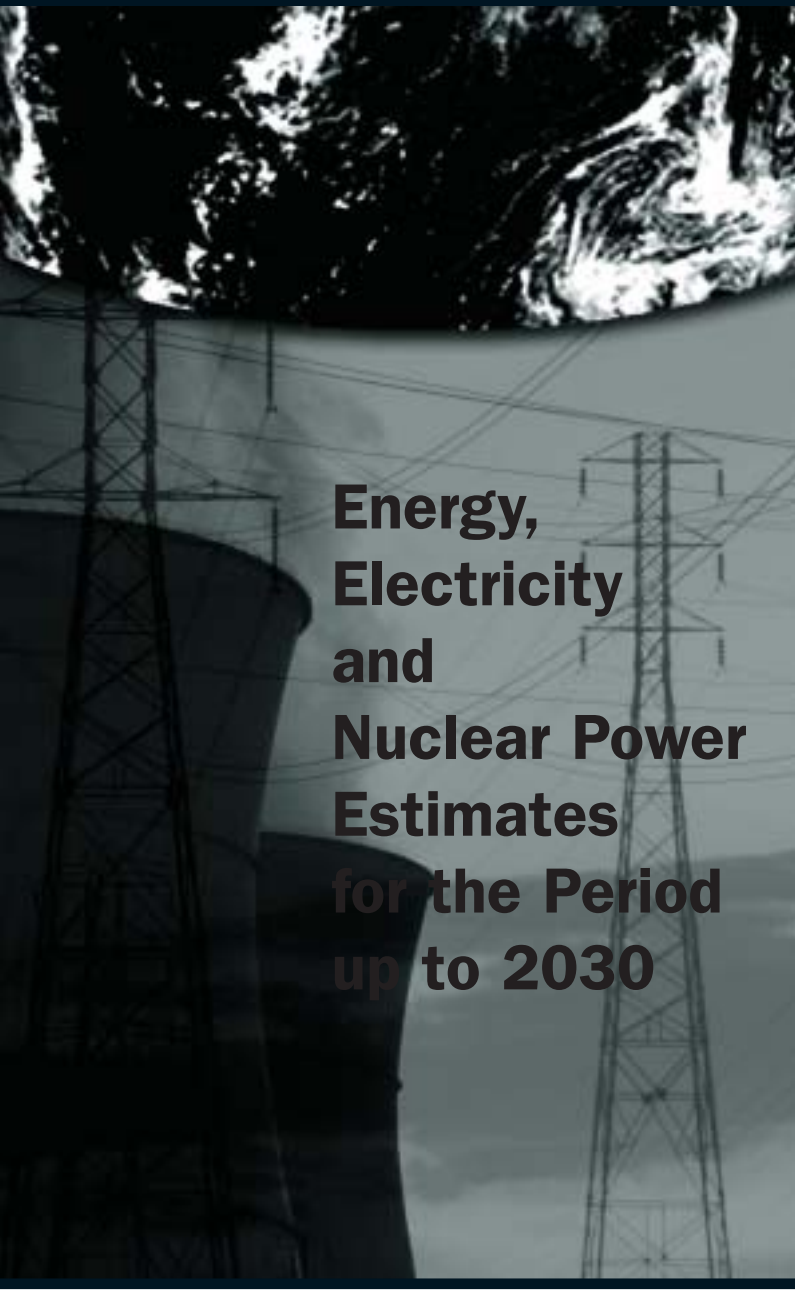
REFERENCE DATA SERIES No. 1 July 2005



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

IAEA
International Atomic Energy Agency

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REFERENCE DATA SERIES No. 1

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

July 2005 Edition

INTERNATIONAL ATOMIC ENERGY AGENCY
VIENNA, 2005

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NUCLEAR POWER ESTIMATES
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July 2005

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INTRODUCTION

Reference Data Series No. 1 is an annual publication – currently in its twenty-fifth 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 2004, however, are estimated, since the latest available information from the Department of Economic and Social Affairs of the United Nations is for 2002. 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 2004 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 three 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 cooperation, 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.

Beginning with the 25th edition of this publication, the data on electrical energy are converted to joules differently than in the previous issues. The following changes were introduced to represent more accurately the physical energy supply in countries and to align with the United Nations Secretariat's and other international organizations treatment of electricity: data on electricity produced by nuclear power plants is converted to joules based on the average efficiency of a nuclear power plant, i.e. 33 per cent; data on electricity generated by geothermal heat is converted to joules based on the average efficiency of a geothermal power plant, i.e. 10 per cent. The conversion to joules of electricity generated by hydropower or by the other non-thermal sources such as wind, tide, and solar is based on the energy content of the electricity generated (the equivalent of assuming a 100 per cent efficiency).

The total energy consumption has been calculated by summing the primary energy production, the net energy trade minus changes in international bunkers and domestic stocks.

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 terawatt-hour = 10^9 kW·h = 3.6×10^{-3} EJ

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 of America*

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
Côte 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 2004)

Group and Country	In Operation		Under Construction		Electricity Supplied by Nuclear Power Reactors in 2004	
	Number of Units	Total MW(e)	Number of Units	Total MW(e)	TW·h	Percent of Total Electricity
North America						
Canada	17	12113			85.3	15.0
United States of America	104	99210			788.6	19.9
Latin America						
Argentina	2	935	1	692	7.3	8.2
Brazil	2	1901			11.5	3.0
Mexico	2	1310			10.6	5.2
Western Europe						
Belgium	7	5801			44.9	55.1
Finland	4	2656			21.8	26.6
France	59	63363			426.8	78.1
Germany	18	20679			158.4	32.1
Netherlands	1	449			3.6	3.8
Spain	9	7585			60.9	22.9
Sweden	11	9469			75.0	51.8
Switzerland	5	3220			25.4	40.0
United Kingdom	23	11852			73.7	19.4
Eastern Europe						
Armenia	1	376			2.2	38.8
Bulgaria	4	2722			15.6	41.6
Czech Republic	6	3548			26.3	31.2
Hungary	4	1755			11.2	33.8

TABLE 1. NUCLEAR POWER REACTORS IN THE WORLD (end of 2004) — continued

Group and Country	In Operation		Under Construction		Electricity Supplied by Nuclear Power Reactors in 2004	
	Number of Units	Total MW(e)	Number of Units	Total MW(e)	TW·h	Percent of Total Electricity
Lithuania (b)	2	2370			13.9	72.1
Romania	1	655	1	655	5.1	10.1
Russian Federation	31	21743	4	3775	133.0	15.6
Slovakia	6	2442			15.6	55.2
Slovenia	1	656			5.2	38.8
Ukraine	15	13107	2	1900	81.8	51.1
Africa						
South Africa	2	1800			14.3	6.6
Middle East and South Asia						
India	14	2550	9	4092	15.0	2.8
Iran, Islamic Republic of			1	915		
Pakistan	2	425			1.9	2.4
Far East						
China	9	6602	2	2000	47.8	2.2
Japan	54	45468	3	3237	273.8	29.3
Korea, Republic of	19	15850	1	960	124.0	37.9
World Total (a)	441	367496	26	20826	2618.6	16.0

Notes:

(a) 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 2600 MW(e);

— 37.9 TW.h of nuclear electricity generation, representing 20.9% of the total electricity generated.

(b) one unit was shut down on 31 December 2004.

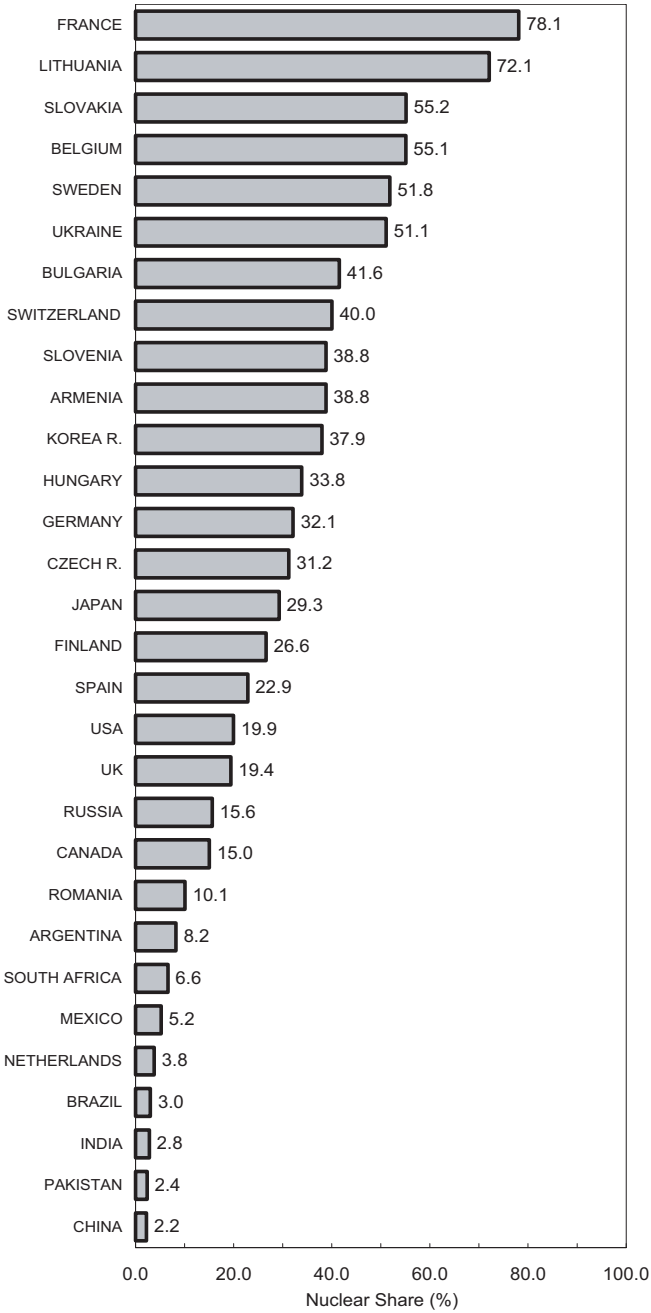

FIGURE 1. NUCLEAR SHARE OF TOTAL ELECTRICITY GENERATION IN 2004

Note: The nuclear share of electricity generation in Taiwan, China was 20.9%.

TABLE 2. NUMBER OF COUNTRIES WITH NUCLEAR POWER REACTORS IN OPERATION OR UNDER CONSTRUCTION (end of 2004)

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	45	3	1	3
Western Europe	29	9		9
Eastern Europe	27	10	3	10
Africa	57	1		1
Middle East and South Asia	25	2	2	3
South East Asia and the Pacific	27			
Far East	11	4	4	4
World Total	223	31	10	32

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

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TABLE 3. ESTIMATES OF TOTAL AND NUCLEAR ELECTRICAL GENERATING CAPACITY

Country Group	2004			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	1055	111.3	10.6	1099 1155	116 117	11 10	1194 1279	118 128	10 10	1318 1422	115 145	8.7 10
Latin America	264	4.1	1.6	303 350	4.1 4.1	1.4 1.2	383 543	6.1 6.1	1.6 1.1	483 828	5.8 15	1.2 1.8
Western Europe	724	125.1	17.3	762 816	119 125	16 15	842 951	97 130	11 14	940 1118	79 145	8.5 13
Eastern Europe	466	49.4	10.6	469 496	48 51	10 10	505 605	64 78	13 13	543 736	66 97	12 13
Africa	105	1.8	1.7	115 135	1.8 1.8	1.6 1.3	143 207	2.1 4.1	1.5 2.0	181 316	2.1 9.3	1.2 3.0
Middle East and South Asia	284	3.0	1.0	331 370	9 10	2.8 2.8	430 555	15 27	3.6 4.9	556 811	18 43	3.2 5.3
South East Asia and the Pacific	143			169 184			213 270	0.9 0.9	0.4 0.3	264 391	0.9 3.0	0.3 0.8
Far East	651	72.8	11.2	685 840	82 85	12 10	804 1167	113 142	14 12	937 1589	131 183	14 11
World Total Low Estimate	3693	367.5	10.0	3934	380	10	4515	416	9.2	5223	418	8.0
World Total High Estimate				4347	395	9.1	5576	516	9.3	7210	640	8.9

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

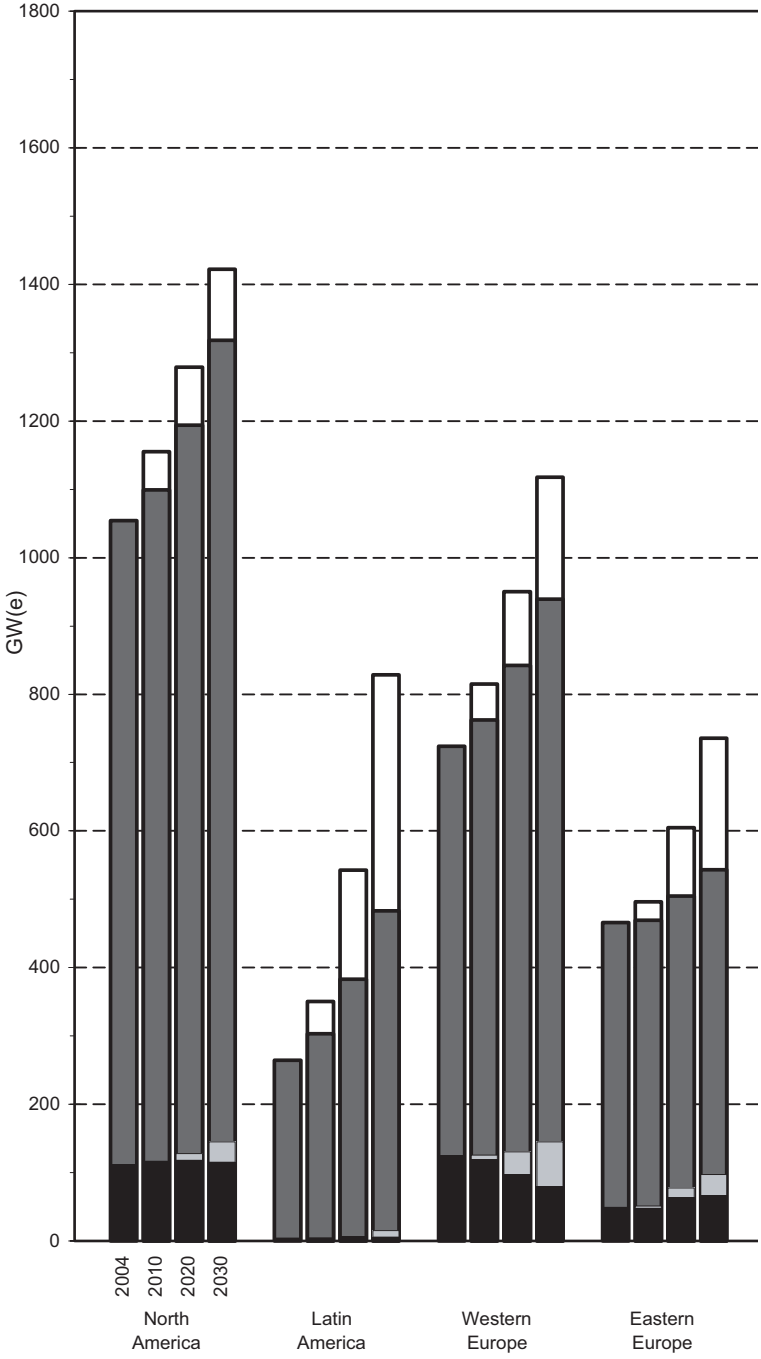

FIGURE 2. TOTAL AND NUCLEAR ELECTRICAL GENERATING CAPACITY

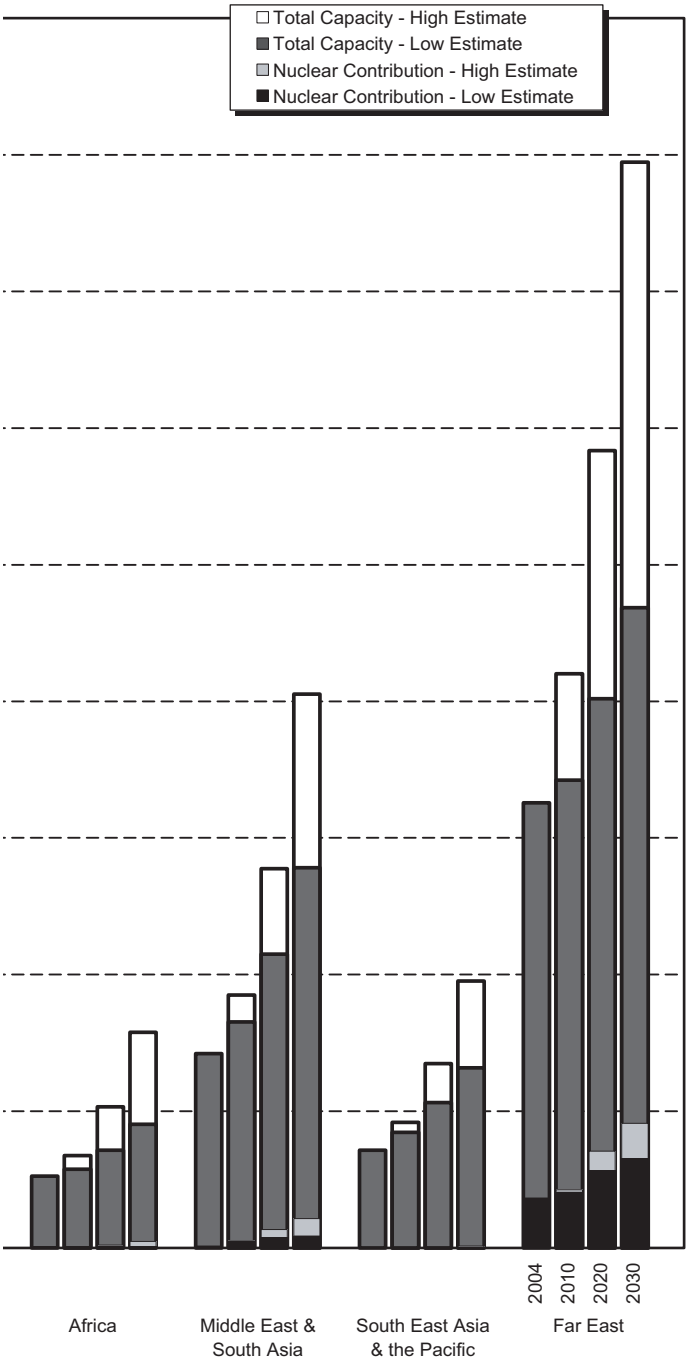
Total Capacity - High Estimate
Total Capacity - Low Estimate
Nuclear Contribution - High Estimate
Nuclear Contribution - Low Estimate
2004
2010
2020
2030
Africa
Middle East & South Asia
South East Asia & the Pacific
Far East

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

Country Group	2004			2010			2020			2030		
	Total Elect. TW·h	Nuclear		Total Elect. TW·h	Nuclear		Total Elect. TW·h	Nuclear		Total Elect. TW·h	Nuclear	
		TW·h	%		TW·h	%		TW·h	%		TW·h	%
North America	4521	873.8	19.3	4732 5079	926 931	20 18	5402 6217	953 1031	18 17	6044 7559	928 1168	15 15
Latin America	1069	29.4	2.8	1151 1366	31 31	2.7 2.2	1564 2166	46 46	2.9 2.1	2138 3545	44 114	2.1 3.2
Western Europe	2934	890.5	30.3	3147 3377	877 923	28 27	3432 4347	728 981	21 23	3720 5621	613 1119	16 20
Eastern Europe	1692	310.1	18.3	1784 1941	315 338	18 17	2061 2661	429 525	21 20	2341 3835	464 681	20 18
Africa	498	14.3	2.9	569 637	14 14	2.5 2.3	738 1008	17 34	2.4 3.3	929 1582	18 77	1.9 4.9
Middle East and South Asia	1201	17.0	1.4	1348 1597	56 62	4.2 3.9	1792 2532	94 167	5.3 6.6	2316 3864	115 279	5.0 7.2
South East Asia and the Pacific	639			763 805			973 1148	5.5 5.5	0.6 0.5	1211 1629	5.8 19	0.5 1.2
Far East	3785	483.5	12.8	4037 4968	558 583	14 12	4934 7592	783 980	16 13	5968 11325	928 1296	16 11
World Total Low Estimate	16337	2618.6	16.0	17531	2776	16	20894	3055	15	24667	3115	13
World Total High Estimate				19769	2881	15	27671	3769	14	38960	4753	12

(*) 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.

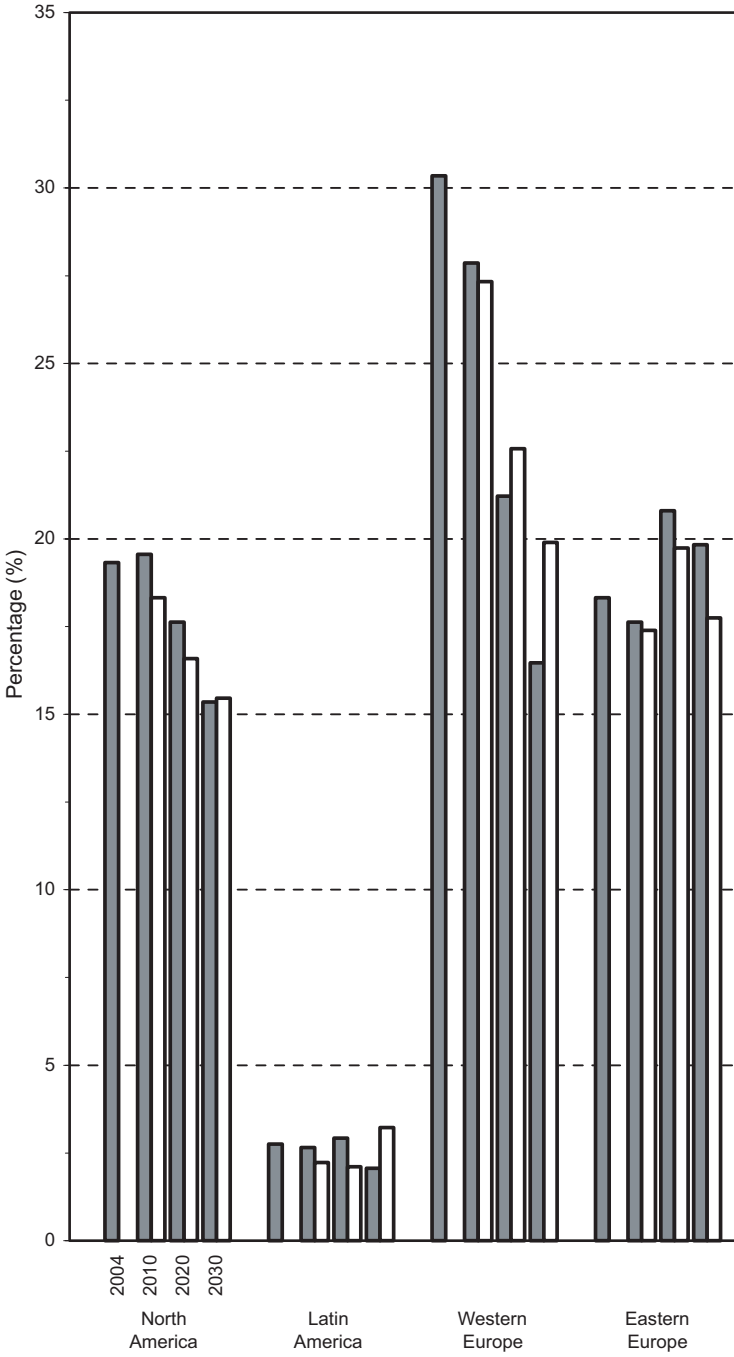

FIGURE 3. PERCENTAGE OF ELECTRICITY SUPPLIED BY NUCLEAR POWER

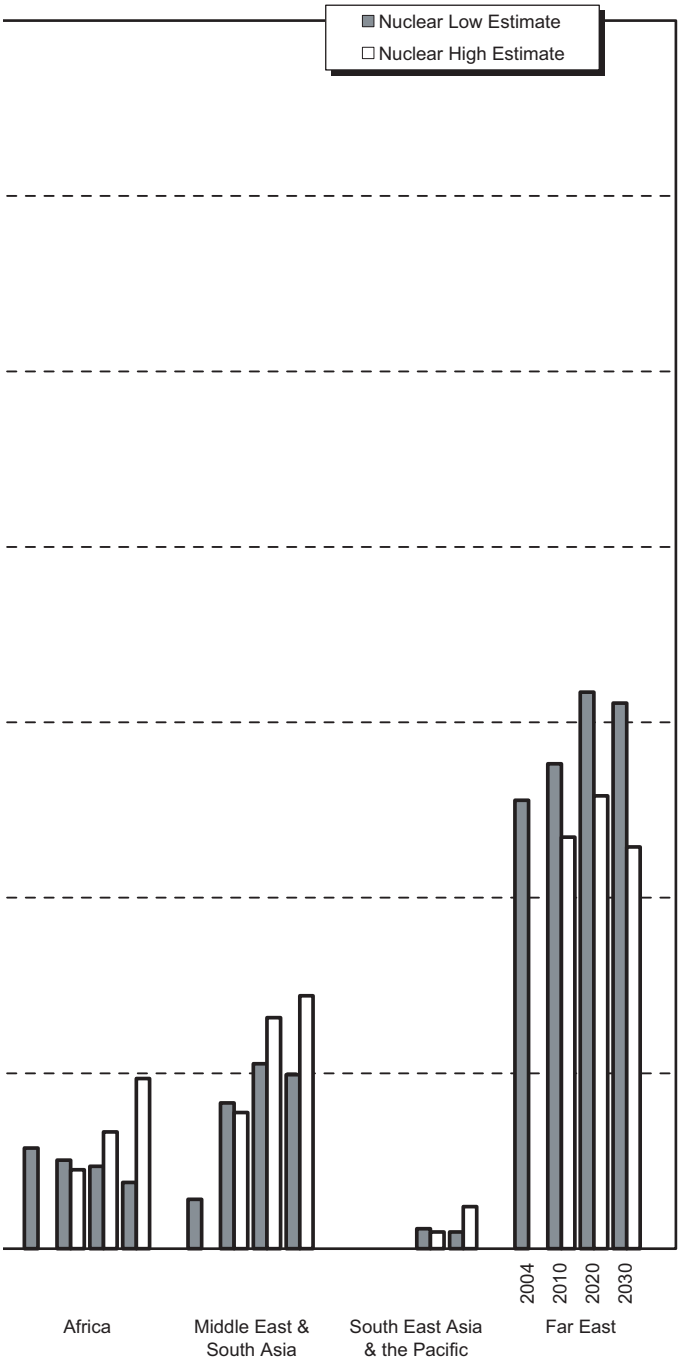
Nuclear Low Estimate
Nuclear High Estimate
2004
2010
2020
2030
Africa
Middle East & South Asia
South East Asia & the Pacific
Far East

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

Country Group	2004			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	113.9	36.2	8.4	119 127	36 36	8.5 8.0	127 145	39 39	8.2 7.7	136 166	40 41	7.4 7.7
Latin America	28.4	22.6	1.1	33 36	21 23	1.0 0.9	42 55	22 24	1.2 0.9	53 81	24 26	0.9 1.5
Western Europe	69.9	36.4	13.9	73 76	37 38	13 13	78 85	37 43	10 13	82 96	37 49	8.1 13
Eastern Europe	52.7	38.0	6.4	56 60	38 38	6.2 6.1	63 77	38 41	7.4 7.5	71 95	39 48	7.1 7.8
Africa	22.3	20.0	0.7	25 27	21 21	0.6 0.6	30 37	22 24	0.6 1.0	36 49	23 29	0.5 1.7
Middle East and South Asia	46.3	30.0	0.4	54 60	29 31	1.1 1.1	69 88	30 33	1.5 2.1	87 124	31 36	1.4 2.5
South East Asia and the Pacific	21.5	30.9		25 28	32 30		30 40	33 30	0.2 0.2	37 54	34 31	0.2 0.4
Far East	95.3	35.7	5.5	107 120	34 37	5.7 5.3	130 171	34 40	6.6 6.3	156 236	35 43	6.5 6.0
World Total Low Estimate	450.5	33.8	6.3	491	33	6.2	570	34	5.8	660	34	5.2
World Total High Estimate				535	34	5.9	697	37	5.9	901	40	5.8

Note:
(*) Total energy consumption is estimated as primary energy requirments = production of primary energy plus net trade (Import – Export) minus international bunkers and stock changes.

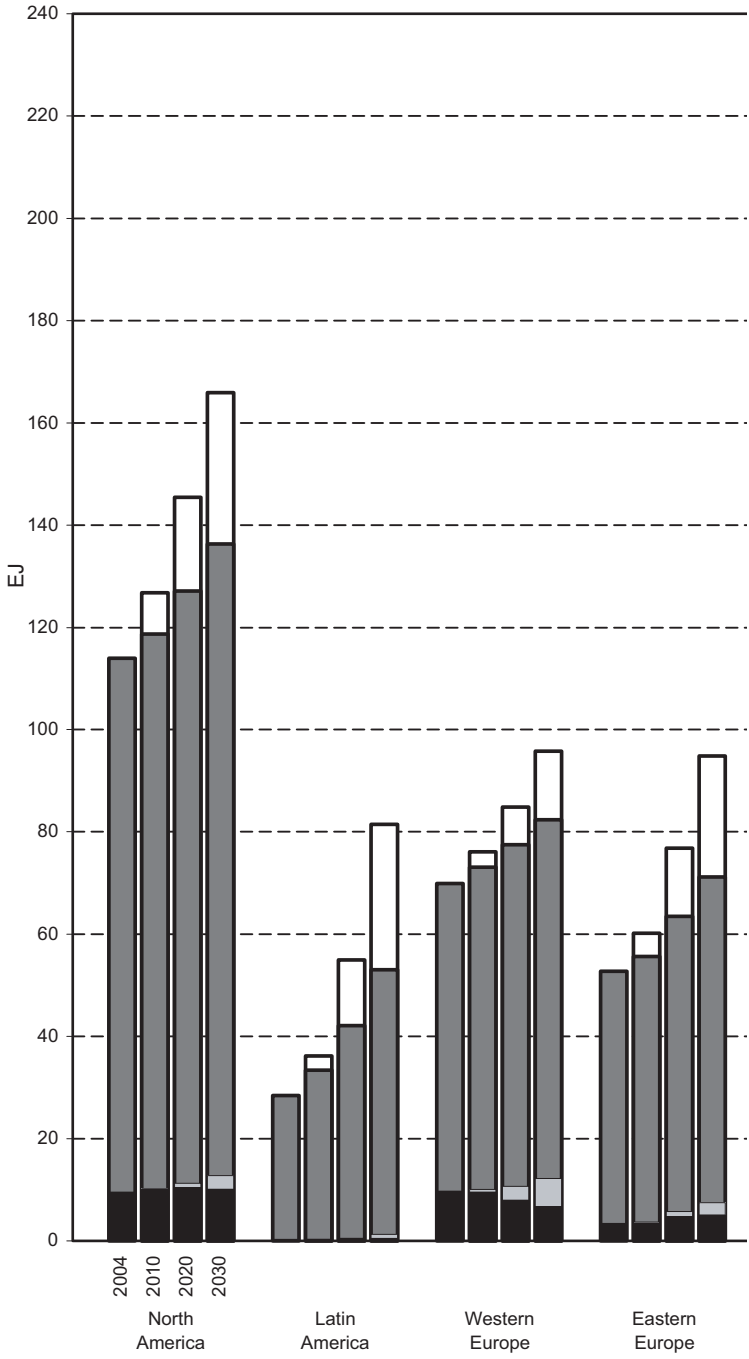

FIGURE 4. ENERGY CONSUMPTION ESTIMATES

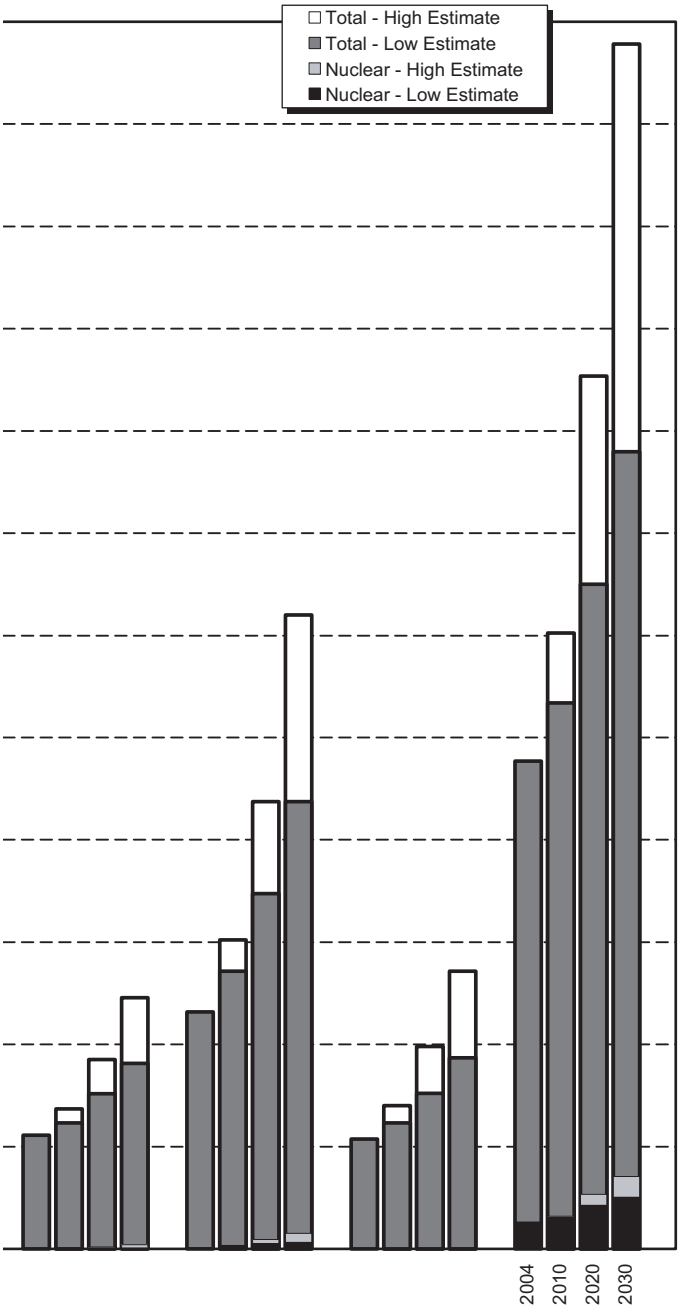
Total - High Estimate
Total - Low Estimate
Nuclear - High Estimate
Nuclear - Low Estimate
2004
2010
2020
2030
Africa
Middle East & South Asia
South East Asia & the Pacific
Far East

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TABLE 6. TOTAL ENERGY CONSUMPTION (EJ) BY TYPE OF FUEL IN 2004 (*)

Country Group	Solids (a)	Liquids	Gases	Biomass (b)	Hydro	Nuclear	Renewables (c)	Total
North America	24.63	45.06	28.30	3.69	2.19	9.53	0.54	113.95
Latin America	1.10	13.66	6.85	3.98	2.18	0.32	0.32	28.41
Western Europe	10.44	26.09	18.31	2.80	1.97	9.71	0.58	69.92
Eastern Europe	11.54	10.71	24.41	1.93	0.89	3.38	-0.12	52.74
Africa	6.18	5.54	2.68	7.36	0.34	0.16	0.01	22.27
Middle East and South Asia	11.00	18.68	10.61	5.49	0.37	0.19	0.01	46.34
South East Asia and the Pacific	4.28	9.66	4.90	2.16	0.28		0.24	21.52
Far East	48.31	28.69	7.71	3.00	1.78	5.27	0.58	95.35
World Total	117.48	158.10	103.79	30.41	10.00	28.57	2.16	450.50

Notes:

(*) Total energy consumption = production of primary energy plus net trade (Import – Export) minus international bunkers and stock changes.

(a) Solids do not include commercial wood.

(b) The column headed 'Biomass' includes commercial wood, combustible renewables, waste and other biomass products.

(c) The column headed 'Renewables' includes geothermal, wind, solar, tide energy and net electricity trade.

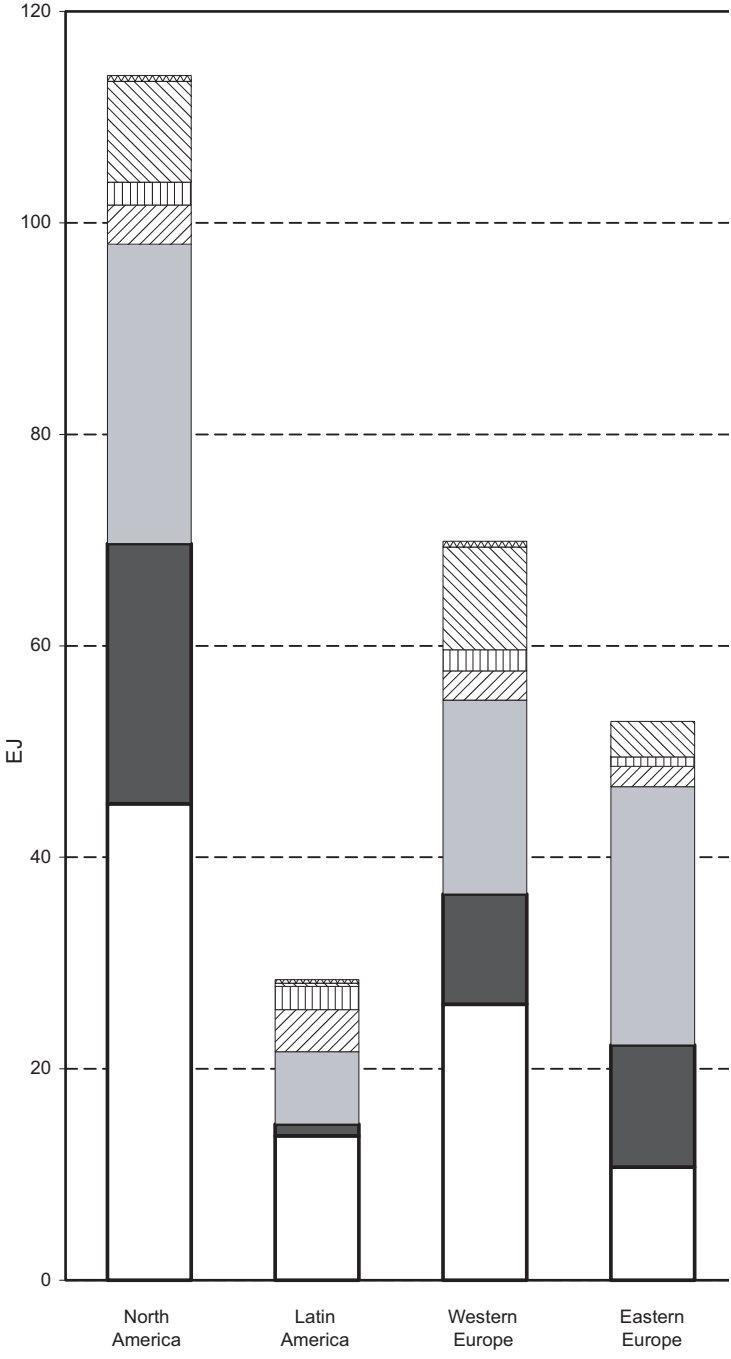
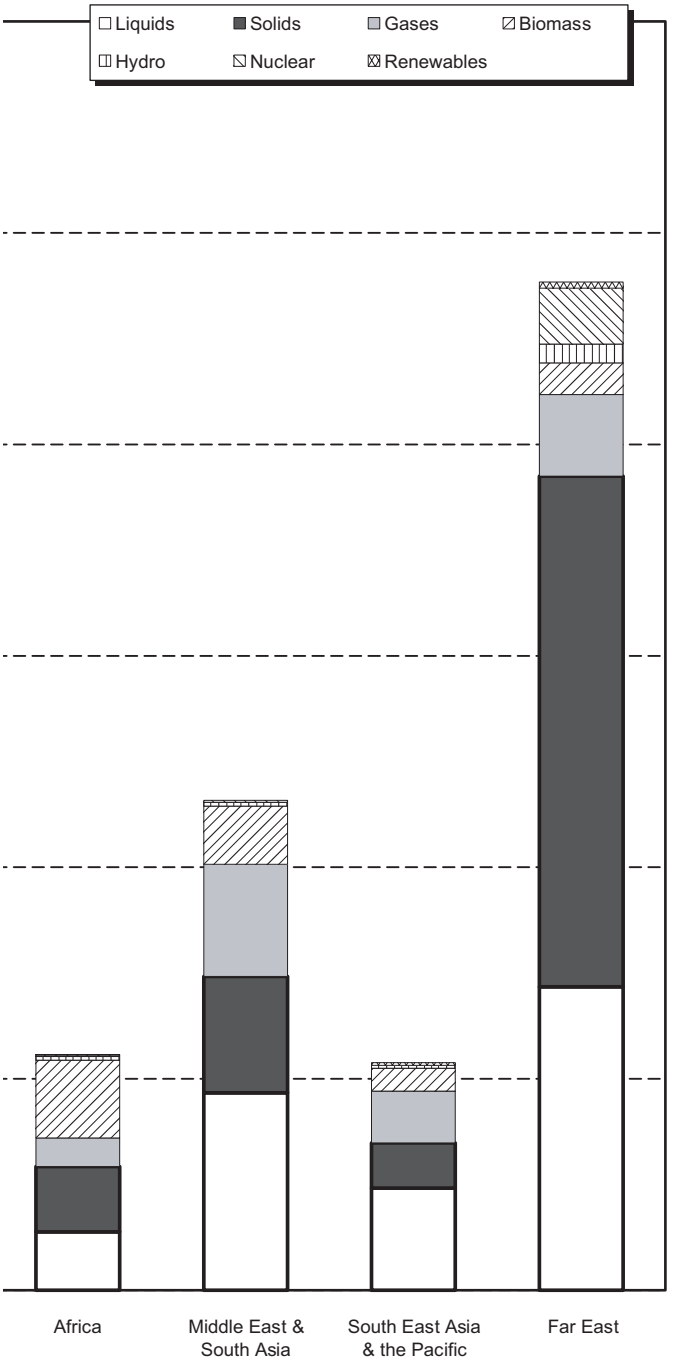


FIGURE 5. TOTAL ENERGY CONSUMPTION BY FUEL TYPE IN 2004


Liquids
Solids
Gases
Biomass
Hydro
Nuclear
Renewables
Africa
Middle East & South Asia
South East Asia & the Pacific
Far East

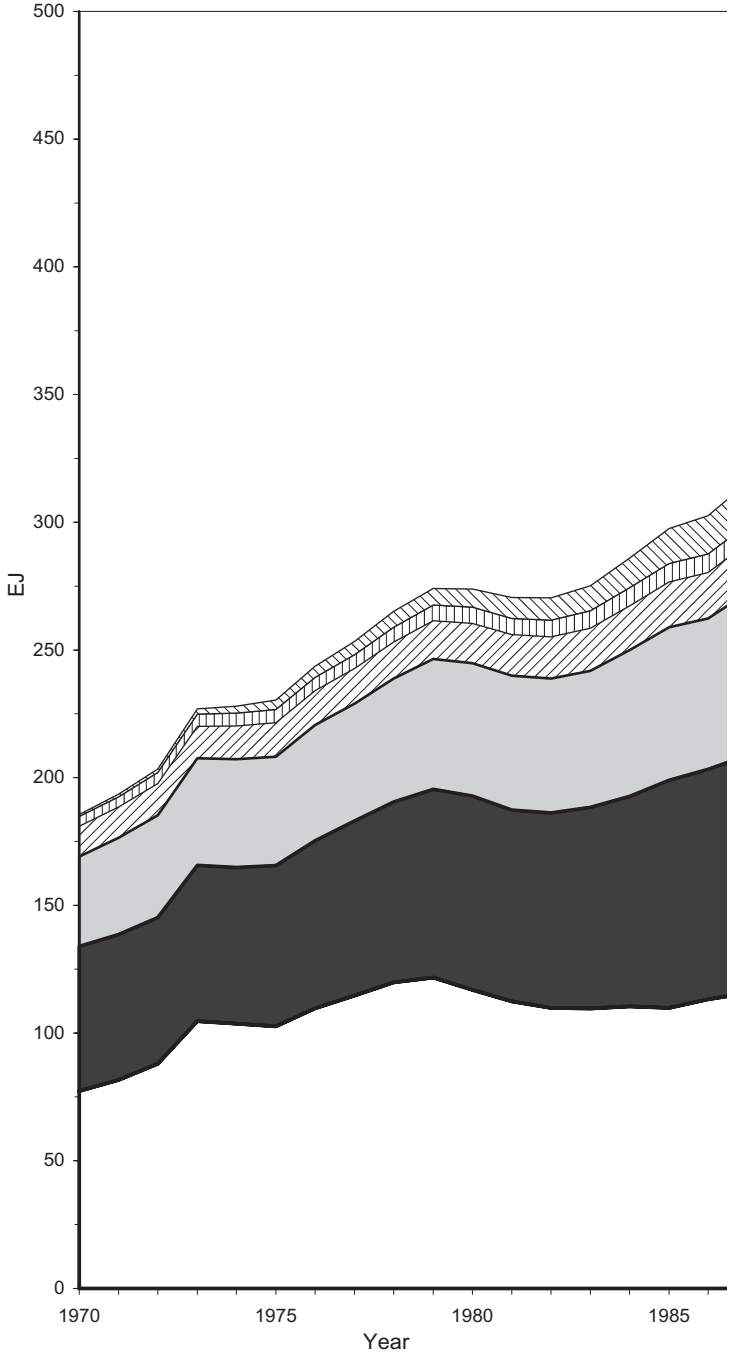


FIGURE 6. BREAKDOWN OF WORLD TOTAL ENERGY CONSUMPTION DURING THE PERIOD 1970—2004

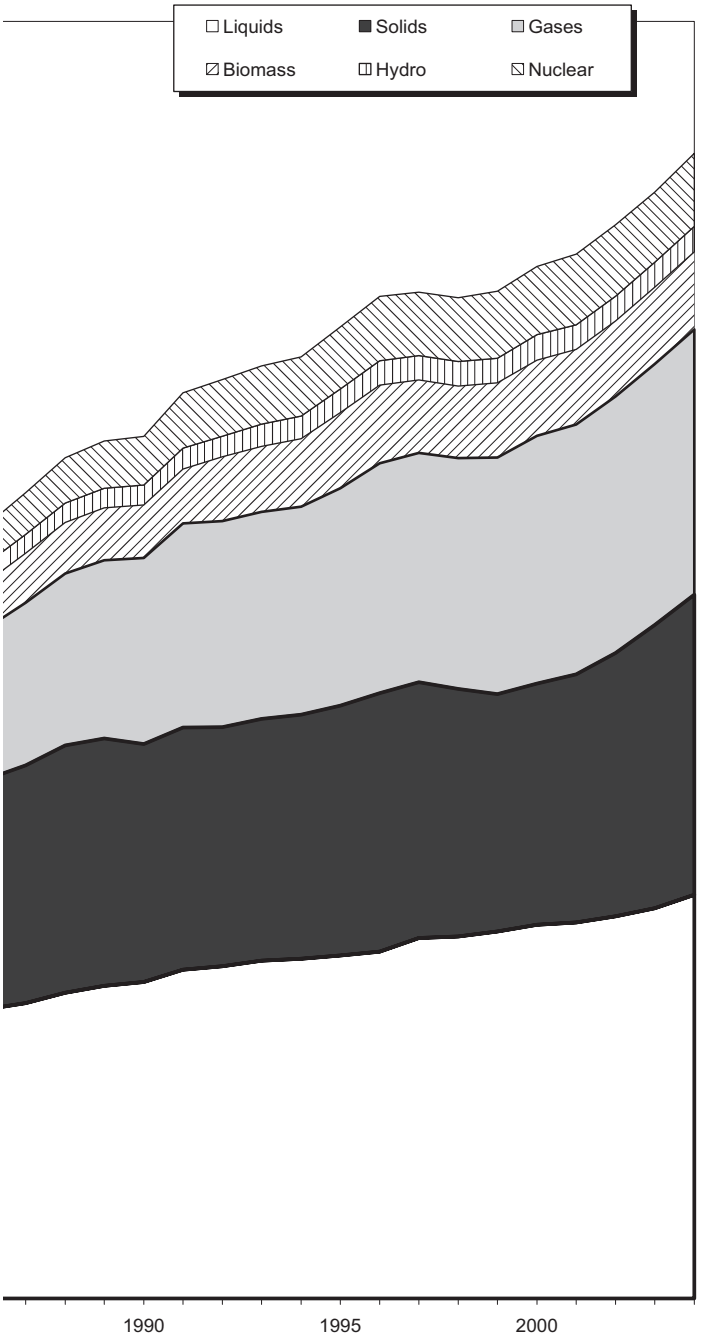

Liquids
Solids
Gases
Biomass
Hydro
Nuclear
1990
1995
2000

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TABLE 7. FUEL SHARES (%) OF ENERGY CONSUMPTION IN 2004 (*)

Country Group	Solids (a)	Liquids	Gases	Biomass (b)	Hydro	Nuclear	Renewables (c)	Total
North America	21.62	39.54	24.84	3.24	1.92	8.37	0.48	100.00
Latin America	3.89	48.07	24.12	14.00	7.68	1.13	1.11	100.00
Western Europe	14.93	37.32	26.20	4.01	2.82	13.89	0.83	100.00
Eastern Europe	21.88	20.31	46.29	3.65	1.68	6.41	-0.23	100.00
Africa	27.74	24.89	12.05	33.03	1.53	0.70	0.06	100.00
Middle East and South Asia	23.73	40.31	22.89	11.85	0.79	0.40	0.03	100.00
South East Asia and the Pacific	19.90	44.90	22.75	10.04	1.30		1.11	100.00
Far East	50.67	30.09	8.09	3.15	1.86	5.53	0.61	100.00
World Total	26.08	35.09	23.04	6.75	2.22	6.34	0.48	100.00

Notes:

(*) Total energy consumption = production of primary energy plus net trade (Import – Export) minus international bunkers and stock changes.

(a) Solids do not include commercial wood.

(b) The column headed 'Biomass' includes commercial wood, combustible renewables, waste and other biomass products.

(c) The column headed 'Renewables' includes geothermal, wind, solar, tide energy and net electricity trade.

TABLE 8. ENERGY CONSUMPTION (EJ) FOR ELECTRICITY GENERATION BY TYPE OF FUEL IN 2004

Country Group	Thermal (a)	Hydro	Nuclear	Renewables (b)	Total
North America	29.48	2.19	9.53	0.54	41.75
Latin America	4.05	2.18	0.32	0.32	6.88
Western Europe	14.62	1.97	9.71	0.41	26.72
Eastern Europe	16.42	0.89	3.38	0.01	20.70
Africa	4.28	0.34	0.16	0.02	4.79
Middle East and South Asia	14.99	0.37	0.19	0.01	15.56
South East Asia and the Pacific	6.28	0.28		0.23	6.78
Far East	25.88	1.78	5.27	0.58	33.51
World Total	116.00	10.00	28.57	2.12	156.68

Notes:
(a) The column headed 'Thermal' is the total for solids, liquids, gases, biomass and waste.
(b) The column headed 'Renewables' includes geothermal, wind, solar and tide energy.

TABLE 9. PERCENTAGE CONTRIBUTION OF EACH FUEL TYPE TO ELECTRICITY GENERATION IN 2004

Country Group	Thermal (a)	Hydro	Nuclear	Renewables (b)	Total
North America	66.60	13.46	19.33	0.61	100.00
Latin America	39.46	56.71	2.76	1.08	100.00
Western Europe	48.76	18.70	30.35	2.19	100.00
Eastern Europe	67.07	14.59	18.32	0.02	100.00
Africa	78.03	18.92	2.87	0.18	100.00
Middle East and South Asia	89.81	8.52	1.41	0.25	100.00
South East Asia and the Pacific	86.72	12.20		1.08	100.00
Far East	73.78	13.00	12.78	0.44	100.00
World Total	66.18	17.00	16.03	0.80	100.00

Notes:
(a) The column headed 'Thermal' is the total for solids, liquids, gases, biomass and waste.
(b) The column headed 'Renewables' includes geothermal, wind, solar and tide energy.

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

Country Group	2004		2010		2020		2030	
	Million Inhabitants	Growth Rate (%/a) 1991 — 2004	Million Inhabitants	Growth Rate (%/a) 2004 — 2010	Million Inhabitants	Growth Rate (%/a) 2010 — 2020	Million Inhabitants	Growth Rate (%/a) 2020 — 2030
North America	329	1.05	348	0.95	379	0.87	407	0.71
Latin America	551	1.53	595	1.28	659	1.04	711	0.76
Western Europe	466	0.46	475	0.30	484	0.19	488	0.09
Eastern Europe	407	-0.16	402	-0.20	393	-0.22	380	-0.35
Africa	869	2.33	984	2.09	1188	1.90	1398	1.64
Middle East and South Asia	1646	1.90	1816	1.66	2091	1.42	2325	1.07
South East Asia and the Pacific	400	1.45	428	1.14	469	0.91	500	0.64
Far East	1706	0.89	1778	0.69	1872	0.52	1914	0.22
World Total	6375	1.32	6827	1.15	7535	0.99	8123	0.75

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

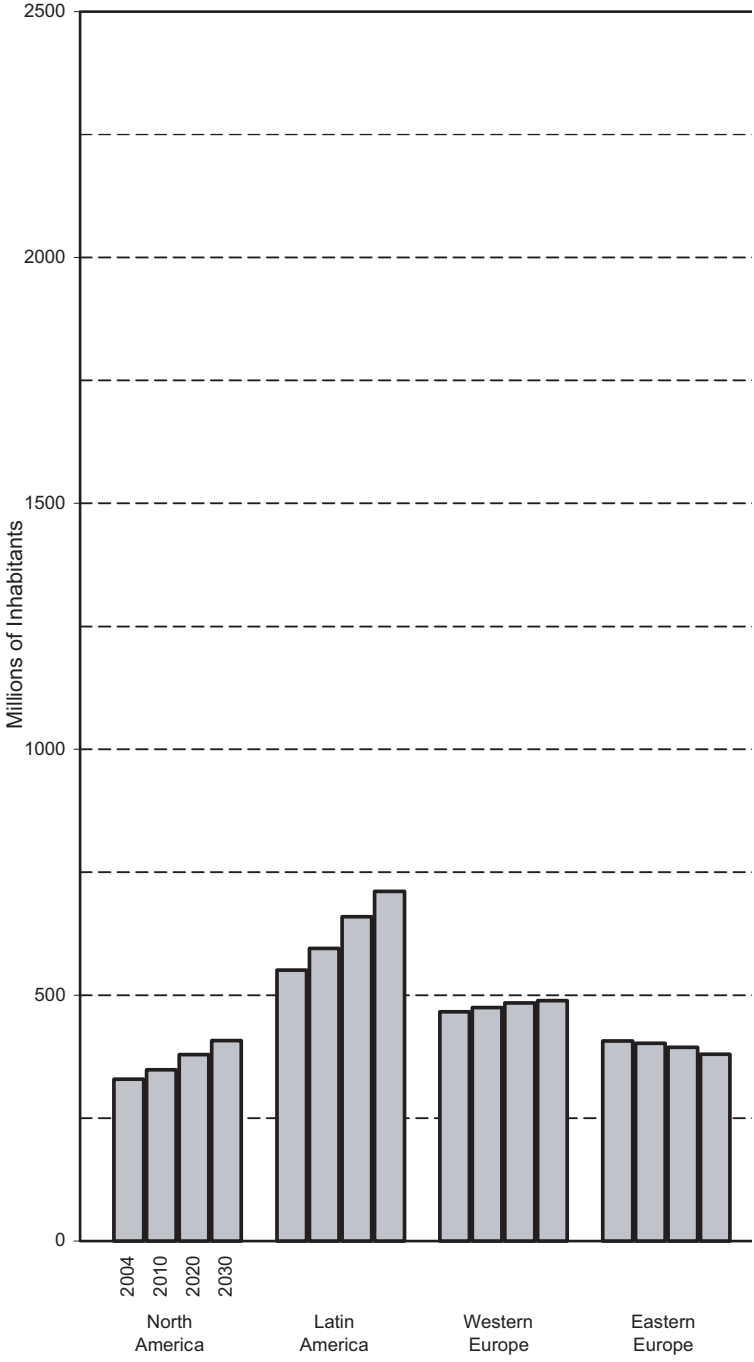

FIGURE 7. POPULATION ESTIMATES

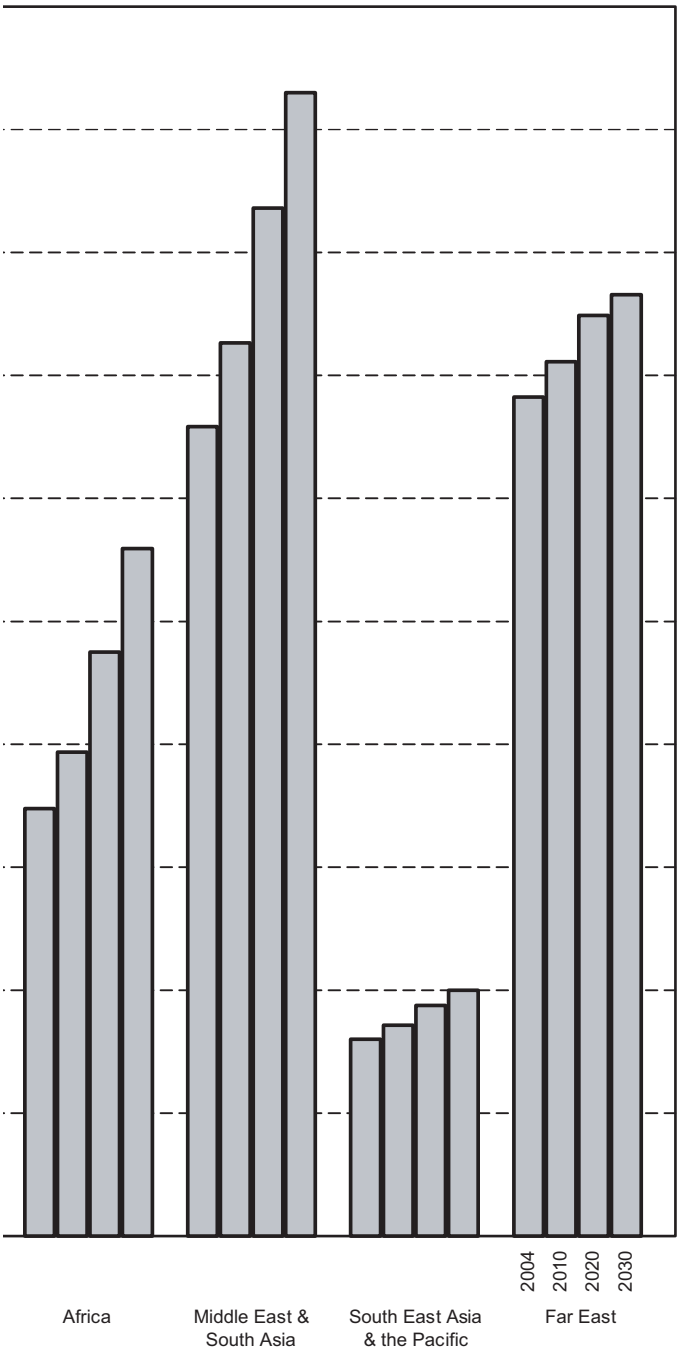
2004
2010
2020
2030
Africa
Middle East &
South Asia
South East Asia
& the Pacific
Far East

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

Country Group	2004		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	347	13.8	341 — 364	13.6 — 14.6	335 — 383	13.6 — 14.6	335 — 407	14.8 — 18.6
Latin America	52	1.9	56 — 61	1.9 — 2.3	64 — 83	1.9 — 2.3	75 — 115	3.0 — 5.0
Western Europe	150	6.3	154 — 160	6.6 — 7.1	160 — 175	6.6 — 7.1	169 — 196	7.6 — 11.5
Eastern Europe	130	4.2	138 — 150	4.4 — 4.8	161 — 195	4.4 — 4.8	187 — 250	6.2 — 10.1
Africa	26	0.6	25 — 28	0.6 — 0.6	26 — 31	0.6 — 0.6	26 — 35	0.7 — 1.1
Middle East and South Asia	28	0.7	30 — 33	0.7 — 0.9	33 — 42	0.7 — 0.9	38 — 53	1.0 — 1.7
South East Asia and the Pacific	54	1.6	58 — 65	1.8 — 1.9	65 — 84	1.8 — 1.9	75 — 109	2.4 — 3.3
Far East	56	2.2	60 — 68	2.3 — 2.8	69 — 91	2.3 — 2.8	81 — 123	3.1 — 5.9
World Average	71	2.6	72 — 78	2.6 — 2.9	76 — 92	2.6 — 2.9	81 — 111	3.0 — 4.8

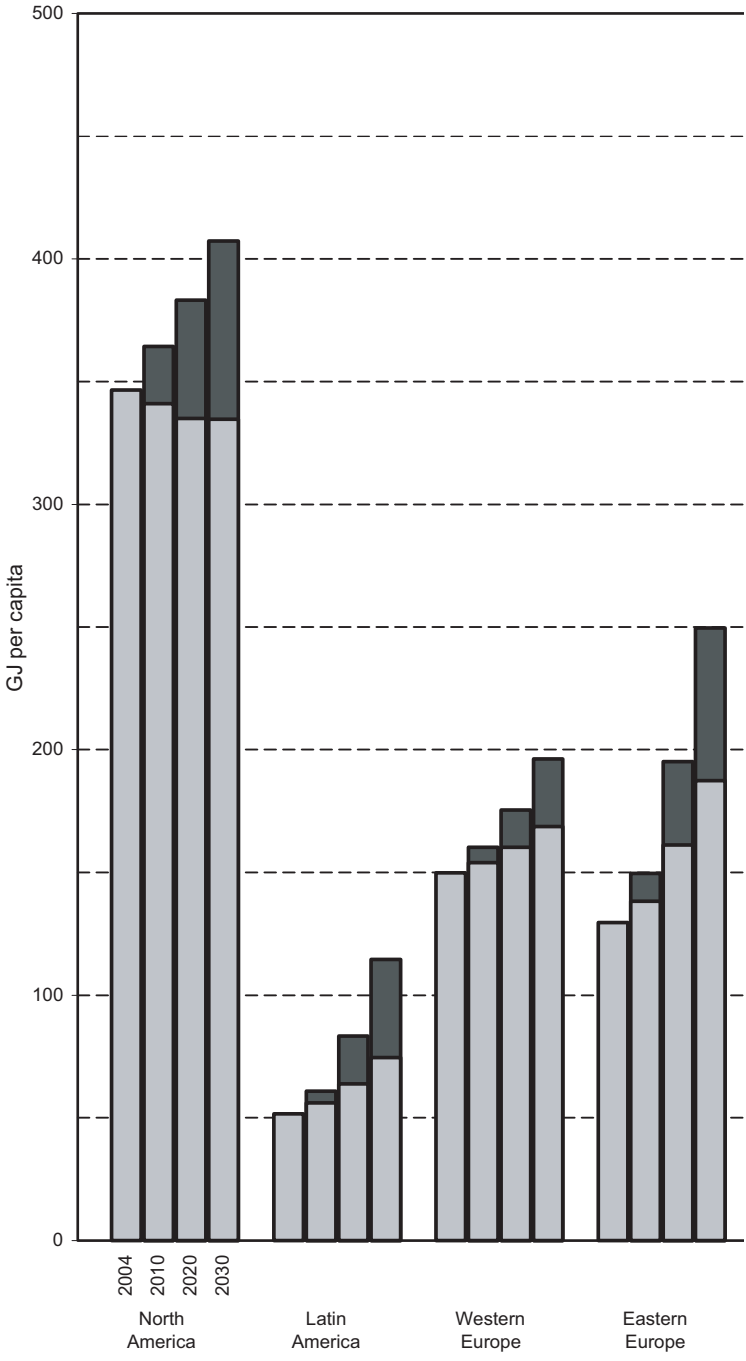
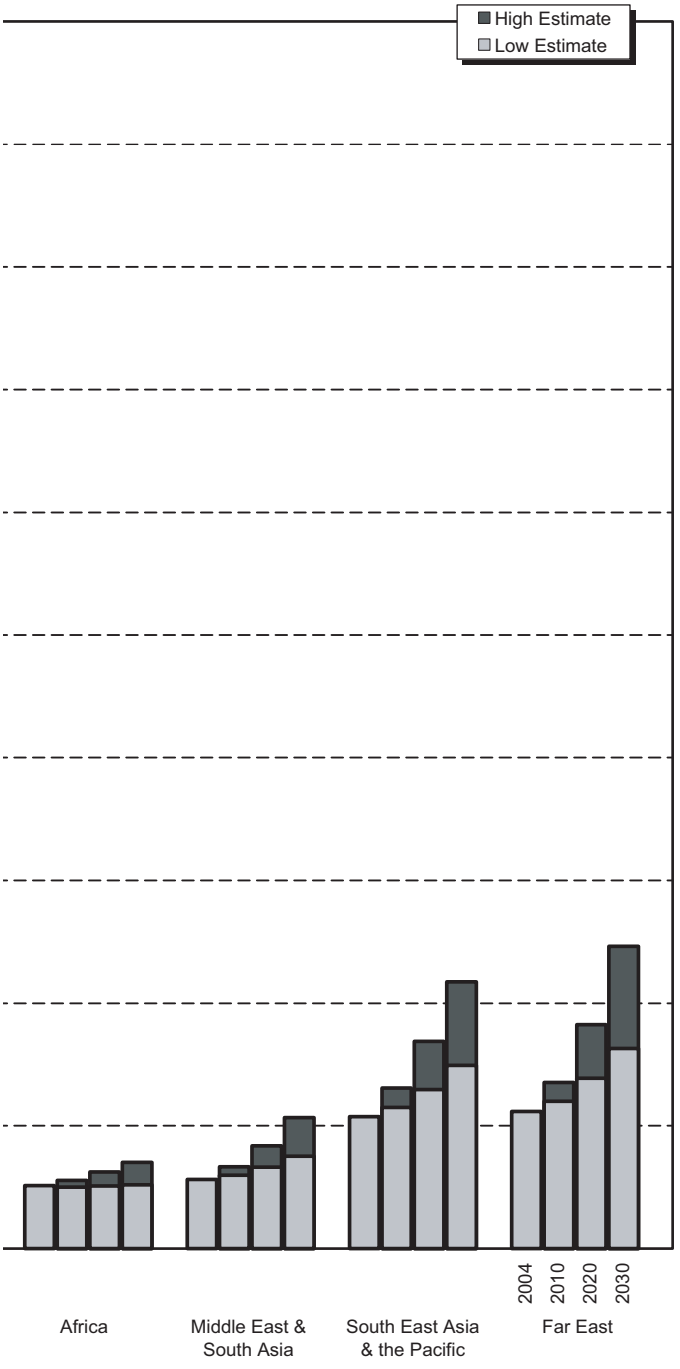


FIGURE 8. PER CAPITA ENERGY CONSUMPTION


High Estimate
Low Estimate
2004
2010
2020
2030
Africa
Middle East & South Asia
South East Asia & the Pacific
Far East

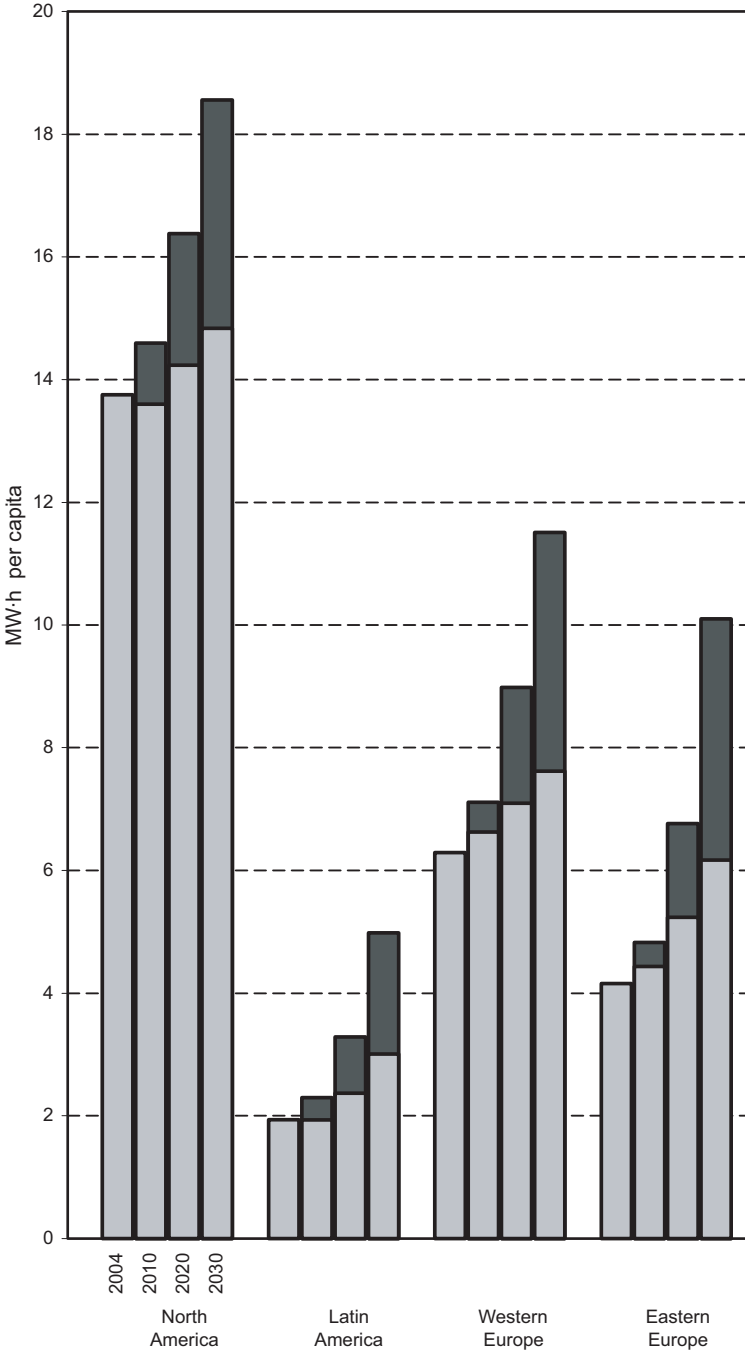


FIGURE 9. PER CAPITA ELECTRICITY CONSUMPTION

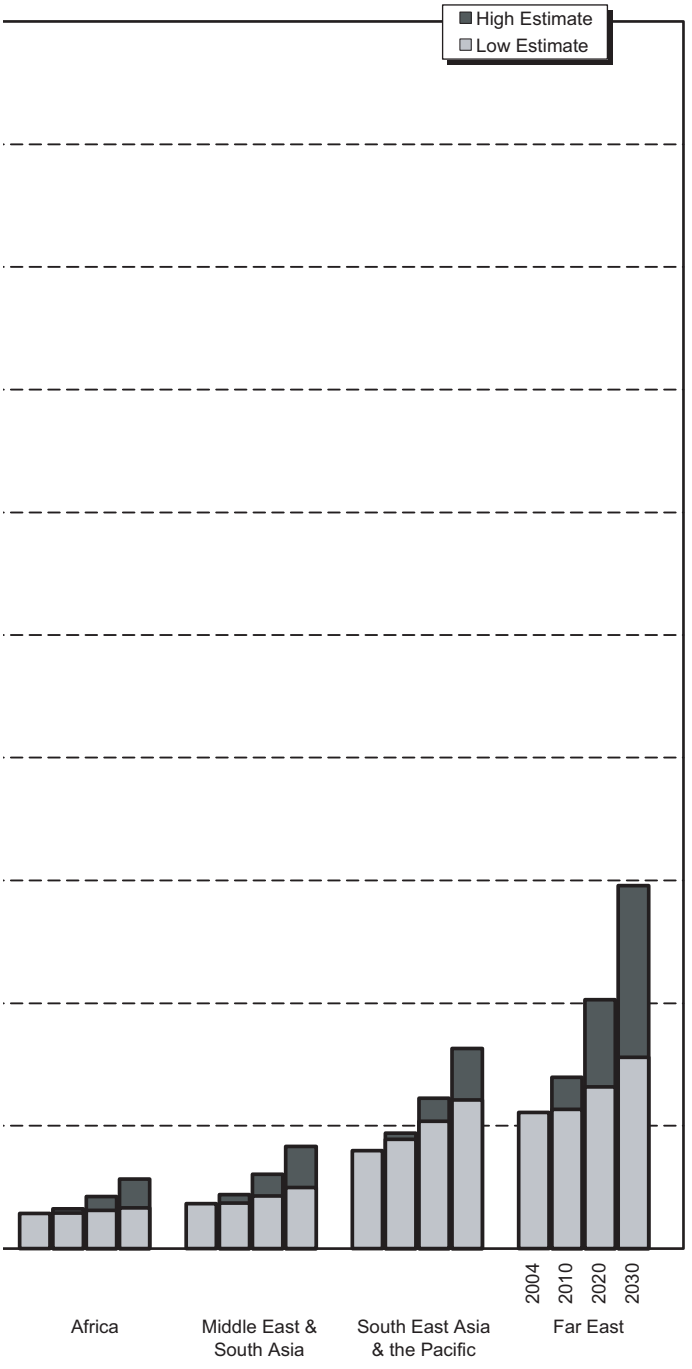

High Estimate
Low Estimate
2004
2010
2020
2030
Africa
Middle East & South Asia
South East Asia & the Pacific
Far East

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TABLE 12. AVERAGE ANNUAL GROWTH RATES DURING THE PERIOD 1994—2004 (%)

Country Group	Population	Total Energy Consumption	Total Electricity Consumption	Nuclear Energy Consumption	Nuclear Capacity
North America	1.1	1.4	1.8	1.7	-0.5
Latin America	1.5	1.7	3.8	9.4	3.7
Western Europe	0.5	1.4	2.1	1.5	0.3
Eastern Europe	-0.2	-0.3	0.5	3.0	1.2
Africa	2.3	3.4	3.9	4.0	
Middle East and South Asia	1.9	4.0	4.9	13.4	6.0
South East Asia and the Pacific	1.4	3.1	4.9		
Far East	0.9	3.3	5.8	3.0	2.8
World Average	1.3	2.0	3.0	2.1	0.7

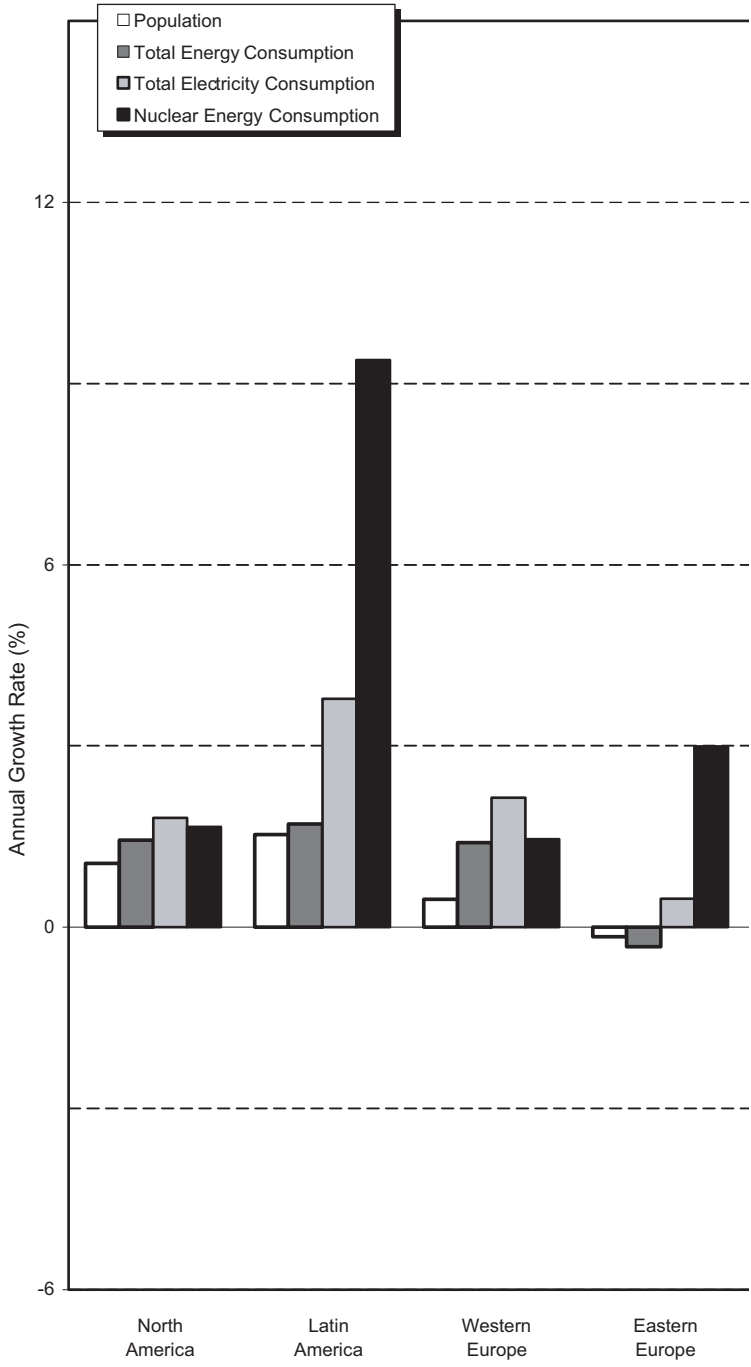

FIGURE 10. AVERAGE ANNUAL GROWTH RATES DURING THE PERIOD 1994—2004

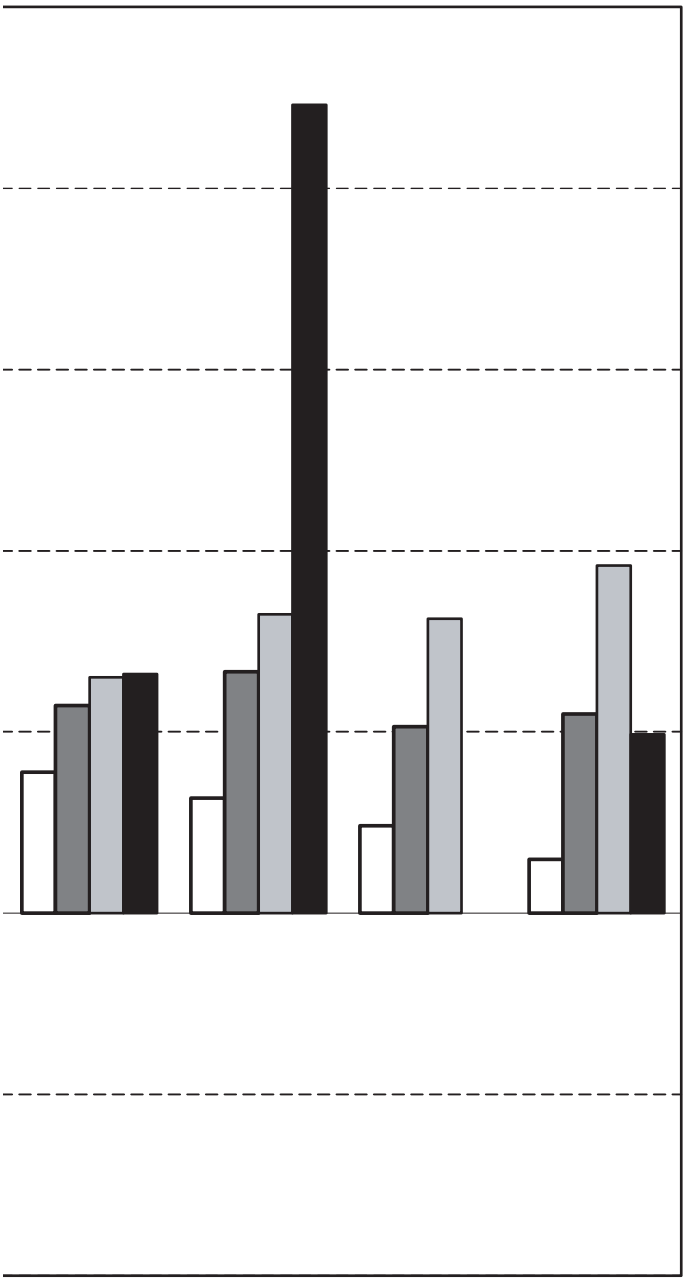
Africa
Middle East &
South Asia
South East Asia
& the Pacific
Far East

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TABLE 13. ESTIMATES OF AVERAGE ANNUAL GROWTH RATES DURING THE PERIOD 2004—2030 (%)

Country Group	Population	Total Energy Requirement	Total Electricity Consumption	Nuclear Energy Production	Nuclear Capacity
North America	0.8	0.7 — 1.5	1.1 — 2.0	0.2 — 1.1	0.1 — 1.0
Latin America	1.0	2.4 — 4.1	2.7 — 4.7	1.6 — 5.4	1.3 — 5.1
Western Europe	0.2	0.6 — 1.2	0.9 — 2.5	-1.4 — 0.9	-1.7 — 0.6
Eastern Europe	-0.3	1.2 — 2.3	1.3 — 3.2	1.6 — 3.1	1.1 — 2.6
Africa	1.8	1.9 — 3.1	2.4 — 4.6	0.8 — 6.7	0.6 — 6.5
Middle East and South Asia	1.3	2.5 — 3.9	2.6 — 4.6	7.6 — 11.4	7.1 — 10.8
South East Asia and the Pacific	0.9	2.1 — 3.6	2.5 — 3.7		
Far East	0.4	1.9 — 3.5	1.8 — 4.3	2.5 — 3.9	2.3 — 3.6
World Average	0.9	1.5 — 2.7	1.6 — 3.4	0.7 — 2.3	0.5 — 2.2