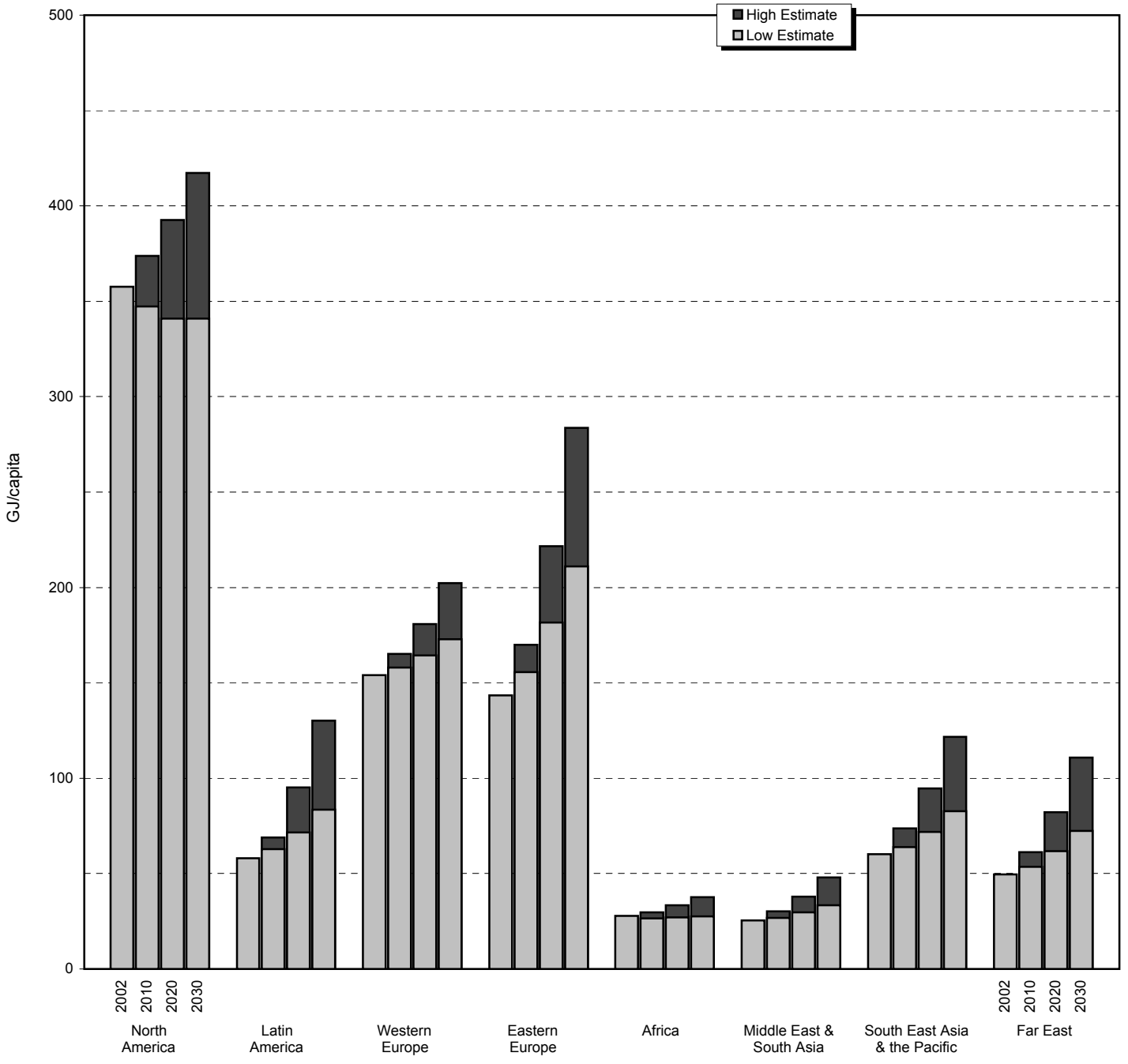

FIGURE 8. PER CAPITA ENERGY CONSUMPTION

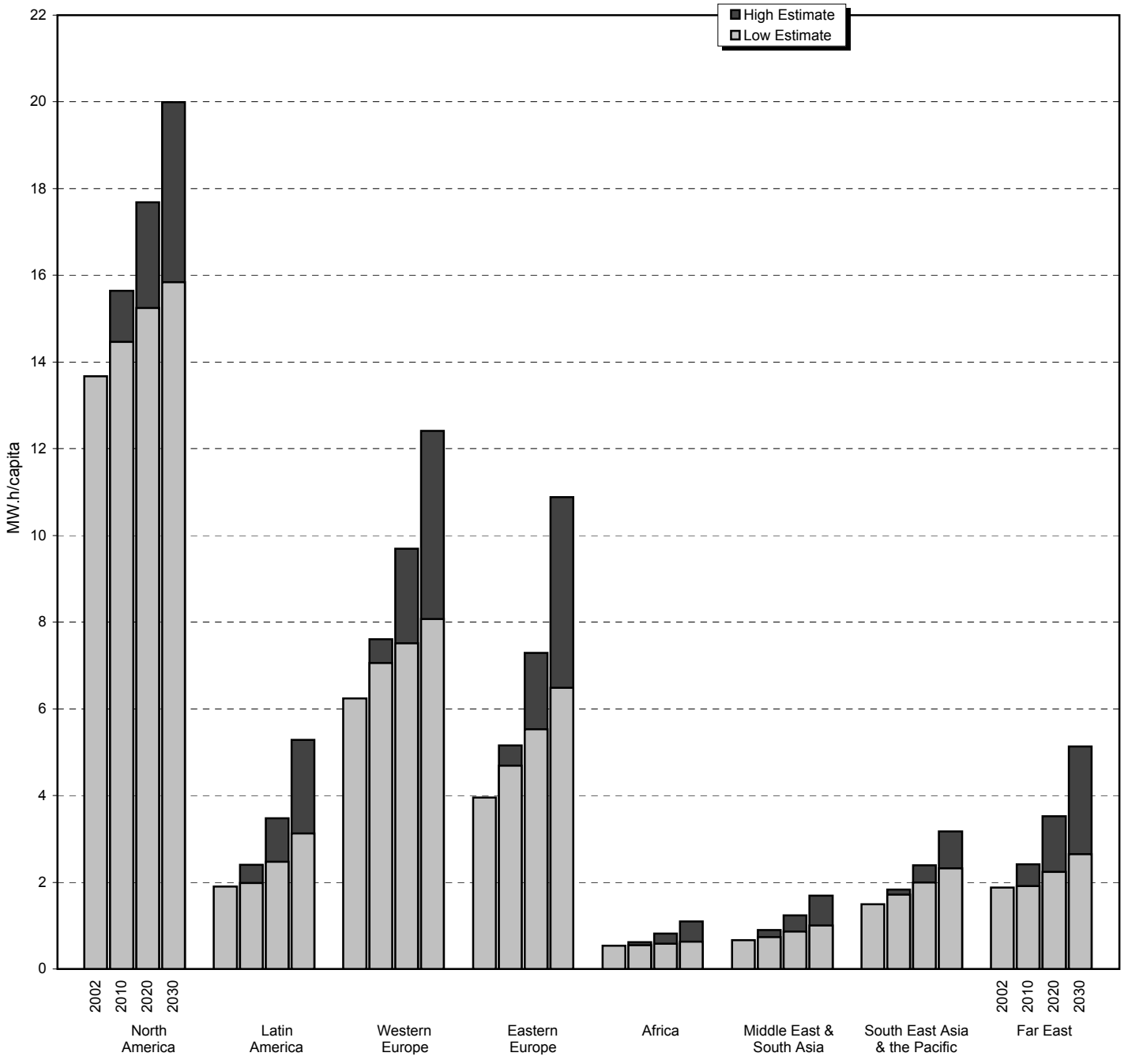

FIGURE 9. PER CAPITA ELECTRICITY CONSUMPTION

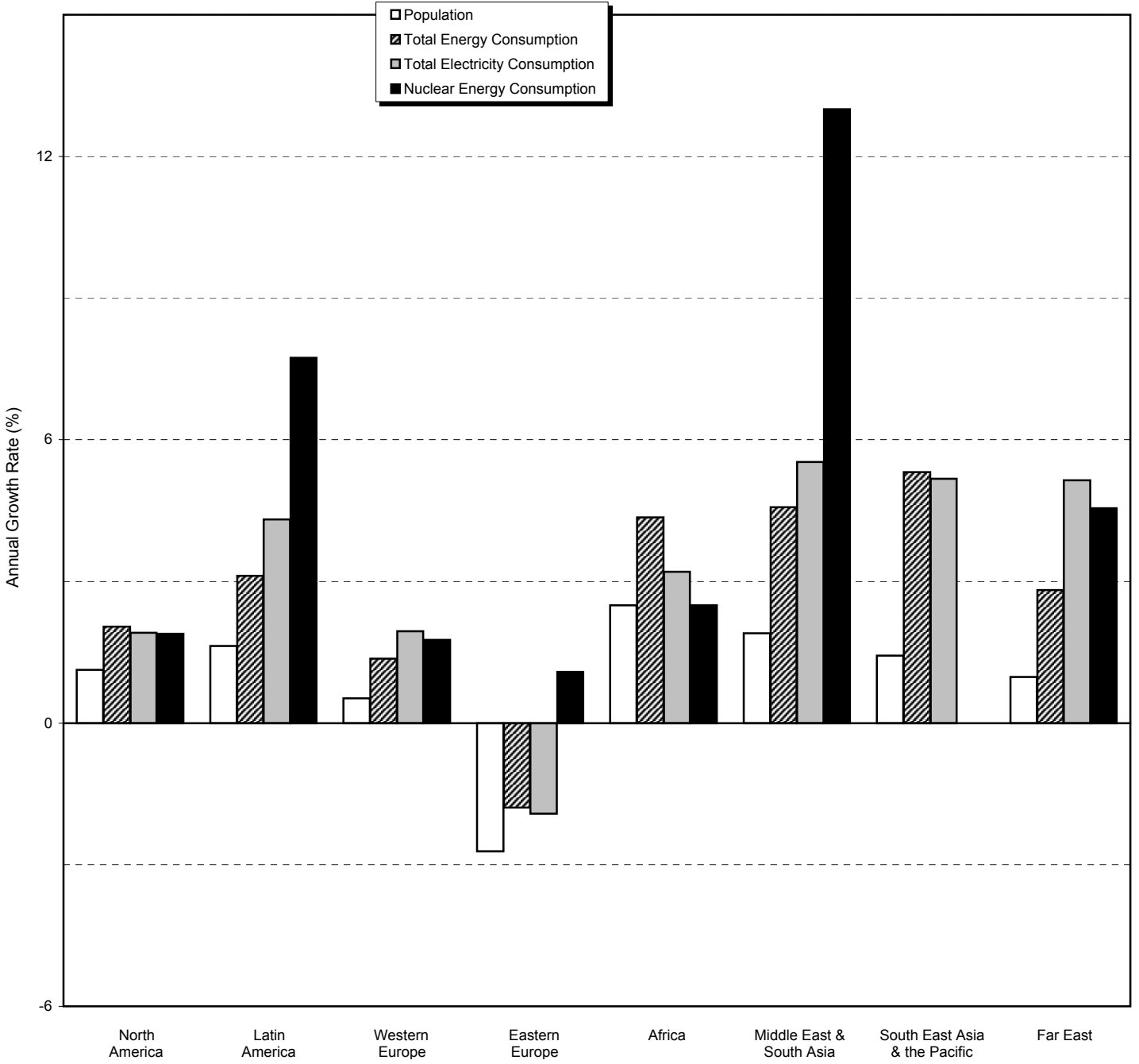

FIGURE 10. AVERAGE ANNUAL GROWTH RATES DURING THE PERIOD 1991 — 2002