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International Atomic Energy Agency

REFERENCE DATA SERIES No. 1

Energy, Electricity and Nuclear Power Estimates for the Period up to 2050

2024 Edition

ENERGY, ELECTRICITY AND NUCLEAR POWER ESTIMATES FOR THE PERIOD UP TO 2050

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2024 Edition

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Introduction

Reference Data Series No. 1 (RDS-1) is an annual publication — currently in its 44th edition — containing estimates of energy, electricity and nuclear power trends up to the year 2050. The projections of RDS-1 constitute a low and a high case projection.

Relative to a global nuclear operational capacity of 372 GW(e) at the end of 2023, the low case projects an increase of about 40% to 514 GW(e) by 2050. In the high case global nuclear operational capacity is projected to increase to 2.5 times the current capacity, reaching 950 GW(e) by 2050. Uprates were also considered as part of the projections. It is estimated that small modular reactors (SMRs) would account for 24% of the capacity added by 2050 in the high case and for 6% of the capacity added in the low case.

Worldwide, coal remains the main energy source for electricity production, accounting for more than one third of the electricity produced in 2023. While coal's share in electricity production has changed little since 1980, that of natural gas — the world's second largest source of electricity — has almost doubled over the same time frame.

Hydro is the largest and nuclear is the second largest source of low carbon electricity. Nuclear contributed 9.2% of global electricity production in 2023. The share of hydro and nuclear has declined gradually over the past 30–40 years owing to a lack of investment. In recent years there has been an increase in the use of wind and solar, with their combined share reaching 13% in 2023.

By 2050 global final energy consumption is projected to decrease by about 2% and electricity production is expected to more than double.

Data, Assumptions & Methods

The publication is organized into world and regional subsections and starts with a summary of the status of nuclear power in IAEA Member States as of the end of 2023 based on the latest statistical data collected by the IAEA's Power Reactor Information System (PRIS).

The publication then presents global and regional projections for energy and electricity up to 2050 estimated using the IAEA's Model for Analysis of Energy Demand (MAED). The energy and electricity projections are based on existing policies and potential measures but are not necessarily pathways to net zero emissions by 2050, nor

do they explicitly adhere to a scenario of global warming of 1.5°C or 2°C above pre-industrial levels. References [1, 2] are considered in the development of the energy and electricity projections.

The energy, electricity and nuclear power projections presented in RDS-1 are for countries grouped according to the geographical regions used by the Statistics Division of the United Nations Secretariat (see annex I to Ref. [3]).

The narrative underpinning the energy and electricity projections considers the regions' unique starting points and the specific factors that influence the development of their respective energy sectors. In both the high and the low cases, the same outlook of economic and electricity demand growth estimated using MAED is assumed.

The energy and electricity data for 2023 are estimated, as the latest information available from the United Nations Department of Economic and Social Affairs [4] and International Energy Agency [5] is for 2021.

Population data originate from World Population Prospects 2024 [6], published by the Population Division of the United Nations Department of Economic and Social Affairs.

Global and regional nuclear power projections are presented as low and high cases, encompassing the uncertainties inherent in projecting trends. The projections are based on three sources: the nuclear data collected by the IAEA's PRIS; the estimate of the nuclear generating capacity established by a group of external experts participating in the IAEA's annual Consultancy Meeting on Nuclear Capacity Projections up to 2050; and national projections supplied by countries for the OECD Nuclear Energy Agency and IAEA publication on uranium resources, production and demand through 2040 [7].

The nuclear electrical generating capacity estimates presented in Table 5 on page 24 of the publication are derived using a country by country 'bottom-up' approach. In deriving these estimates, the group of experts considered all operating reactors, possible licence renewals, planned shutdowns and plausible construction projects foreseen for the next few decades. The experts built the estimates project by project by assessing the plausibility of each considering a low and high case.

The low and high estimates reflect contrasting, but not extreme, underlying assumptions about the different driving factors that have an impact on nuclear power deployment. These factors,

and the way they might evolve, vary from country to country. The estimates presented provide a plausible range of nuclear capacity development 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.

The assumptions of the low case nuclear power projections are that current market, technology and resource trends continue and there are few additional changes in explicit laws, policies and regulations affecting nuclear power. This case was designed to produce a conservative and plausible projection. Additionally, the low case does not assume that targets for nuclear power in a particular country will necessarily be achieved.

National policies on climate change are considered in the high case, as well as national intentions for expanding the use of nuclear power. The high case is more ambitious than the low case, while remaining plausible and technically feasible, and it is possible that capacity could increase beyond that projected in the high case. However, enabling factors would be necessary to help facilitate reaching — or exceeding — the high case, including national policies and strategies, supporting investment, demonstration projects for new reactor technologies, investment in grids, supply chain management for reactor construction, regulatory collaboration and global harmonization (particularly for SMR development), and work force development. Additionally, the value of nuclear's service contributions to the power system (e.g. reliability, security of supply, low emissions) should be appropriately remunerated. Each region and country faces different challenges that would need to be overcome to increase nuclear power capacity. With different national contexts, different policies would be needed. Establishing such enabling factors could set the world on the path to achieving the ambitious pledge to triple global nuclear capacity, launched at the UN Climate Change Conference (COP28) in 2023 [8].

In addition, there is uncertainty in the future growth in demand for electricity, for example the potential for a substantial increase in requirements for secure low carbon electricity to power the digital economy and the projected level of electrification in transport and industry. This uncertainty could impact the growth of nuclear capacity. The development of heat and other non-electrical applications could also have a significant impact on the growth of nuclear capacity.

Background Information

The outcome of the first global stocktake under the Paris Agreement, agreed at COP28, called for “Accelerating zero- and low-emission technologies, including, inter alia, renewables, nuclear, abatement and removal technologies such as carbon capture and utilization and storage, particularly in hard-to-abate sectors, and low-carbon hydrogen production” [9]. The inclusion of nuclear as a low emission technology was historic and, together with the declaration made by 22 countries (25 countries as of May 2024) from four continents to advance a global aspirational goal of tripling global nuclear energy capacity by 2050 to meet climate goals and energy needs, underscores the momentum building behind an important source of low carbon electricity [8]. Furthermore, the global momentum for nuclear power continued to grow as world leaders from more than 30 countries met at the inaugural Nuclear Energy Summit in Brussels, Belgium, in March 2024. High level representatives emphasized the importance of using nuclear power to achieve energy security and climate goals and to drive sustainable development. Increased access to financing, more favourable energy market frameworks, workforce development and more proactive support to nuclear newcomer countries, among other factors, were identified as key to long term success [10].

Energy security and resilience continue to be major policy concerns. Amid the backdrop of uneven economic recovery in a post-pandemic world, increasing geopolitical tensions, a recent global energy crisis and a critical climate crisis, there have been disruptions in energy system reliability and significant volatility in energy prices. Nuclear energy can contribute to energy supply security and thus to averting future shocks in energy prices. There is also increased interest in the development of SMRs in a growing number of countries targeting both electric and non-electric applications.

Currently, about two thirds of the nuclear power capacity has been in operation for more than 30 years and almost 30% for more than 40 years, highlighting the need for significant new nuclear capacity to offset retirements in the long term. Extending the lifetimes of existing reactors is one of the most cost effective sources of low emission electricity, with initiatives supporting lifetime extensions under way in several regions and countries with large nuclear fleets. An increasing number of ageing management programmes have been implemented for long term operation. New policy measures

are also being implemented to support the competitiveness of existing reactors in deregulated electricity markets.

Geographical Regions

The designations employed and the presentation of material in this publication do not imply the expression of any opinion whatsoever on the part of the IAEA concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries.

Notes

The estimates for nuclear electricity production in 2023 are from the 2024 edition of Nuclear Power Reactors in the World, Reference Data Series No. 2 (RDS-2) [11]. The estimates for energy and electricity were made by the IAEA Secretariat on the basis of different international and national data sources available as of August 2023.

In accordance with the International Recommendations for Energy Statistics [12], the estimates for the breakdown of historical electricity production by energy source are expressed in gross figures. Gross electricity production is the total electrical energy produced by all generating units and installations measured at the output terminals of the generators. Current data on nuclear electrical production and future estimates of nuclear and total electrical production are expressed in net values, as the data are adapted from the RDS-2 publication.

Owing to rounding, numbers presented throughout this publication might not add up precisely to the totals provided, and percentages might not precisely reflect the absolute figures.

Total final energy consumption refers to all fuel and energy delivered to end users for their energy use.

Nuclear electrical generating capacity estimates consider the scheduled retirement of older units at the end of their lifetimes.

The global and regional nuclear electrical production data and the nuclear electrical generating capacity data cannot be used to calculate average annual capacity factors for nuclear power plants, as the nuclear electrical generating capacity data are year-end capacities.

World

8 092

million people

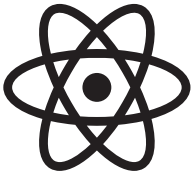
Energy Overview 2023

20.2%

of final energy consumed was electricity

28 379 TW·h

of electricity produced



9.2%

of electricity produced by nuclear

Nuclear Power Development in 2023

- At the end of 2023, 413 nuclear power reactors were operational, with a global nuclear operational capacity of 371.5 GW(e).
- In addition, 59 reactors with a total capacity of 61.1 GW(e) were under construction, and 25 reactors with a total capacity of 21.3 GW(e) were in suspended operation.
- Five new nuclear power reactors with a total capacity of 5 GW(e) were connected to the grid, and five reactors with a total capacity of 6 GW(e) were retired. Construction began on six new reactors that are expected to add a total capacity of 6.9 GW(e).
- Compared with 2022, total electricity production from all energy sources increased by about 2.6% and electricity production from nuclear power reactors increased about 2.1% to 2598 TW·h.
- Nuclear power accounted for 9.2% of total electricity production in 2023, remaining unchanged from 2022.

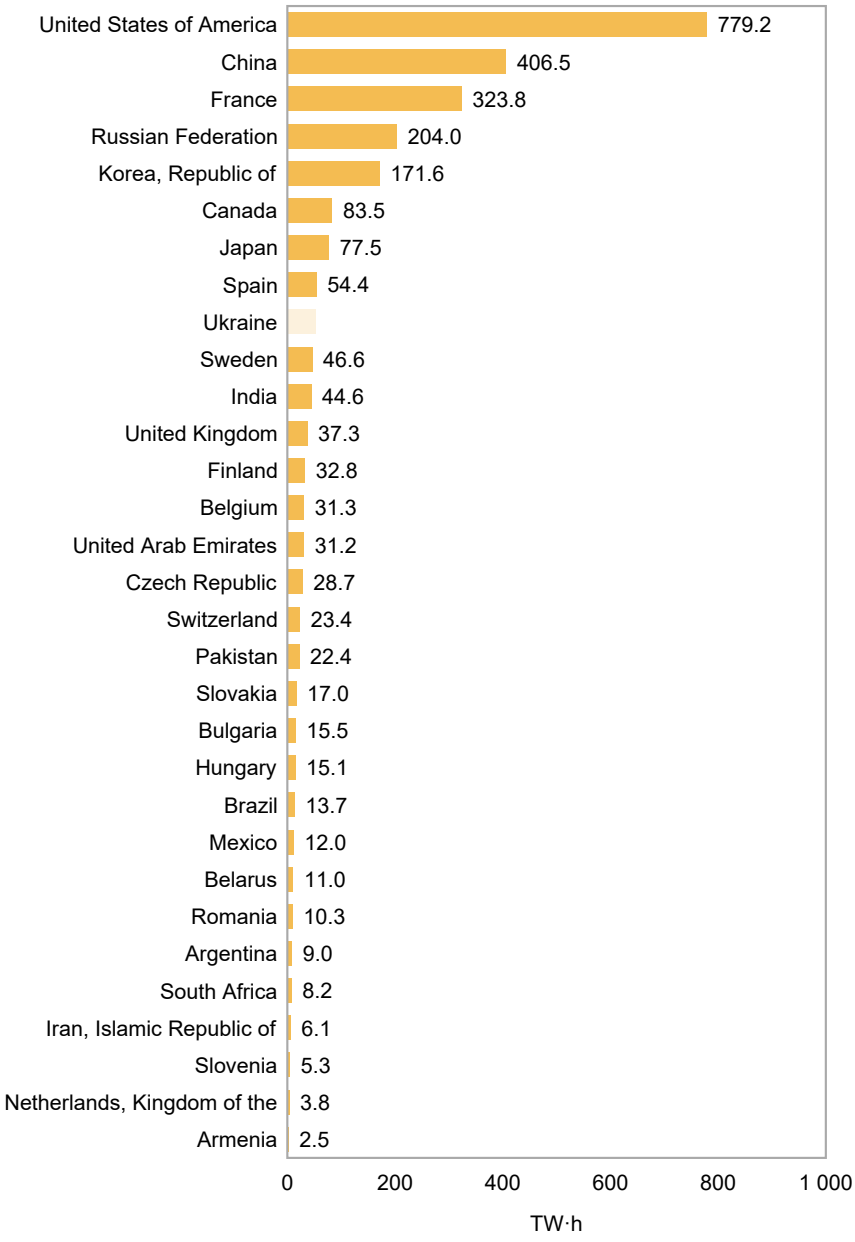
TABLE 1. NUCLEAR POWER REACTORS IN THE WORLD (end of 2023)

Country	Operational		Under Construction		Nuclear Electricity Production in 2023	
	Number of units	Net capacity (MW(e))	Number of units	Net capacity (MW(e))	TW·h	% of total
World Total [a,b]	**413**	**371 539**	**59**	**61 091**	**2597.9**	**9.2**
Argentina	3	1 641	1	25	9.0	6.3
Armenia	1	416			2.5	31.1
Bangladesh			2	2 160		
Belarus	2	2 220			11.0	28.6
Belgium	5	3 908			31.3	41.2
Brazil	2	1 884	1	1 340	13.7	2.2
Bulgaria	2	2 006			15.5	40.5
Canada	19	13 699			83.5	13.7
China	55	53 152	24	24 948	406.5	4.9
Czech Republic	6	3 934			28.7	40.0
Egypt			3	3 300		
Finland	5	4 394			32.8	42.0
France	56	61 370	1	1 630	323.8	64.8
Hungary	4	1 916			15.1	48.8
India	19	6 290	8	6 028	44.6	3.1
Iran, Islamic Republic of	1	915	1	974	6.1	1.7

Japan	12	11 046	2	2 653	77.5	5.5
Korea, Republic of	26	25 825	2	2 680	171.6	31.5
Mexico	2	1 552			12.0	4.9
Netherlands, Kingdom of the	1	482			3.8	3.4
Pakistan	6	3 262			22.4	17.4
Romania	2	1 300			10.3	18.9
Russian Federation	37	27 727	3	2 700	204.0	18.4
Slovakia	5	2 308	1	440	17.0	61.3
Slovenia	1	688			5.3	36.8
South Africa	2	1 854			8.2	4.4
Spain	7	7 123			54.4	20.3
Sweden	6	6 944			46.6	28.6
Switzerland	4	2 973			23.4	32.4
Türkiye			4	4 456		
United Arab Emirates	3	4 011	1	1 310	31.2	19.7
United Kingdom	9	5 883	2	3 260	37.3	12.5
Ukraine [c]	15	13 107	2	2 070	—	—
United States of America	93	95 835	1	1 117	779.2	18.5

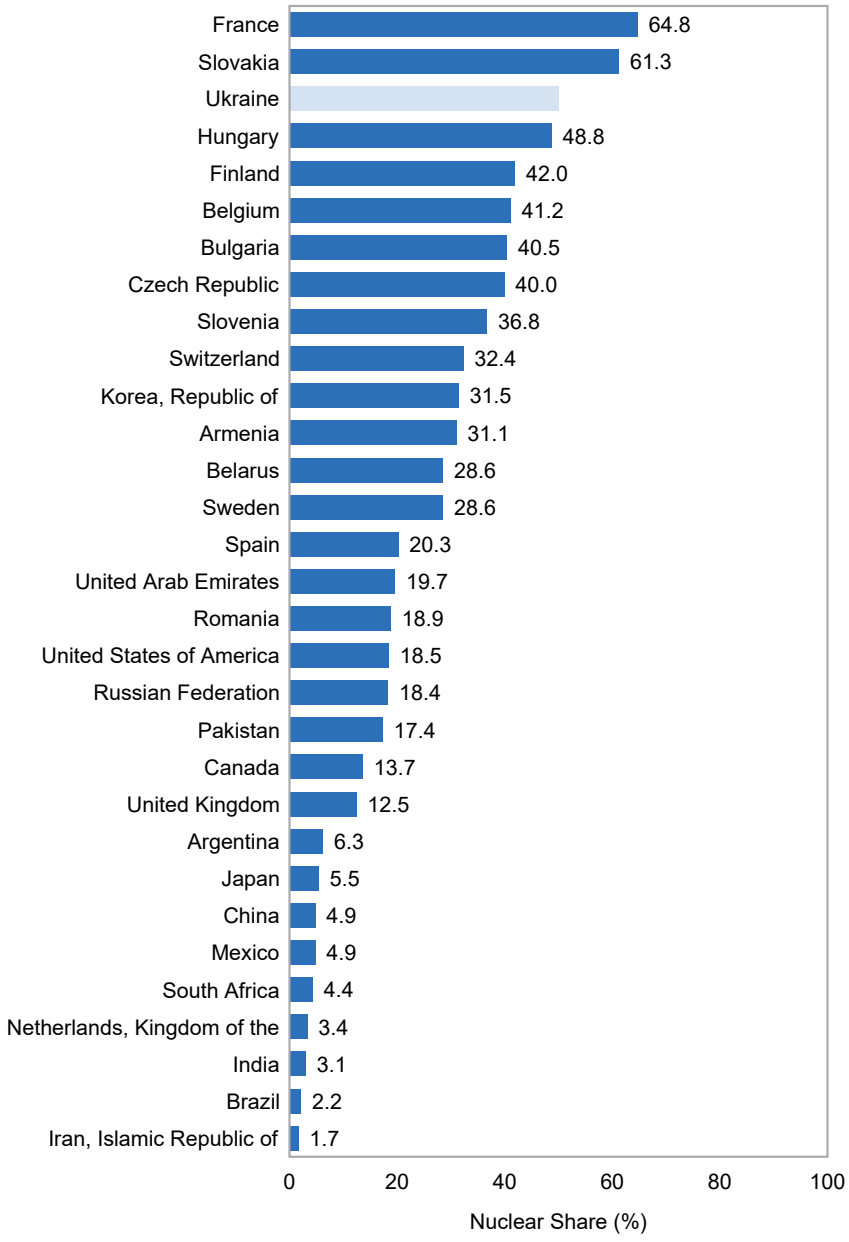
[a] Includes the following data from Taiwan, China: 2 units in operation with a total capacity of 1874 MW(e) and 17.2 TW·h of nuclear electricity generation, representing 6.9% of the total electricity produced.
[b] All missing data are internal estimates by the Secretariat.
[c] Ukrainian operational data were not available for the year 2023 in the 2024 edition of Nuclear Power Reactors in the World [10].

FIGURE 1. WORLD NUCLEAR ELECTRICITY PRODUCTION IN 2023



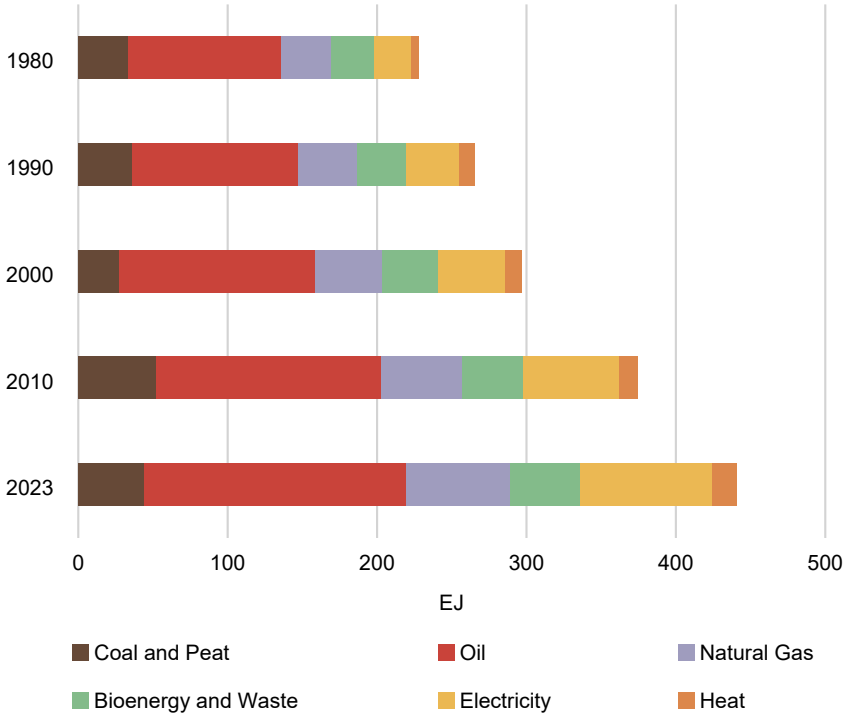
Note: The nuclear electricity production in Taiwan, China, was 17.2 TW·h.

FIGURE 2. SHARE OF NUCLEAR IN TOTAL ELECTRICITY PRODUCTION IN THE WORLD IN 2023



Note: The share of nuclear in the total electricity production of Taiwan, China, was 6.9%.

FIGURE 3. WORLD FINAL ENERGY CONSUMPTION BY ENERGY SOURCE



Final Energy Consumption

The share of electricity in world final energy consumption has almost doubled since 1980.

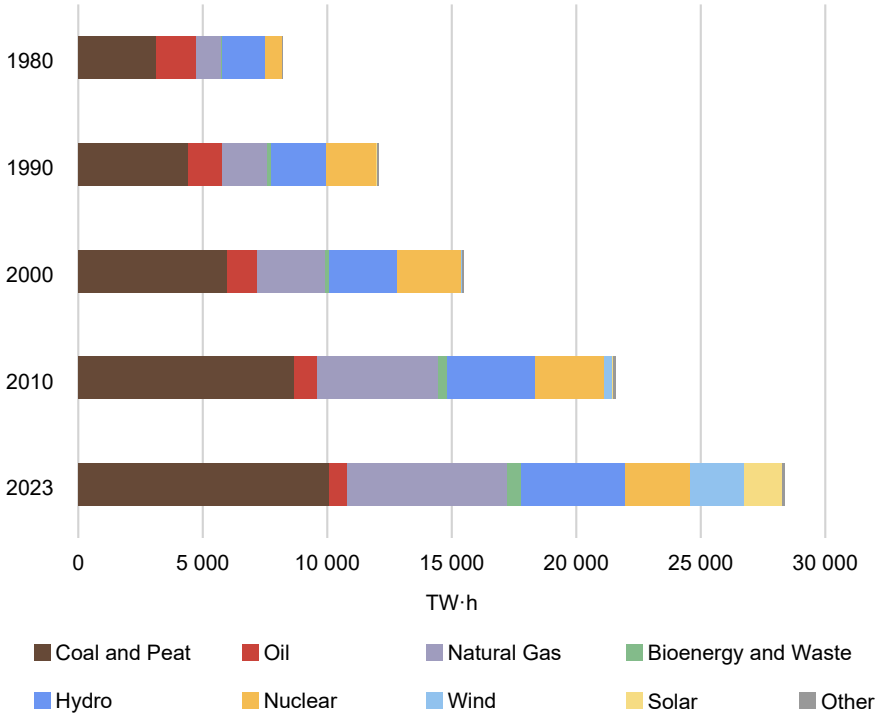
Fossil fuels have dominated final energy consumption since 1980, although there has been a gradual reduction in their combined share from about 75% in 1980 to about 65% in 2023.

In 2023, the share of coal was 5 percentage points less than in 1980. It declined slightly from 1980 to 2000 and then increased from 2000 to 2010; the trend from 2010 onwards has been a decline. Natural gas has maintained a consistent share of about 15%. The share of oil has declined slightly since 1980, stabilizing at about 40% since 2010.

The share of heat in final energy consumption has doubled since 1980.

The share of bioenergy and waste has remained about the same over the past 40 years.

FIGURE 4. WORLD TOTAL ELECTRICITY PRODUCTION BY ENERGY SOURCE



Electricity Production

Nuclear was the second largest source of low carbon electricity in 2023. The share of nuclear in total electricity production grew rapidly from 1980 to 1990 — almost doubling — but from 1990 onwards it has declined to around 9.2% for 2023.

With a share of about 60%, fossil fuels — particularly coal — have remained dominant energy sources for electricity production since 1980. Coal appeared to peak with a share of 40% in 2010, and has been gradually declining since. The share of natural gas has remained stable at just over 20% since 2010. Oil's share has significantly declined from 20% in 1980 to about 2–3% in 2023.

Hydro continues to be the largest source of low carbon electricity, accounting for about 15% of total electricity production. Its share has been gradually declining since 1980.

In recent years, the share of solar and wind has undergone a rapid increase. In 2023 the share of wind was almost 8% and that of solar was about 5%.

Energy and Electricity Projections

- Final energy consumption is expected to decrease by about 2% by 2050, owing to increased electrification of end-uses and higher efficiency of appliances and processes.
- Electricity consumption is expected to increase at an average annual rate of 2.8% from 2023 to 2050. Electricity consumption is expected to more than double by 2050.
- By 2050 the share of electricity in final energy consumption is expected to increase by more than 20 percentage points from its 2023 share to reach more than 40%.

FIGURE 5. WORLD FINAL CONSUMPTION OF ENERGY AND ELECTRICITY

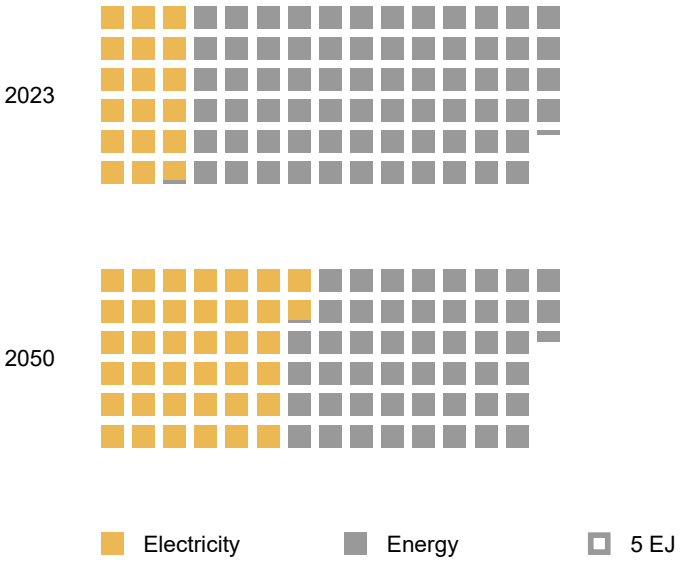


TABLE 2. WORLD FINAL CONSUMPTION OF ENERGY AND ELECTRICITY, EJ

Final Consumption	2023	2030	2040	2050
Energy	440.9	439.4	432.2	432.3
Electricity	89.0	103.0	136.2	189.4
Electricity as % of Energy	*20.2%*	*23.4%*	*31.5%*	*43.8%*

Nuclear Electrical Generating Capacity Projections

- Total electrical generating capacity is expected to increase by about 12% by 2030 and to more than double by 2050.
- In the high case, nuclear electrical generating capacity is projected to increase to 2.5 times the 2023 capacity by 2050.
- In the low case, nuclear electrical generating capacity is projected to increase by about 11% by 2030 and then increase by about 24% by 2050.
- In the low case, the share of nuclear in total electrical generating capacity is projected to decrease by 1.6 percentage points by 2050. In the high case, the share of nuclear in total electrical generating capacity is projected to increase by 0.6 percentage points by 2050.

FIGURE 6. WORLD NUCLEAR ELECTRICAL GENERATING CAPACITY

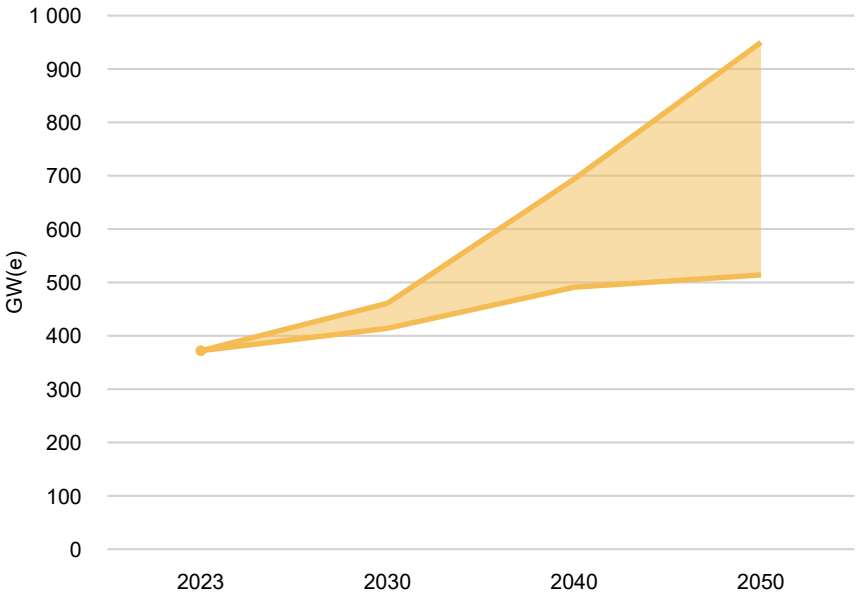


TABLE 3. WORLD TOTAL AND NUCLEAR ELECTRICAL GENERATING CAPACITY, GW(e)

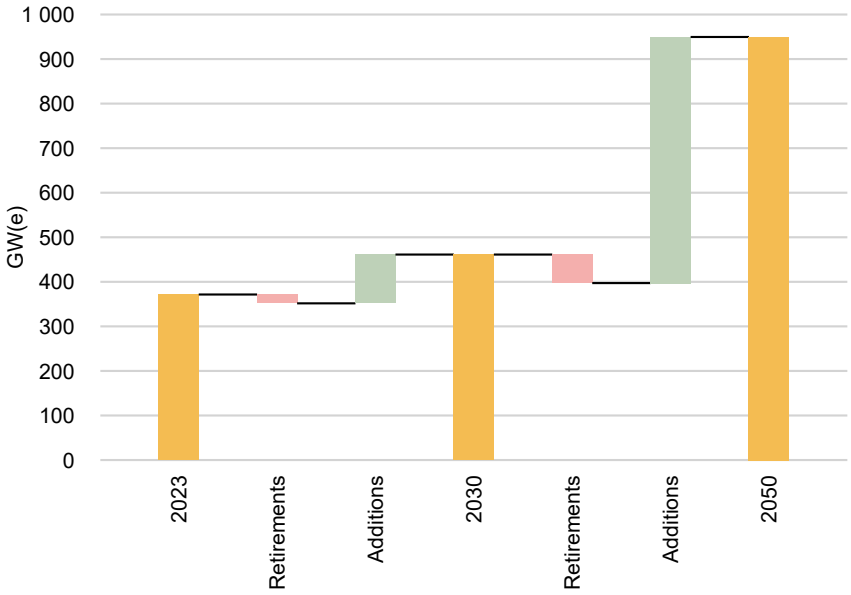
Electrical Capacity	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
Total	8 992	10 042	10 042	13 747	13 747	20 329	20 329
Nuclear	372	414	461	491	694	514	950
Nuclear as % of Electrical Capacity	*4.1%*	*4.1%*	*4.6%*	*3.6%*	*5.0%*	*2.5%*	*4.7%*

Reactor Retirements and Additions

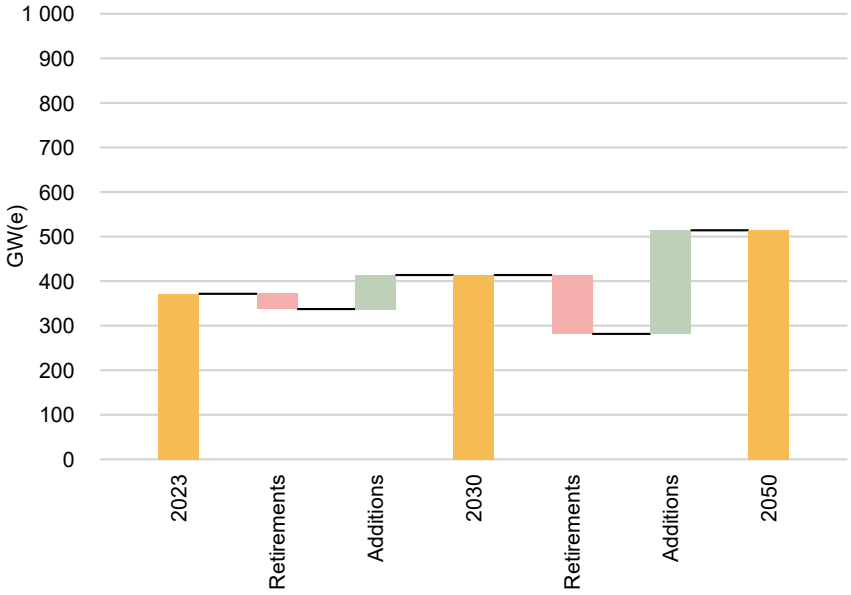
- Two out of every three nuclear power reactors have been in operation for more than 30 years and almost 30% have been in operation for more than 40 years.
- In the high case it is assumed that the operating lifetimes of most nuclear power reactors scheduled for retirement will be extended such that only about 84 GW(e) of the 2023 nuclear electrical generating capacity is retired by 2050. This is expected to result in net capacity additions (newly installed less retired) of 557 GW(e) by 2050.
- In the low case more retirements are assumed, with 166 GW(e) of the 2023 nuclear electrical generating capacity retired by 2050. This is expected to result in net capacity additions (newly installed less retired) of 122 GW(e) by 2050.

FIGURE 7. WORLD NUCLEAR CAPACITY: ACTUAL, RETIREMENTS AND ADDITIONS

HIGH CASE



LOW CASE



Electricity and Nuclear Production Projections

- Total electricity production is expected to increase by 16% by 2030 and to more than double by 2050 compared with the 2023 level.
- In the high case, nuclear electricity production is expected to almost triple from the 2023 level by 2050. The share of nuclear in total electricity production is expected to increase by 3.6 percentage points.
- In the low case, nuclear electricity production is expected to increase by 60% from the 2023 level by 2050. The share of nuclear in total electricity production is expected to decline by 2.3 percentage points.

FIGURE 8. WORLD NUCLEAR ELECTRICITY PRODUCTION

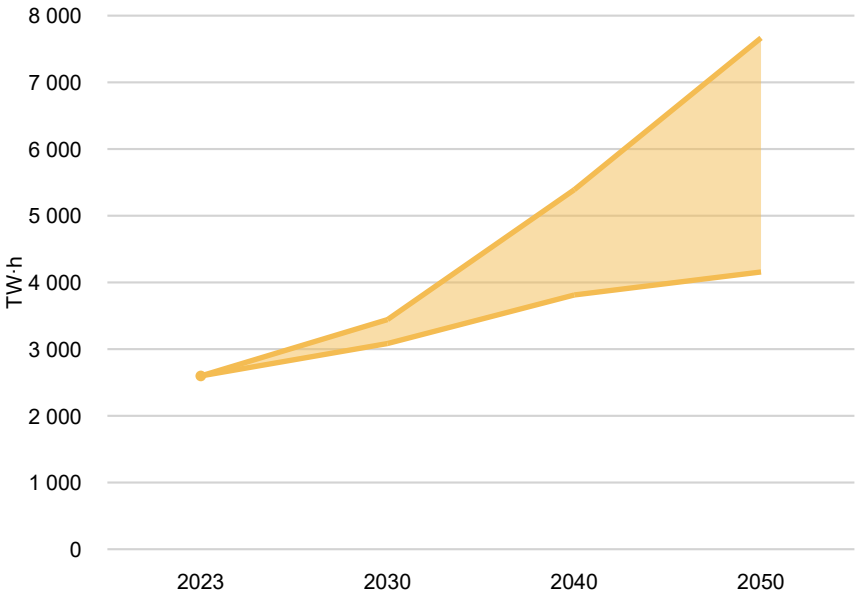


TABLE 4. WORLD TOTAL AND NUCLEAR ELECTRICITY PRODUCTION, TW·h

Electricity Production	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
Total	28 379	32 932	32 932	43 215	43 215	59 929	59 929
Nuclear	2 598	3 084	3 443	3 812	5 390	4 157	7 666
Nuclear as % of Electricity Production	*9.2%*	*9.4%*	*10.5%*	*8.8%*	*12.5%*	*6.9%*	*12.8%*

TABLE 5. WORLD NUCLEAR ELECTRICAL GENERATING CAPACITY, GW(e)

Region	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
World Total	**371.6**	**414**	**461**	**491**	**694**	**514**	**950**
Northern America	109.5	108	110	104	150	89	228
Latin America and the Caribbean	5.1	5	5	8	12	8	20
Northern, Western and Southern Europe	93.8	86	88	88	114	69	135
Eastern Europe	54.5	54	60	56	92	66	112
Africa	1.9	4	6	9	14	10	24
Western Asia	4.4	9	10	15	23	17	32
Southern Asia	10.5	18	23	35	58	45	88
Central and Eastern Asia	91.9	130	160	175	231	207	297
South-eastern Asia				1	1	3	11
Oceania							2

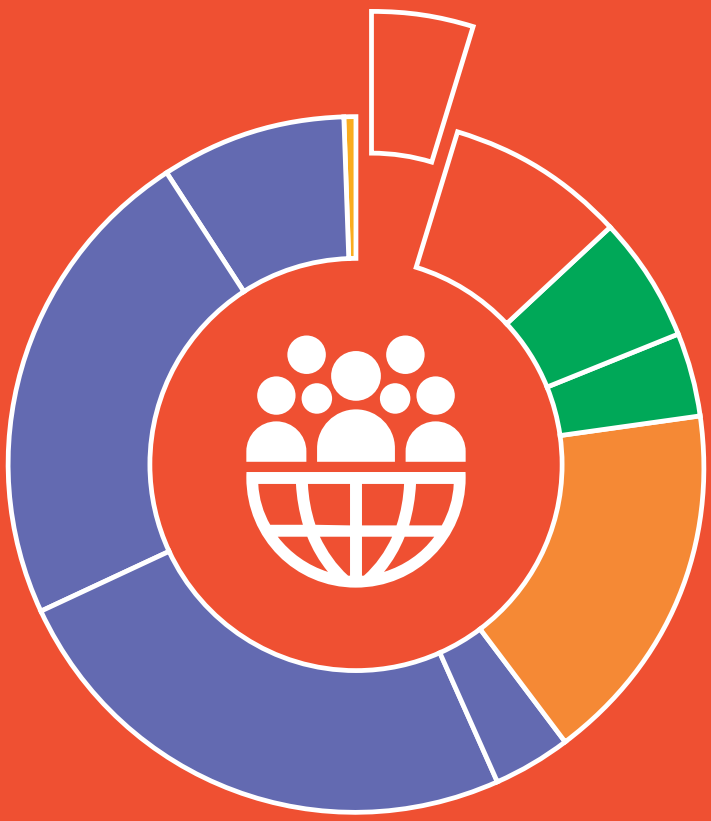
TABLE 6. WORLD NUCLEAR ELECTRICITY PRODUCTION, TW·h

Region	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
World Total	**2597.9**	**3 084**	**3 443**	**3 812**	**5 390**	**4 157**	**7 666**
Northern America	862.7	853	866	838	1 209	732	1 878
Latin America and the Caribbean	34.7	39	39	60	94	63	154
Northern, Western and Southern Europe	558.7	562	576	631	815	532	1 042
Eastern Europe	354.0	404	444	431	708	535	903
Africa	8.2	33	42	69	108	77	187
Western Asia	33.7	69	81	113	178	132	255
Southern Asia	73.1	125	158	264	430	357	698
Central and Eastern Asia	672.8	999	1 237	1 398	1 840	1 705	2 446
South-eastern Asia				8	8	24	87
Oceania							16

Northern America

383

million people



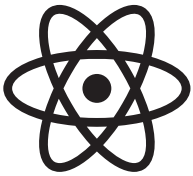
Energy Overview 2023

22.3%

of final energy consumed was electricity

4 927 TW·h

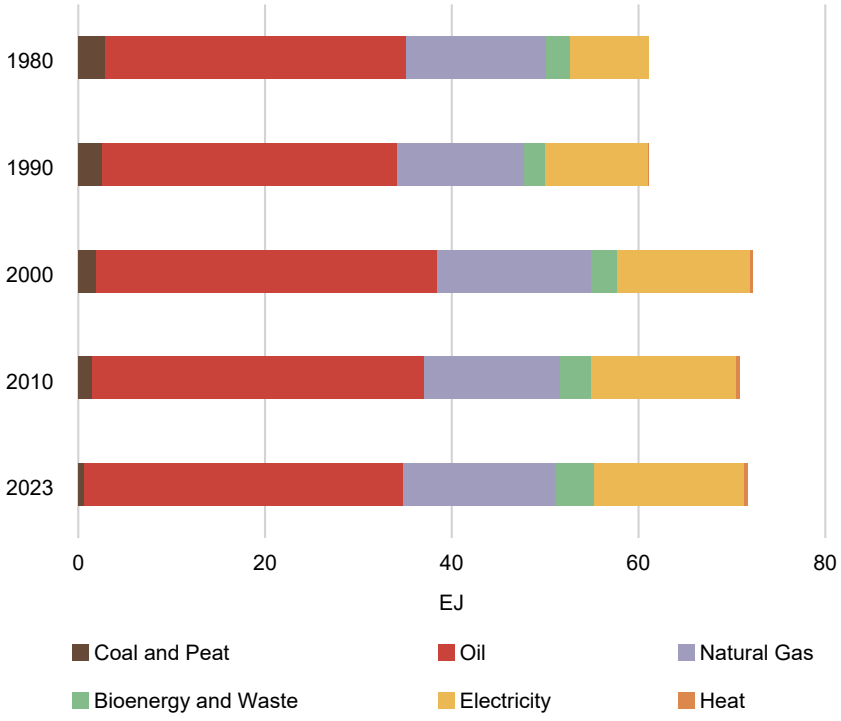
of electricity produced



17.5%

of electricity produced by nuclear

FIGURE 9. FINAL ENERGY CONSUMPTION BY ENERGY SOURCE IN THE NORTHERN AMERICA REGION



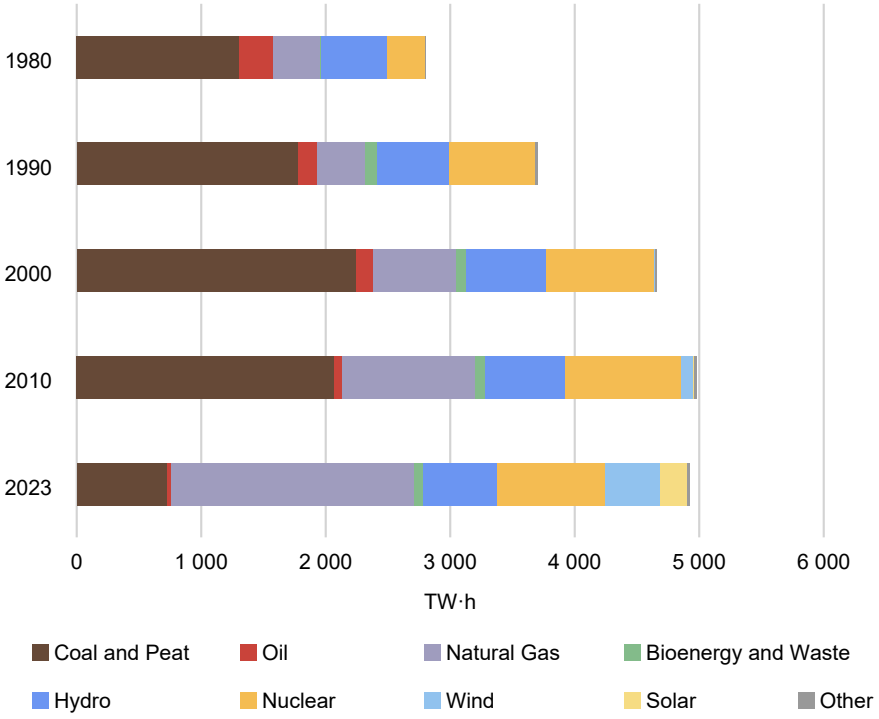
Final Energy Consumption

From 1980 to 2010, the share of electricity gradually increased by 8 percentage points. Its share in 2023 was about 22% of final energy consumption, remaining unchanged from the 2022 level.

Since 1980, the share of fossil fuels in final energy consumption has remained above 70%; in 2023 the combined share was 71%, a reduction of about 10 percentage points compared with 1980.

Of all fossil fuels, oil has the largest share, having remained at about 50% since 1980. In 2023 the share of oil decreased to slightly below 50%. With a share of 23%, natural gas was the second largest energy source in 2023. Its share has remained relatively stable since 1980.

FIGURE 10. ELECTRICITY PRODUCTION BY ENERGY SOURCE IN THE NORTHERN AMERICA REGION



Electricity Production

Nuclear is the largest source of low carbon electricity. Its share of total electricity production nearly doubled from 1980 to 1990 and has remained relatively stable since then, and was about 18% in 2023.

Fossil fuels accounted for more than half the electricity produced in 2023.

The share of coal was 15%, a decrease of 30 percentage points since 1980, whereas the share of natural gas has almost tripled to about 40%. The share of oil has decreased from 10% in 1980 to around 1% in 2023.

The share of hydro has decreased by about 7 percentage points over the past 40 years.

The share of wind has increased rapidly since 2000, reaching about 9% in 2023. In recent years, the share of solar has also undergone a rapid increase, rising from less than 1% in 2010 to 4% in 2023.

Energy and Electricity Projections

- Final energy consumption is expected to remain stable until 2050.
- By 2050 electricity consumption is expected to double from the 2023 level.
- The share of electricity in final consumption of energy is expected to increase from 22% to 45% by 2050.

FIGURE 11. FINAL CONSUMPTION OF ENERGY AND ELECTRICITY IN THE NORTHERN AMERICA REGION

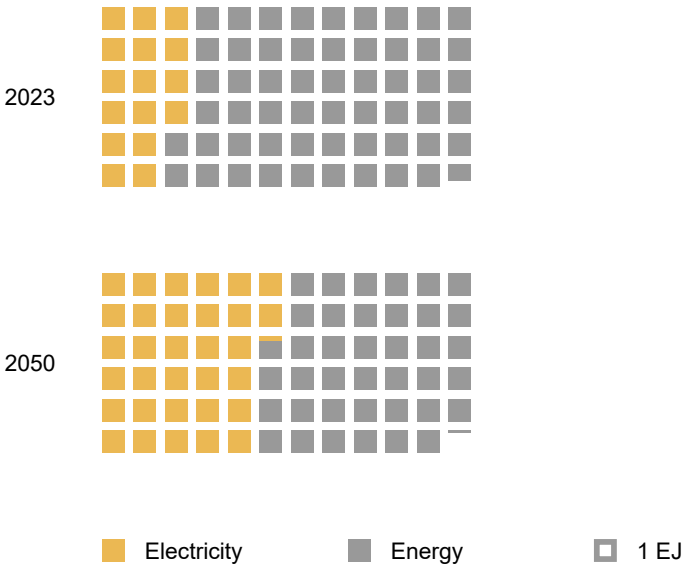


TABLE 7. FINAL CONSUMPTION OF ENERGY AND ELECTRICITY IN THE NORTHERN AMERICA REGION, EJ

Final Consumption	2023	2030	2040	2050
Energy	71.7	71.5	71.3	71.1
Electricity	16.0	18.1	23.1	32.2
Electricity as % of Energy	*22.3%*	*25.3%*	*32.4%*	*45.3%*

Nuclear Electrical Generating Capacity Projections

- Total electrical generating capacity is projected to increase by 4% by 2030 and to more than double by 2050 compared with the 2023 level.
- In the high case nuclear electrical generating capacity will increase by around 40 GW(e) by 2040, with a further addition of approximately 80 GW(e) by 2050. This would mean that nuclear electrical generating capacity would more than double by 2050. The share of nuclear in total electrical capacity is expected to decrease by 0.6 percentage points by 2050.
- In the low case this region is expected to have a reduction of about 20 GW(e) of nuclear electrical generating capacity by 2050 compared with 2023 capacity, predominantly due to retirements taking place from 2040 onwards. The share of nuclear in total electrical capacity is projected to decrease by about 5 percentage points by 2050.

FIGURE 12. NUCLEAR ELECTRICAL GENERATING CAPACITY IN THE NORTHERN AMERICA REGION

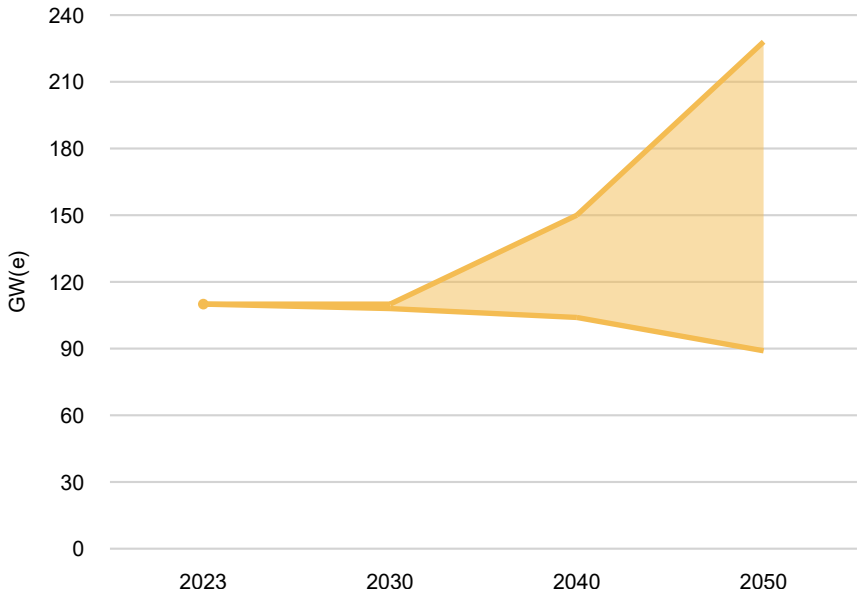


TABLE 8. TOTAL AND NUCLEAR ELECTRICAL GENERATING CAPACITY IN THE NORTHERN AMERICA REGION, GW(e)

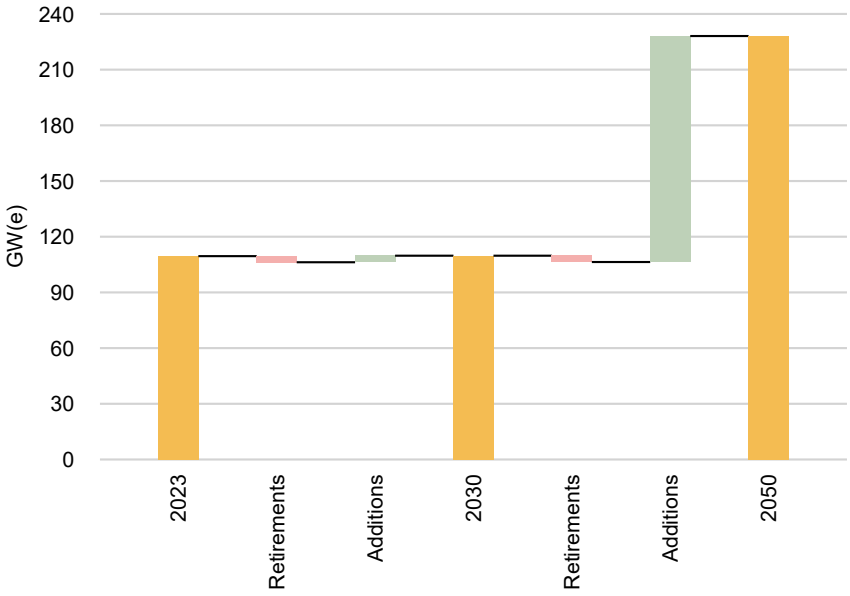
Electrical Capacity	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
Total	1 470	1 529	1 529	2 157	2 157	3 328	3 328
Nuclear	110	108	110	104	150	89	228
Nuclear as % of Electrical Capacity	*7.5%*	*7.1%*	*7.2%*	*4.8%*	*7.0%*	*2.7%*	*6.9%*

Reactor Retirements and Additions

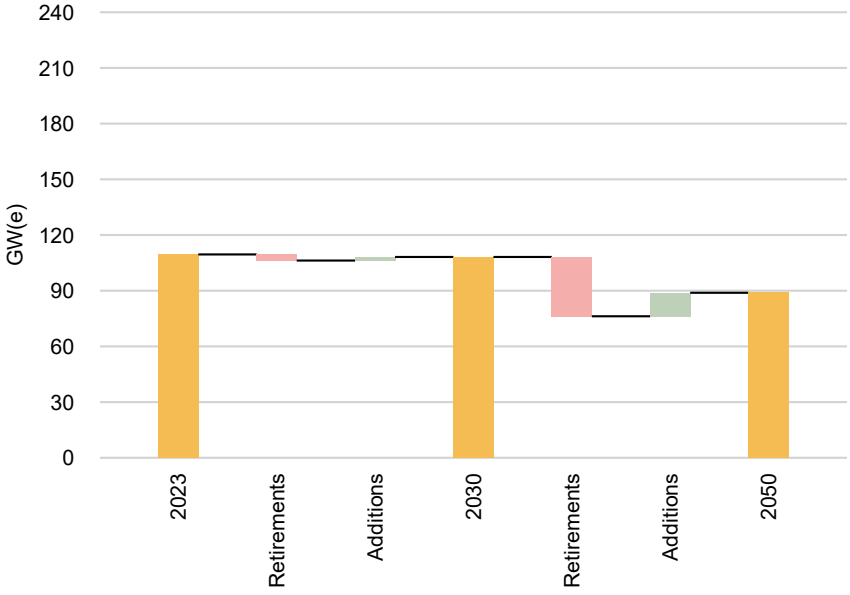
- The high case shows the importance of operating lifetime extensions for this region. In this case, only about 7 GW(e) of nuclear capacity will be retired by 2050. Approximately 125 GW(e) nuclear capacity is projected to be added by 2050, resulting in a net capacity addition of about 118 GW(e) in the high case.
- In the low case, 35 GW(e) of nuclear capacity is projected to be retired by 2050. Approximately 15 GW(e) of nuclear capacity will be added by 2050, resulting in net capacity reduction of about 20 GW(e) in the low case by 2050.

FIGURE 13. NUCLEAR CAPACITY IN THE NORTHERN AMERICA REGION: ACTUAL, RETIREMENTS AND ADDITIONS

HIGH CASE



LOW CASE



Electricity and Nuclear Production Projections

- Total electricity production is projected to approximately double by 2050 compared with the 2023 level.
- In the high case, nuclear electricity production is projected to more than double by 2050. The share of nuclear in total electricity production is expected to remain at approximately the 2023 level until 2050.
- In the low case, nuclear electricity production is projected to decrease 15% from the 2023 level by 2050. The share of nuclear in total electricity production is expected to decrease by about 10 percentage points by 2050.

FIGURE 14. NUCLEAR ELECTRICITY PRODUCTION IN THE NORTHERN AMERICA REGION

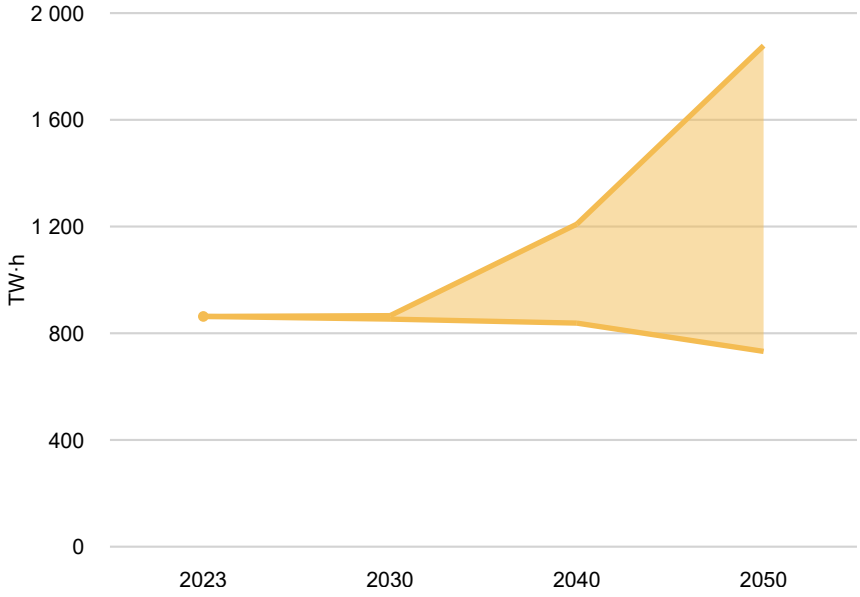


TABLE 9. TOTAL AND NUCLEAR ELECTRICITY PRODUCTION IN THE NORTHERN AMERICA REGION, TW·h

Electricity Production	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
Total	4 927	5 574	5 574	7 206	7 206	10 058	10 058
Nuclear	863	853	866	838	1 209	732	1 878
Nuclear as % of Electricity Production	*17.5%*	*15.3%*	*15.5%*	*11.6%*	*16.8%*	*7.3%*	*18.7%*

Latin America and the Caribbean

659

million people

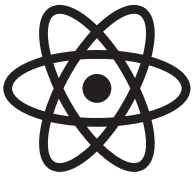
Energy Overview 2023

18.8%

of final energy consumed was electricity

1 731 TW·h

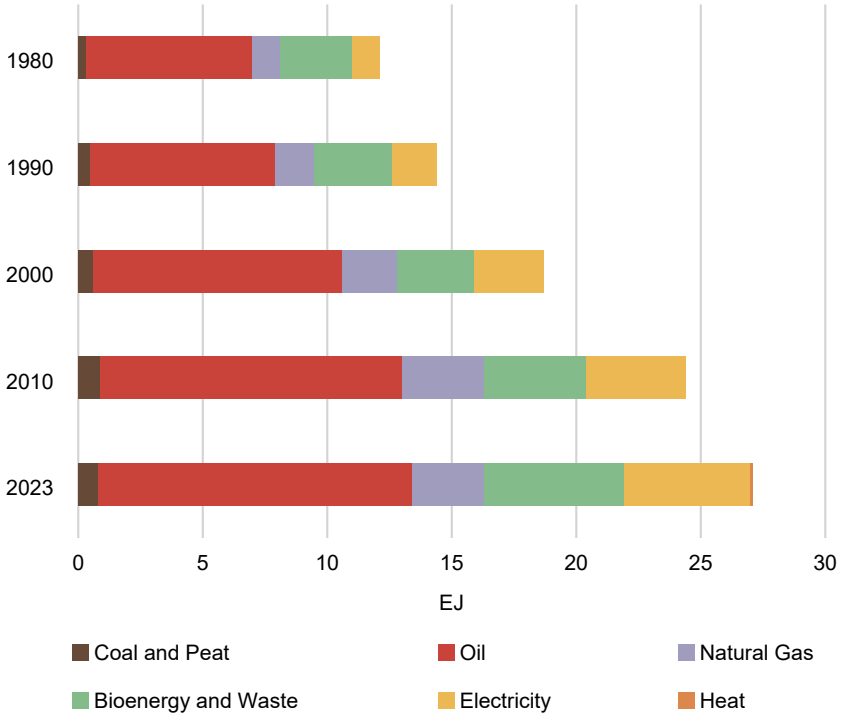
of electricity produced



2.0%

of electricity produced by nuclear

FIGURE 15. FINAL ENERGY CONSUMPTION BY ENERGY SOURCE IN THE LATIN AMERICA AND THE CARIBBEAN REGION



Final Energy Consumption

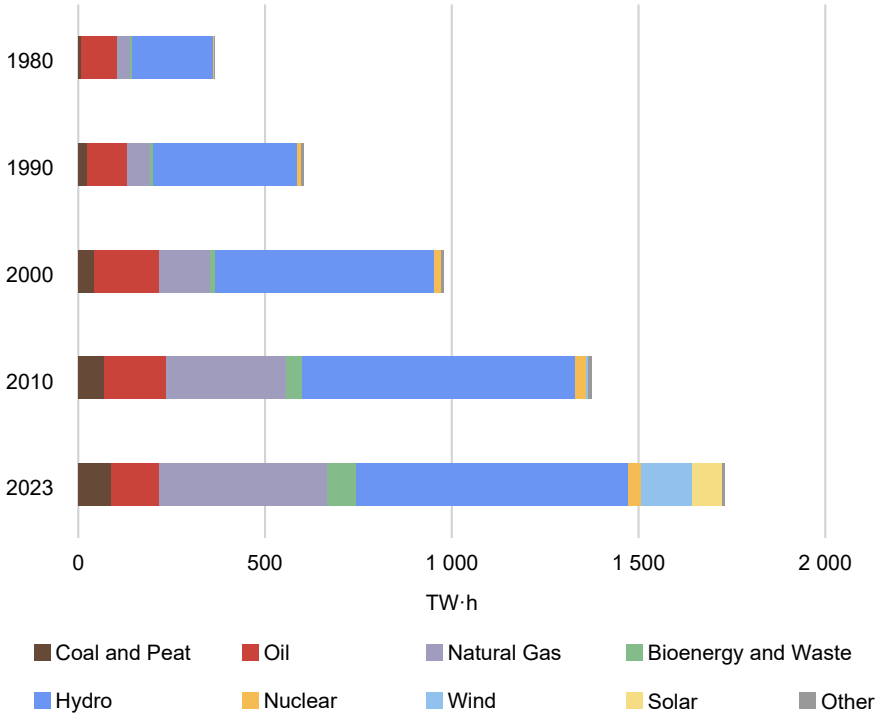
The share of electricity in final energy consumption has more than doubled since 1980, accounting for about 20% of final energy consumption in 2023.

The share of fossil fuels in final energy consumption peaked in 2000 at 67% of the total; by 2023 its share had fallen to about 60%.

Since 1990 the share of coal has remained relatively stable at about 3%. The share of oil was the highest of all fossil fuels in 2023 at 46%. The share of natural gas increased from 1980 until 2010, when it peaked at about 13%. Over the past few years the share has been around 10%.

Bioenergy and waste had a share of about 20% in 2023.

FIGURE 16. ELECTRICITY PRODUCTION BY ENERGY SOURCE IN THE LATIN AMERICA AND THE CARIBBEAN REGION



Electricity Production

The share of nuclear in total electricity production has remained at about 2% since 1990.

Since 1980 hydro has been the largest source of electricity and its share in 2023 was 42%. This was larger than the share of all fossil fuels combined, which together had a share of 39%. Hydro production increased up to 2010 but has gradually decreased since; its share peaked in 1990 at 64%.

Of all fossil fuels, natural gas accounted for the largest share of electricity production in 2023, remaining at its 2022 levels of about 26%. The share of oil has decreased by about 20 percentage points since 1980. The share of coal remains relatively small at about 5%.

Energy and Electricity Projections

- Final consumption of energy is expected to increase by 13% by 2050, at an average annual rate of about 0.5%.
- Electricity consumption is expected to grow at an average annual rate of about 4%, approximately tripling by 2050.
- By 2050 the share of electricity in final energy consumption is expected to increase by about 30 percentage points from its 2023 share.

FIGURE 17. FINAL CONSUMPTION OF ENERGY AND ELECTRICITY IN THE LATIN AMERICA AND THE CARIBBEAN REGION

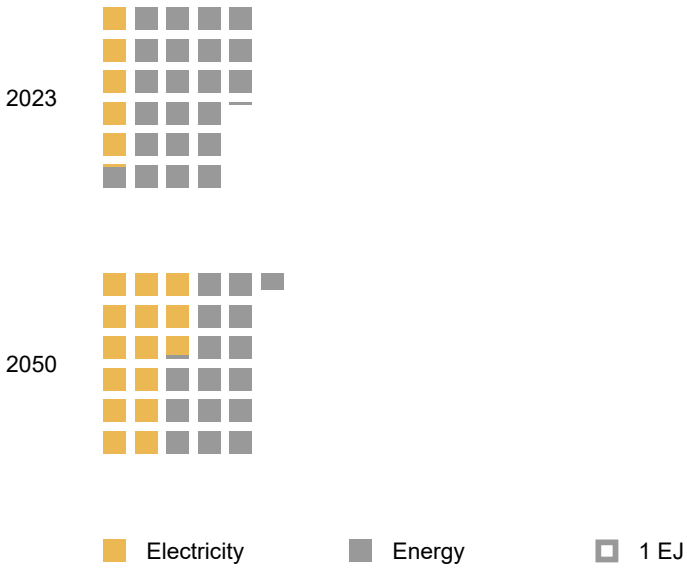


TABLE 10. FINAL CONSUMPTION OF ENERGY AND ELECTRICITY IN THE LATIN AMERICA AND THE CARIBBEAN REGION, EJ

Final Consumption	2023	2030	2040	2050
Energy	27.1	28.0	29.3	30.7
Electricity	5.1	6.5	10.1	14.8
Electricity as % of Energy	*18.8%*	*23.2%*	*34.5%*	*48.2%*

Nuclear Electrical Generating Capacity Projections

- Total electrical generating capacity is projected to increase by 17% by 2030 and to almost triple by 2050.
- In the high case, nuclear electrical generating capacity is projected to increase about fourfold by 2050, with its share of total electrical capacity growing by 0.4 percentage points.
- In the low case, nuclear electrical generating capacity is projected to increase to about 1.5 times the 2023 capacity by 2050, with its share declining by 0.4 percentage points.

FIGURE 18. NUCLEAR ELECTRICAL GENERATING CAPACITY IN THE LATIN AMERICA AND THE CARIBBEAN REGION

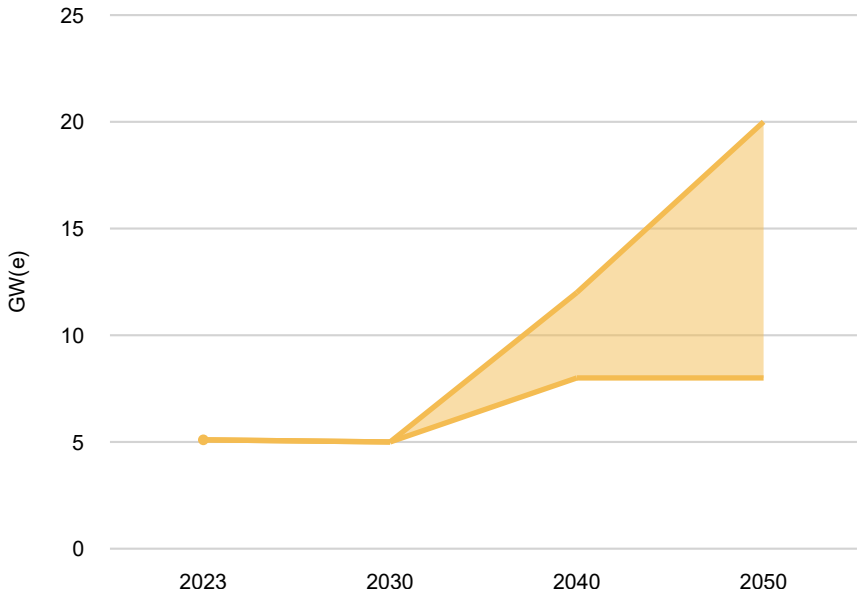


TABLE 11. TOTAL AND NUCLEAR ELECTRICAL GENERATING CAPACITY IN THE LATIN AMERICA AND THE CARIBBEAN REGION, GW(e)

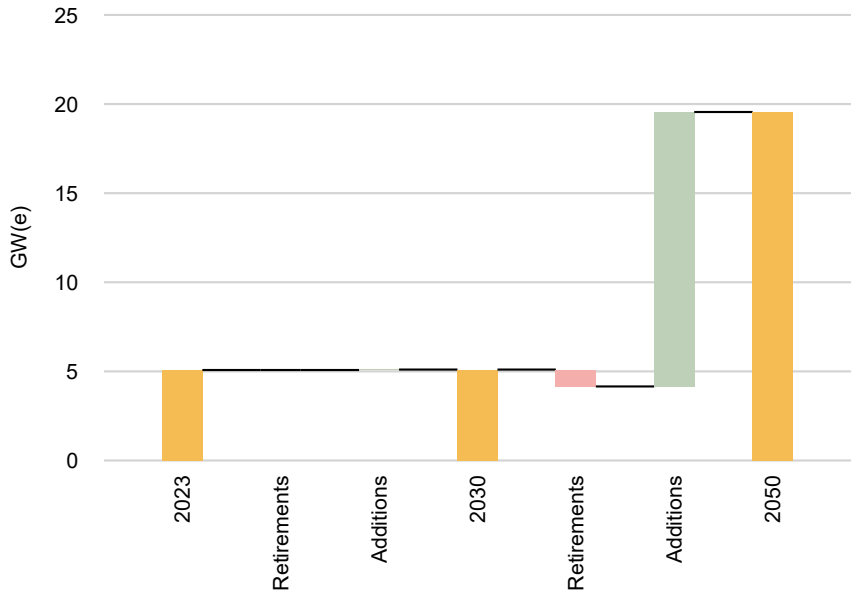
Electrical Capacity	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
Total	539	632	632	1 005	1 005	1 552	1 552
Nuclear	5.1	5	5	8	12	8	20
Nuclear as % of Electrical Capacity	*0.9%*	*0.8%*	*0.8%*	*0.8%*	*1.2%*	*0.5%*	*1.3%*

Reactor Retirements and Additions

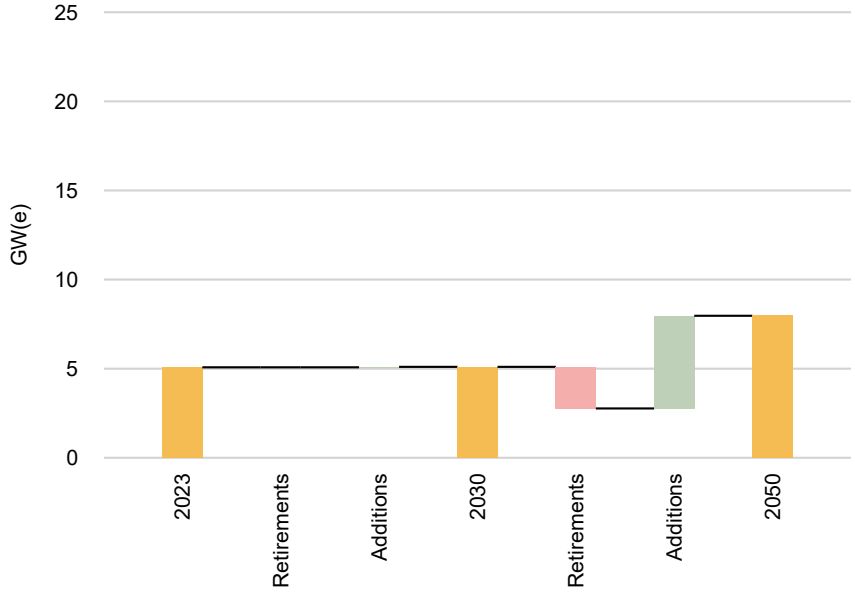
- In both the high and the low cases, no retirements or additions are projected until after 2030. In the high case it is projected that only about 1 GW(e) will be retired, resulting in net additions of about 14 GW(e) by 2050. This highlights the importance of new capacity additions for this region between 2030 and 2050.
- In the low case it is assumed that there will be a net increase in capacity of about 3 GW(e) by 2050, as there will be about 2 GW(e) retired and 5 GW(e) added.

FIGURE 19. NUCLEAR CAPACITY IN THE LATIN AMERICA AND THE CARIBBEAN REGION: ACTUAL, RETIREMENTS AND ADDITIONS

HIGH CASE



LOW CASE



Electricity and Nuclear Production Projections

- Total electricity production is projected to rise significantly by 2030, with an increase of about 27% from the 2023 level. It is expected to almost triple by 2050.
- In the high case, nuclear electricity production is projected to increase more than fourfold by 2050. The share of nuclear in total electricity production is expected to increase by 1.2 percentage points by 2050.
- In the low case, nuclear electricity production is projected to almost double by 2050. The share of nuclear in total electricity production is expected to decrease by 0.7 percentage points.

FIGURE 20. NUCLEAR ELECTRICITY PRODUCTION IN THE LATIN AMERICA AND THE CARIBBEAN REGION

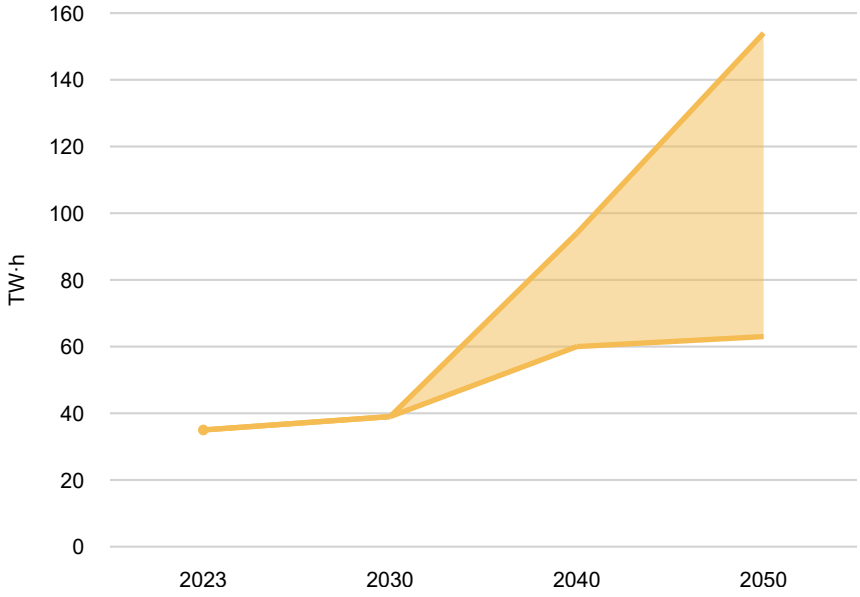


TABLE 12. TOTAL AND NUCLEAR ELECTRICITY PRODUCTION IN THE LATIN AMERICA AND THE CARIBBEAN REGION, TW·h

Electricity Production	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
Total	1 731	2 206	2 206	3 357	3 357	4 829	4 829
Nuclear	35	39	39	60	94	63	154
Nuclear as % of Electricity Production	*2.0%*	*1.8%*	*1.8%*	*1.8%*	*2.8%*	*1.3%*	*3.2%*

Northern, Western and Southern Europe

460

million people

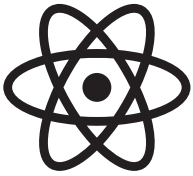
Energy Overview 2023

20.8%

of final energy consumed was electricity

2 791 TW·h

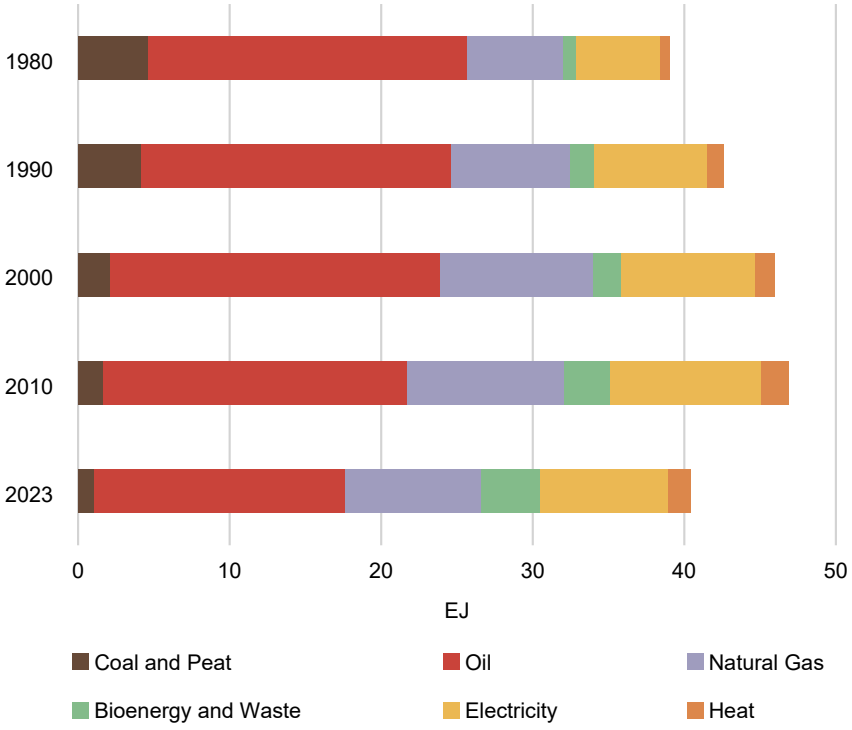
of electricity produced



20.0%

of electricity produced by nuclear

FIGURE 21. FINAL ENERGY CONSUMPTION BY ENERGY SOURCE IN THE COMBINED REGIONS OF NORTHERN, WESTERN AND SOUTHERN EUROPE



Final Energy Consumption

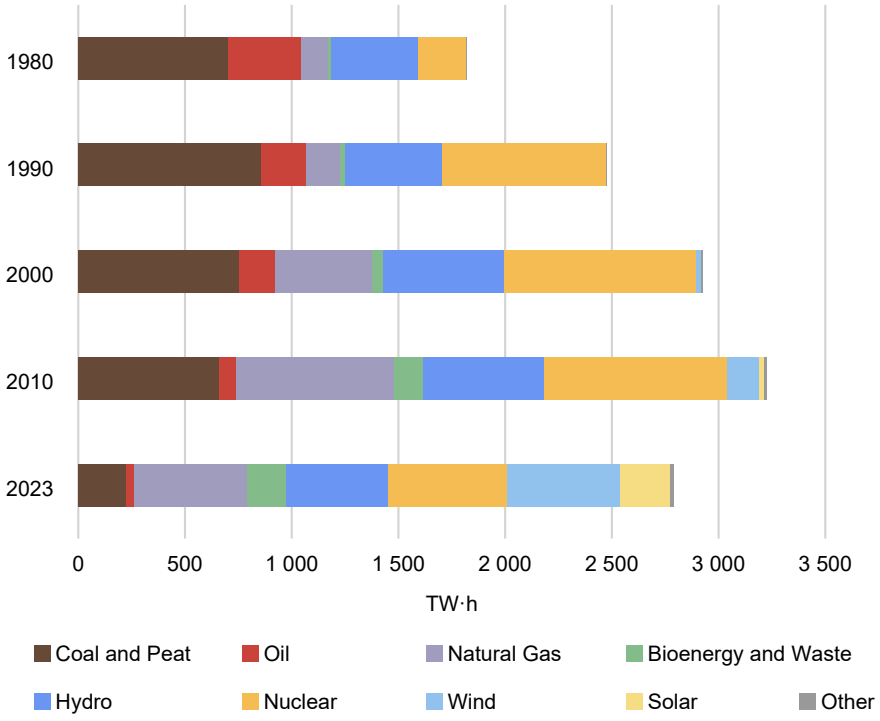
In 2023 the share of electricity in final energy consumption was about 20%, an increase of one third since 1980.

Since 1980 fossil fuels have continued to dominate final energy consumption, although there has been a gradual reduction in their combined share, which fell about 16 percentage points to about 66% in 2023.

Of all fossil fuels, oil had the largest share in 1980 at more than 50%. Although its share has been declining over the past 40 years, in 2023 the share of oil remained significant at about 40%.

The share of natural gas has increased by about 6 percentage points since 1980. It accounted for about one fifth of the final energy consumed in 2023. The share of coal has decreased by about 9 percentage points over the past 40 years, but its share has remained at 3–4% since 2010.

FIGURE 22. ELECTRICITY PRODUCTION BY ENERGY SOURCE IN THE COMBINED REGIONS OF NORTHERN, WESTERN AND SOUTHERN EUROPE



Electricity Production

Nuclear is the largest contributor of low carbon electricity production, accounting for 20% of total electricity production in 2023. Its share more than doubled from 1980 to 1990 and then decreased by about 11 percentage points from 2000 to 2023.

In the past 40 years the combined share of fossil fuels in electricity production has decreased by half. About 28% of electricity was produced by fossil fuels in 2023, with natural gas being the largest contributor at about 20%. The share of natural gas has effectively tripled since 1980, whereas that of oil has declined from almost 20% in 1980 to 1.4% in 2023. Since 1980 the share of coal in electricity production has fallen by about 30 percentage points, from almost 40% to about 8% in 2023.

Over the past 40 years the share of hydro has decreased by about 6 percentage points. In 2023 it was about 17%. Wind and solar did not contribute significantly to electricity production in 1980; the contributions of these energy sources have since increased substantially to reach a combined share of 27% in 2023.

Energy and Electricity Projections

- Final energy consumption is expected to decrease by about 15% by 2050, at an average annual rate of 0.6%.
- Electricity consumption is projected to approximately double by 2050, at an average annual rate of approximately 2.3%.
- The share of electricity in final energy consumption is expected to increase by about 25 percentage points by 2050.

FIGURE 23. FINAL CONSUMPTION OF ENERGY AND ELECTRICITY IN THE COMBINED REGIONS OF NORTHERN, WESTERN AND SOUTHERN EUROPE

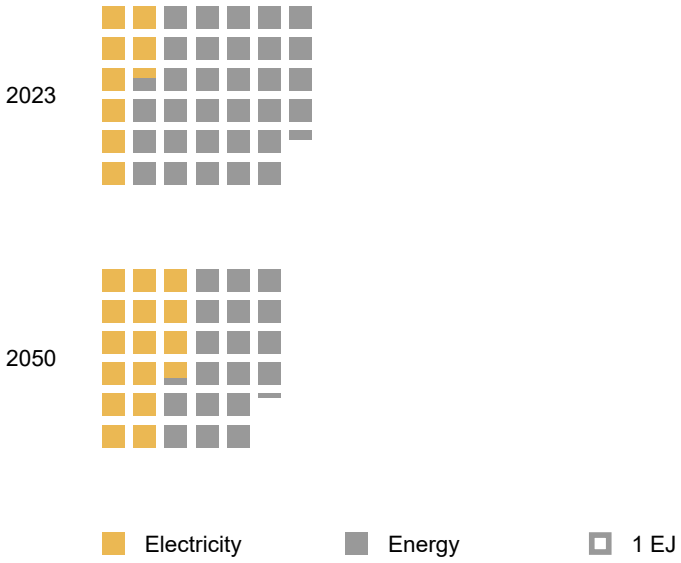


TABLE 13. FINAL CONSUMPTION OF ENERGY AND ELECTRICITY IN THE COMBINED REGIONS OF NORTHERN, WESTERN AND SOUTHERN EUROPE, EJ

Final Consumption	2023	2030	2040	2050
Energy	40.4	38.7	36.4	34.2
Electricity	8.4	10.3	12.4	15.7
Electricity as % of Energy	*20.8%*	*26.6%*	*34.1%*	*45.9%*

Nuclear Electrical Generating Capacity Projections

- Total electrical generating capacity is projected to increase by about 70% by 2050 compared with 2023 capacity.
- In the high case, nuclear electrical generating capacity is expected to decrease slightly by about 6 GW(e) by 2030 and then to increase by about 40% by 2050 compared with 2023 capacity. The share of nuclear in total electrical capacity is expected to decrease by 1.2 percentage points by 2050.
- In the low case, nuclear electrical generating capacity is projected to gradually decrease, with an expected reduction in capacity of approximately 25% by 2050 compared with 2023 capacity. The share of nuclear in total electrical capacity is expected to decline by 4.6 percentage points.

FIGURE 24. NUCLEAR ELECTRICAL GENERATING CAPACITY IN THE COMBINED REGIONS OF NORTHERN, WESTERN AND SOUTHERN EUROPE

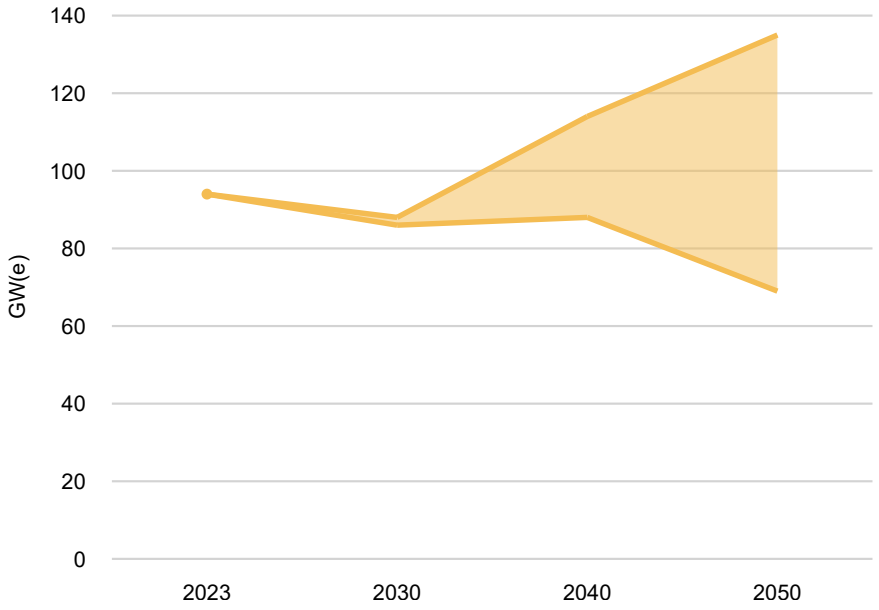


TABLE 14. TOTAL AND NUCLEAR ELECTRICAL GENERATING CAPACITY IN THE COMBINED REGIONS OF NORTHERN, WESTERN AND SOUTHERN EUROPE, GW(e)

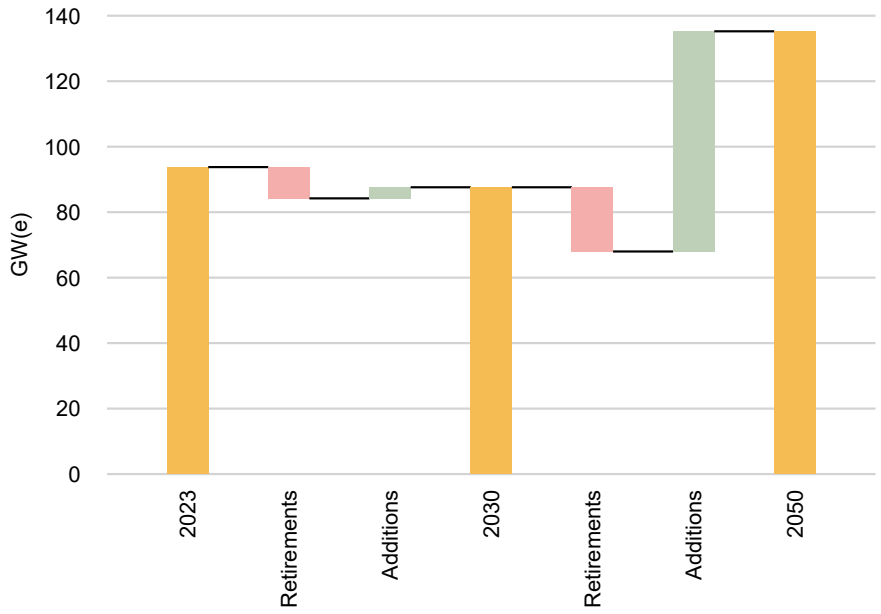
Electrical Capacity	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
Total	1 146	1 243	1 243	1 435	1 435	1 941	1 941
Nuclear	94	86	88	88	114	69	135
Nuclear as % of Electrical Capacity	*8.2%*	*6.9%*	*7.1%*	*6.1%*	*7.9%*	*3.6%*	*7.0%*

Reactor Retirements and Additions

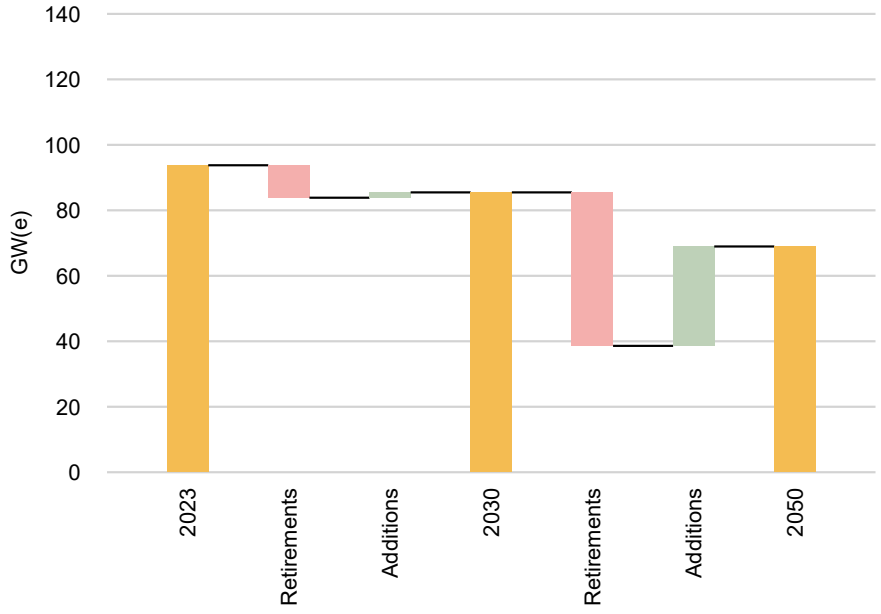
- In the high case, it is assumed that there will be a net increase in nuclear capacity of almost 40 GW(e) for this region by 2050. About 30 GW(e) will be retired by 2050, with most of the retirements taking place after 2030. Most of the capacity additions will also occur after 2030, with about 67 GW(e) of additions between 2030 and 2050.
- In the low case, it is assumed that there will be a net decrease of 25 GW(e) for this region by 2050. The difference in assumptions for the low and the high case is the greater number of retired reactors in the low case case, with almost twice as much capacity — about 57 GW(e) — being retired by 2050 in the low case compared with the high case. This highlights the importance of operating lifetime extensions for the region to achieve the high case.

FIGURE 25. NUCLEAR CAPACITY IN THE COMBINED REGIONS OF NORTHERN, WESTERN AND SOUTHERN EUROPE: ACTUAL, RETIREMENTS AND ADDITIONS

HIGH CASE



LOW CASE



Electricity and Nuclear Production Projections

- Total electricity production is projected to increase by about 20% by 2030 and by about 75% by 2050, compared with 2023 production levels.
- In the high case, nuclear electricity production is projected to almost double by 2050, compared with 2023 production levels. The share of nuclear in total electricity production is expected to increase by about 2 percentage points by 2050.
- In the low case, nuclear electricity production is projected to decrease by about 5% by 2050. The share of nuclear in total electricity production is expected to decline by 9 percentage points by 2050.

FIGURE 26. NUCLEAR ELECTRICITY PRODUCTION IN THE COMBINED REGIONS OF NORTHERN, WESTERN AND SOUTHERN EUROPE

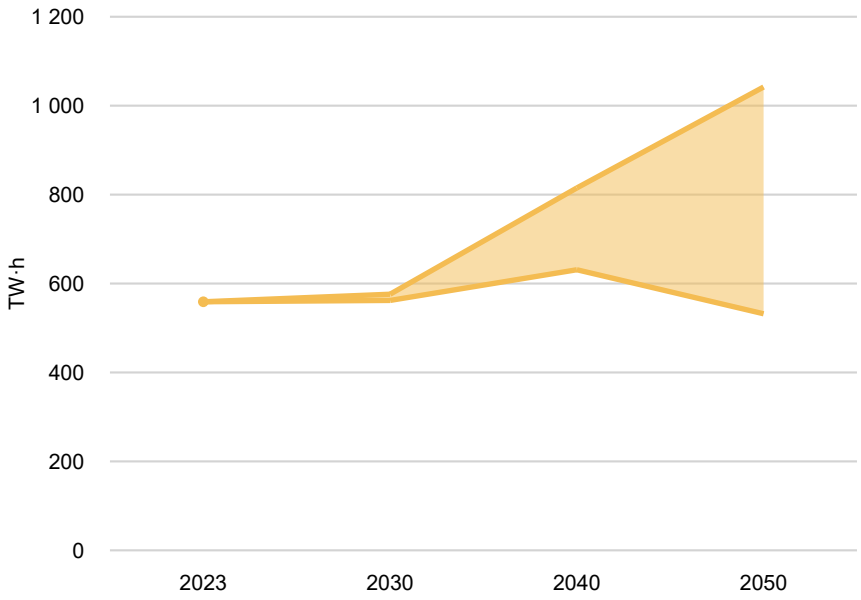


TABLE 15. TOTAL AND NUCLEAR ELECTRICITY PRODUCTION IN THE COMBINED REGIONS OF NORTHERN, WESTERN AND SOUTHERN EUROPE, TW·h

Electricity Production	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
Total	2 791	3 422	3 422	3 836	3 836	4 828	4 828
Nuclear	559	562	576	631	815	532	1 042
Nuclear as % of Electricity Production	*20.0%*	*16.4%*	*16.8%*	*16.4%*	*21.2%*	*11.0%*	*21.6%*

Eastern Europe

286

million people

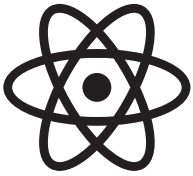
Energy Overview 2023

14.0%

of final energy consumed was electricity

1 541 TW·h

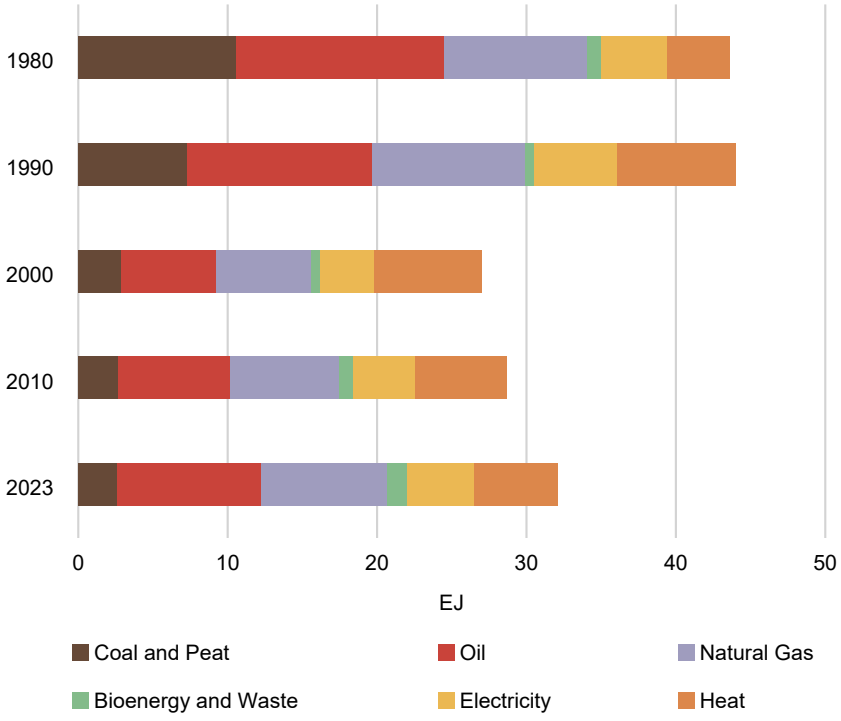
of electricity produced



23.0%

of electricity produced by nuclear

FIGURE 27. FINAL ENERGY CONSUMPTION BY ENERGY SOURCE IN THE EASTERN EUROPE REGION



Final Energy Consumption

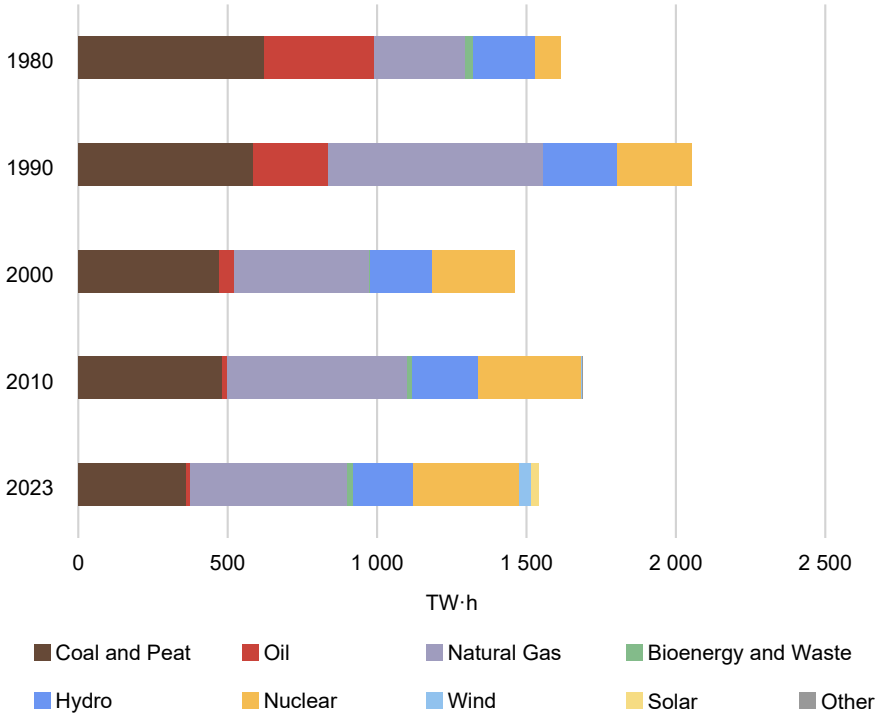
The share of electricity in final energy consumption has increased gradually by about 4 percentage points since 1980.

Since 1980 fossil fuels have accounted for the largest share of final energy consumption. From a level of almost 80% in 1980, the combined share of fossil fuels had declined by about 20 percentage points by 2000. However, there has since been a gradual increase to about 64% in 2023.

Oil has the largest share of all fossil fuels, accounting for 30% in 2023. The share of natural gas has increased by about 4 percentage points since 1980. The share of coal has declined from almost 25% in 1980 to less than 10% in 2023.

Heat accounted for 10% of final energy consumption in 1980, increasing to almost 30% by 2000. Its share has since declined to 17% in 2023. Bioenergy and waste have doubled their share since 1980, however their share remains small at only 4%.

FIGURE 28. ELECTRICITY PRODUCTION BY ENERGY SOURCE IN THE EASTERN EUROPE REGION



Electricity Production

The share of nuclear has almost quadrupled since 1980, and accounted for 23% of the electricity produced in 2023.

Although their combined share has declined by more than 20 percentage points since 1980, fossil fuels remain the principal energy sources for electricity production, with a share of about 58% in 2023.

Over the years the share of natural gas has almost doubled. In 2023 more than one third of electricity was produced from natural gas. Coal contributed about 24% of the electricity produced in 2023, down from almost 40% in 1980. The share of oil has dropped significantly, from almost 23% in 1980 to less than 1% in 2023.

The share of hydro has remained relatively stable throughout the years at about 12–14%. The combined share of solar and wind remained small at about 4% in 2023, although in 1980 these sources did not contribute to electricity production at all.

Energy and Electricity Projections

- Final consumption of energy is expected to decrease by about 20% by 2050.
- Electricity consumption is expected to grow at about 2.6% per year, approximately doubling by 2050.
- The share of electricity in final consumption of energy is expected to increase by about 20 percentage points by 2050.

FIGURE 29. FINAL CONSUMPTION OF ENERGY AND ELECTRICITY IN THE EASTERN EUROPE REGION

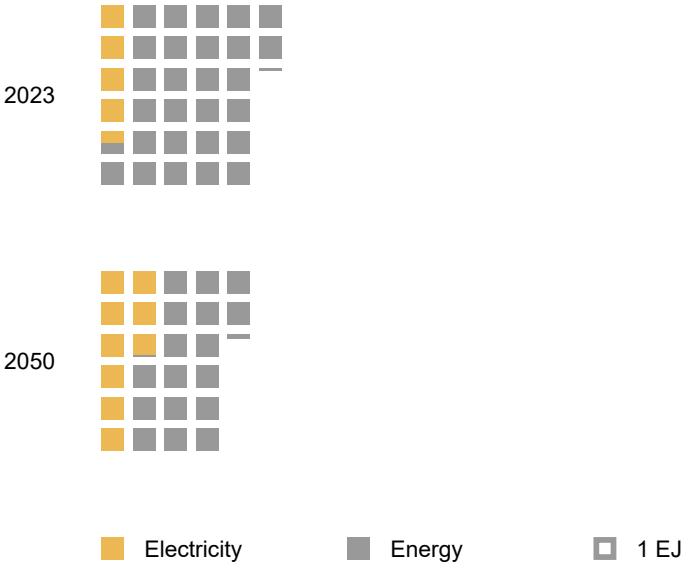


TABLE 16. FINAL CONSUMPTION OF ENERGY AND ELECTRICITY IN THE EASTERN EUROPE REGION, EJ

Final Consumption	2023	2030	2040	2050
Energy	32.1	30.5	28.2	26.2
Electricity	4.5	5.0	6.4	8.9
Electricity as % of Energy	*14.0%*	*16.4%*	*22.7%*	*34.0%*

Nuclear Electrical Generating Capacity Projections

- Total electrical generating capacity is projected to increase by about 90% by 2050 compared with 2023 capacity.
- In the high case, nuclear electrical generating capacity is projected to more than double by 2050 compared with 2023 capacity. The share of nuclear in total electrical capacity is expected to increase 1.2 percentage points by 2050.
- In the low case, nuclear electrical generating capacity is projected to remain approximately stable up to 2040, with about a 20% increase in capacity by 2050 compared with 2023 capacity. The share of nuclear in total electrical capacity is expected to decline by 4 percentage points by 2050.

FIGURE 30. NUCLEAR ELECTRICAL GENERATING CAPACITY IN THE EASTERN EUROPE REGION

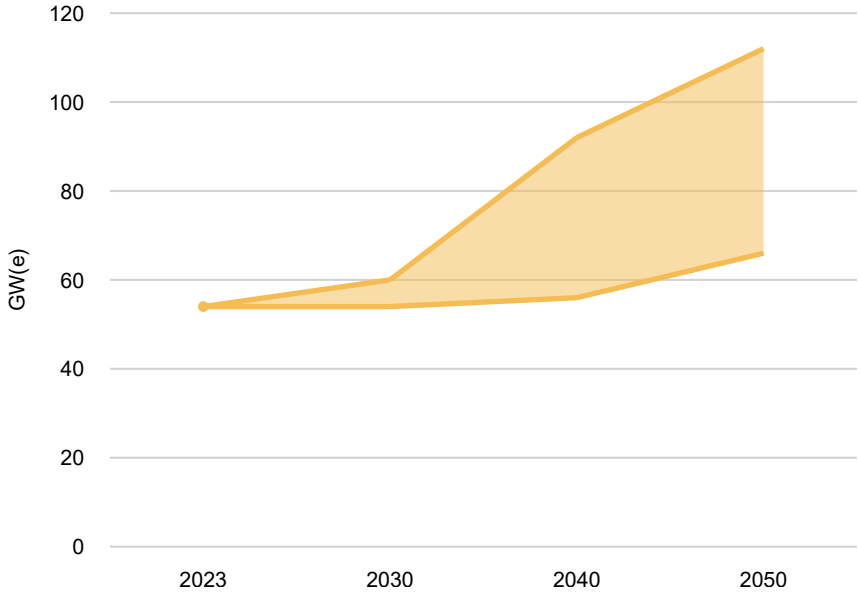


TABLE 17. TOTAL AND NUCLEAR ELECTRICAL GENERATING CAPACITY IN THE EASTERN EUROPE REGION, GW(e)

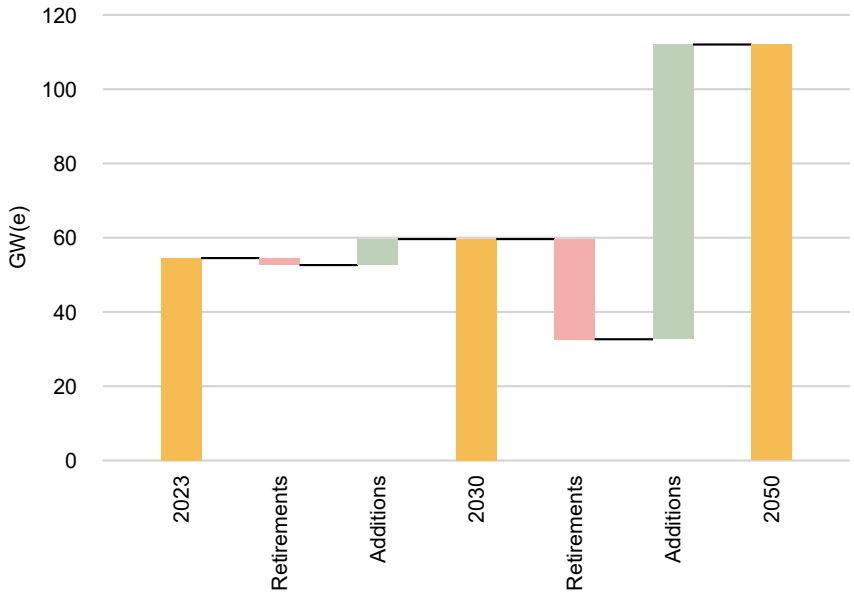
Electrical Capacity	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
Total	478	490	490	663	663	899	899
Nuclear	54	54	60	56	92	66	112
Nuclear as % of Electrical Capacity	*11.3%*	*11.0%*	*12.2%*	*8.4%*	*13.9%*	*7.3%*	*12.5%*

Reactor Retirements and Additions

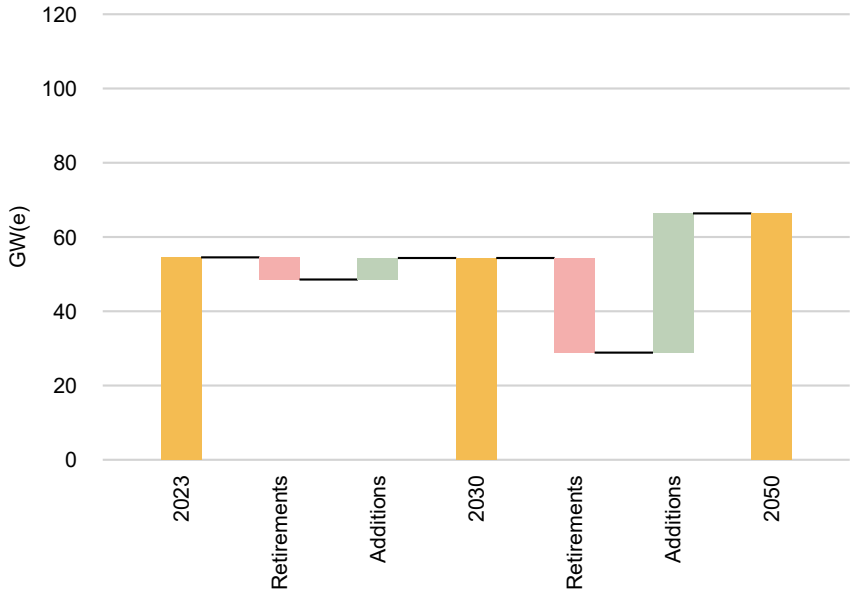
- In the high case, it is assumed that there will be a net increase of almost 60 GW(e) for this region by 2050, with only about 2 GW(e) retired by 2030 and about 27 GW(e) retired between 2030 and 2050. Most of the capacity additions will also occur after 2030, with almost 80 GW(e) of additions between 2030 and 2050.
- In the low case, it is assumed that there will be a net increase of about 12 GW(e) for this region by 2050. By 2030, retirements will equal additions. From 2030 onwards, about half the capacity will be retired and almost 40 GW(e) will be added.

FIGURE 31. NUCLEAR CAPACITY IN THE EASTERN EUROPE REGION: ACTUAL, RETIREMENTS AND ADDITIONS

HIGH CASE



LOW CASE



Electricity and Nuclear Production Projections

- Total electricity production is projected to increase by 11% by 2030 and to almost double by 2050 compared with 2023 production.
- In the high case, nuclear electricity production is projected to increase to about 2.5 times the 2023 level by 2050. The share of nuclear in total electricity production is expected to increase by 8.2 percentage points.
- In the low case, nuclear electricity production is projected to increase to about 1.5 times the 2023 level by 2050. The share of nuclear in total electricity production is expected to decline by 4.5 percentage points by 2050.

FIGURE 32. NUCLEAR ELECTRICITY PRODUCTION IN THE EASTERN EUROPE REGION

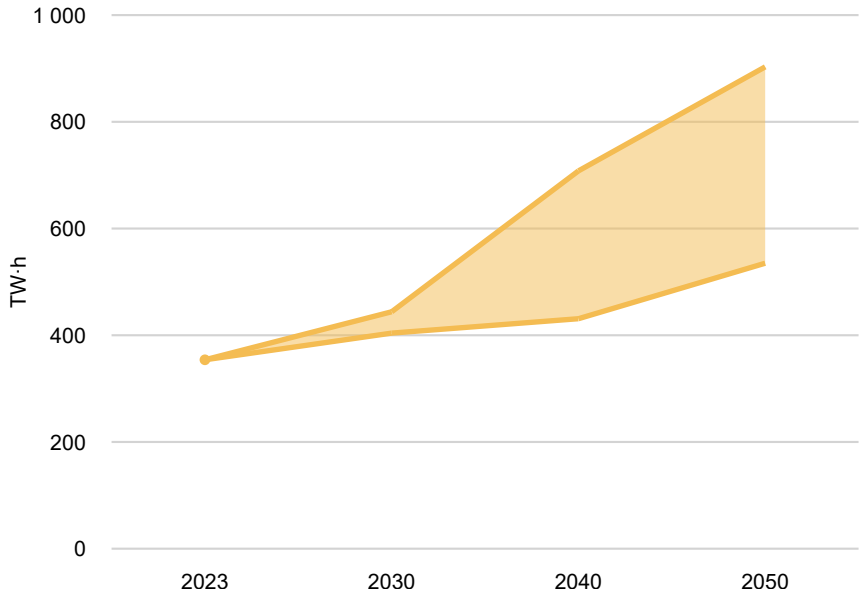


TABLE 18. TOTAL AND NUCLEAR ELECTRICITY PRODUCTION IN THE EASTERN EUROPE REGION, TW·h

Electricity Production	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
Total	1 541	1 712	1 712	2 212	2 212	2 895	2 895
Nuclear	354	404	444	431	708	535	903
Nuclear as % of Electricity Production	*23.0%*	*23.6%*	*25.9%*	*19.5%*	*32.0%*	*18.5%*	*31.2%*

Africa

1 481

million people

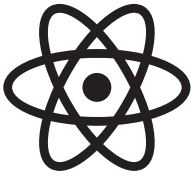
Energy Overview 2023

10.2%

of final energy consumed was electricity

853 TW·h

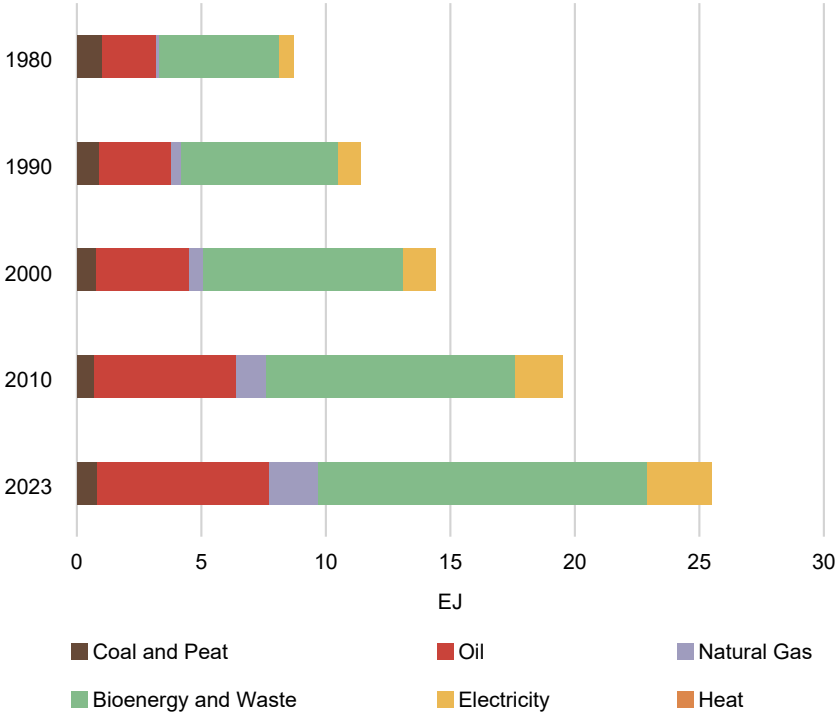
of electricity produced



0.9%

of electricity produced by nuclear

FIGURE 33. FINAL ENERGY CONSUMPTION BY ENERGY SOURCE IN THE AFRICA REGION



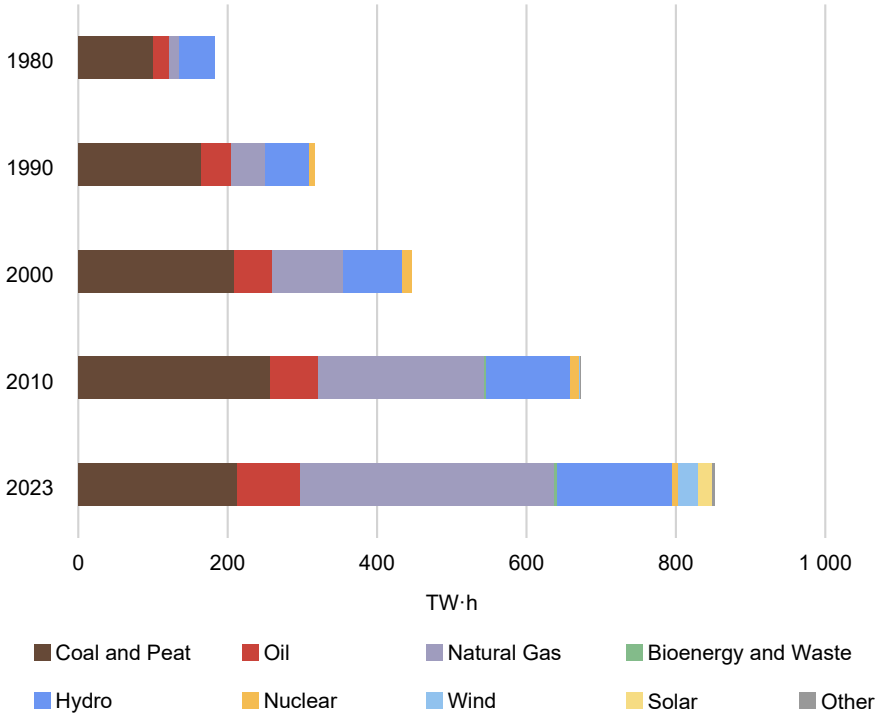
Final Energy Consumption

The share of electricity has increased 3 percentage points since 1980 to reach 10% in 2023.

Bioenergy and waste have accounted for the largest share of final energy consumption over the past 40 years at around 50%.

The combined share of fossil fuels has been relatively stable since 1980 at about 40%. The share of natural gas has increased about eightfold over the past 40 years, while still remaining small at about 8%. The share of oil is about 27%; it has increased by about 2 percentage points since 1980. The share of coal has gradually decreased by about 8 percentage points to only 3%.

FIGURE 34. ELECTRICITY PRODUCTION BY ENERGY SOURCE IN THE AFRICA REGION



Electricity Production

The share of nuclear was around 2–3% from 1990 to 2010, but has since fallen to less than 1% in 2023.

From 1980 until 2010 the combined share of fossil fuels in electricity production gradually increased by about 7 percentage points, peaking at 81% in 2010. In 2023 fossil fuels accounted for about three quarters of the electricity produced, similar to their combined share in 1980.

Since 1980 the share of natural gas has steadily increased by more than 30 percentage points, whereas the share of coal has declined by 50%. The share of oil has decreased by about 2 percentage points, reaching about 10% in 2023.

Hydro was the largest source of low carbon electricity, accounting for about 18% of total electricity production in 2023, although its share has decreased by about 6 percentage points over the past 40 years. The share of wind and solar has increased slightly since 2000, increasing from less than 1% to about 5% in 2023.

Energy and Electricity Projections

- Final energy consumption is expected to increase by almost 60% by 2050 compared with the 2023 level, at an average annual rate of approximately 1.7%.
- Electricity consumption will grow much faster, at an average annual rate of approximately 7.2%, and is expected to increase almost sevenfold by 2050 compared with the 2023 level.
- By 2050 the share of electricity in final energy consumption is expected to increase by more than 30 percentage points from its 2023 share.

FIGURE 35. FINAL CONSUMPTION OF ENERGY AND ELECTRICITY IN THE AFRICA REGION

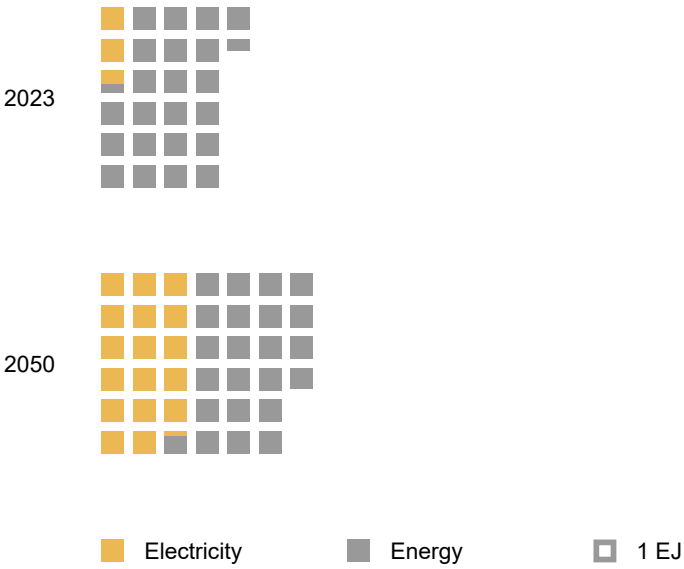


TABLE 19. FINAL CONSUMPTION OF ENERGY AND ELECTRICITY IN THE AFRICA REGION, EJ

Final Consumption	2023	2030	2040	2050
Energy	25.5	28.6	33.8	39.9
Electricity	2.6	4.3	8.4	17.2
Electricity as % of Energy	*10.2%*	*15.0%*	*24.9%*	*43.1%*

Per Capita Energy and Electricity

- Electricity consumption on a per capita basis is expected to increase almost fourfold from 0.5 MW·h per person in 2023 to almost 2.0 MW·h per person in 2050.
- In 2023 the world average electricity consumption for households with electricity access was about 3.6 MW·h, about six times that for the residential sector in Africa in 2023.

FIGURE 36. PER CAPITA ELECTRICITY CONSUMPTION IN THE AFRICA REGION

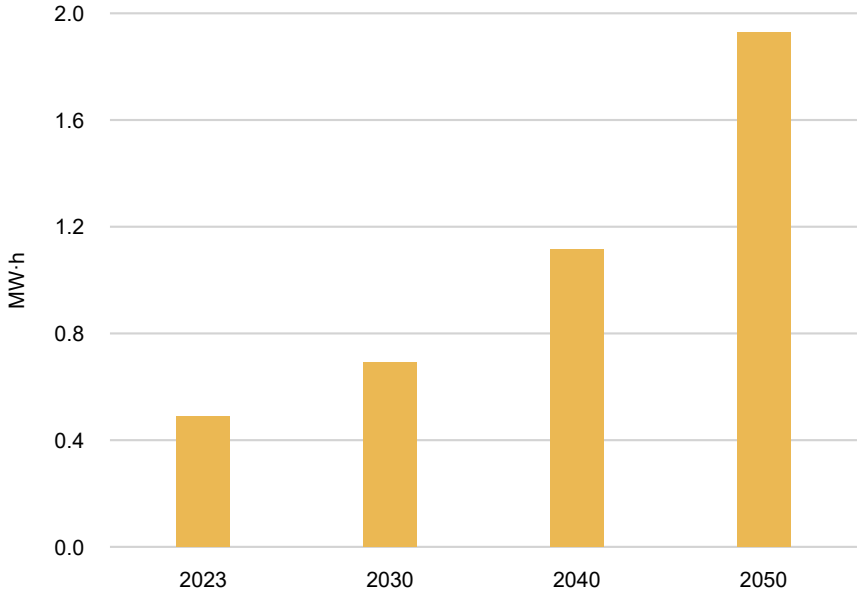
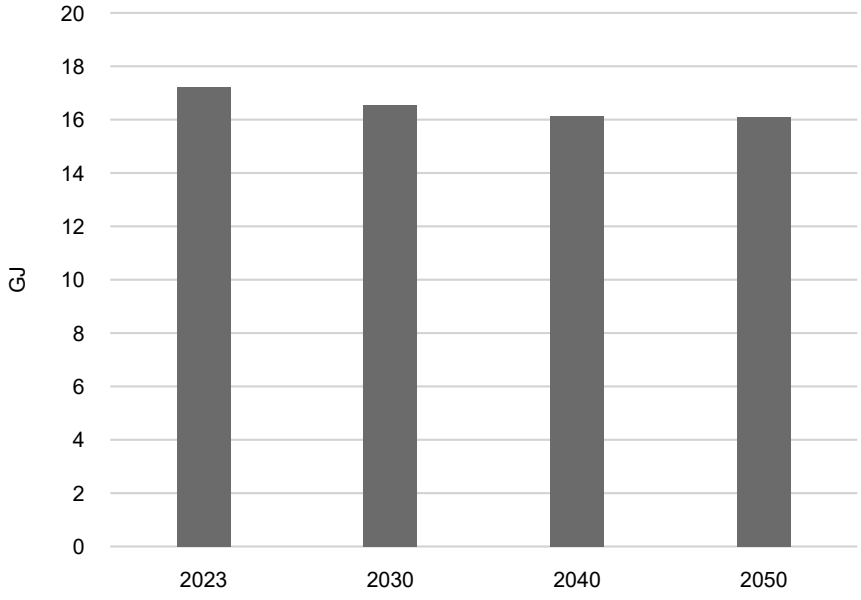


FIGURE 37. PER CAPITA FINAL ENERGY CONSUMPTION IN THE AFRICA REGION



Nuclear Electrical Generating Capacity Projections

- Total electrical generating capacity is expected to increase by 47% by 2030 and almost sevenfold by 2050.
- In the high case, nuclear electrical generating capacity is projected to more than triple by 2030 and increase more than tenfold by 2050 compared with 2023 capacity.
- In the low case, nuclear electrical generating capacity is projected to approximately double by 2030 and to increase fivefold by 2050 compared with the 2023 level.

FIGURE 38. NUCLEAR ELECTRICAL GENERATING CAPACITY IN THE AFRICA REGION

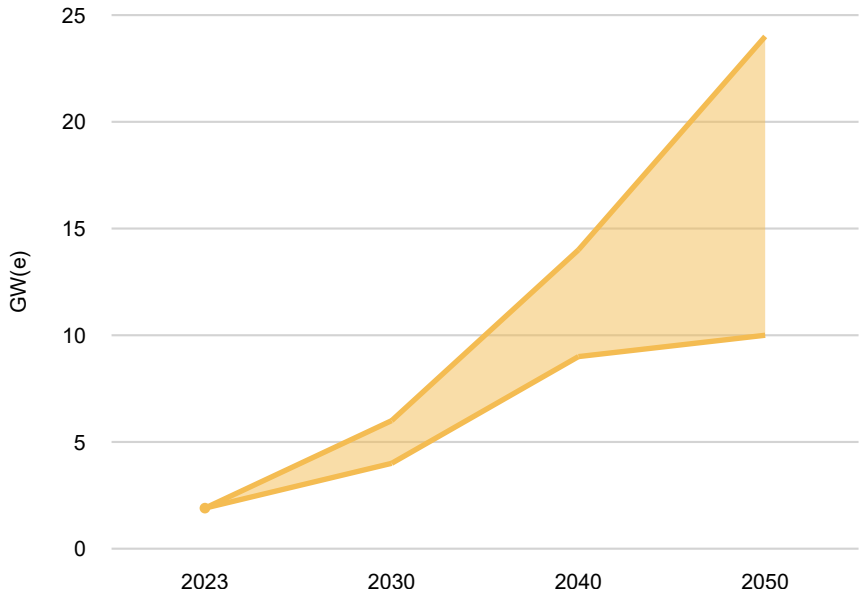


TABLE 20. TOTAL AND NUCLEAR ELECTRICAL GENERATING CAPACITY IN THE AFRICA REGION, GW(e)

Electrical Capacity	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
Total	265	386	386	811	811	1 819	1 819
Nuclear	1.9	4	6	9	14	10	24
Nuclear as % of Electrical Capacity	*0.7%*	*1.0%*	*1.6%*	*1.1%*	*1.7%*	*0.5%*	*1.3%*

Electricity and Nuclear Production Projections

- Total electricity production is projected to increase by about 65% by 2030 and almost sevenfold by 2050.
- In the high case, nuclear electricity production is expected to increase more than twentyfold by 2050. The share of nuclear in total electricity production is expected to more than triple by 2050.
- In the low case, nuclear electricity production is expected to increase almost tenfold by 2050. The share of nuclear in total electricity production is expected to reach 1.4% by 2050.

FIGURE 39. NUCLEAR ELECTRICITY PRODUCTION IN THE AFRICA REGION

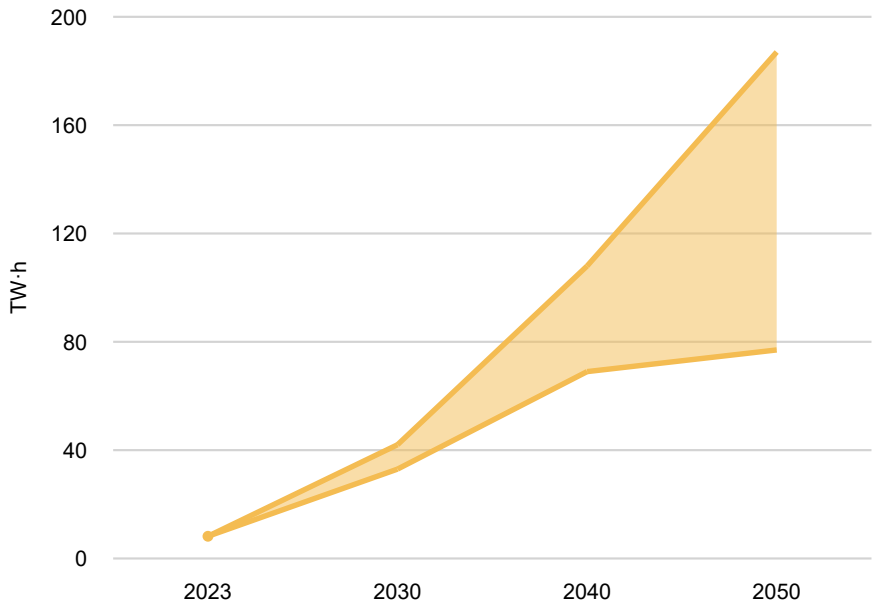


TABLE 21. TOTAL AND NUCLEAR ELECTRICITY PRODUCTION IN THE AFRICA REGION, TW·h

Electricity Production	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
Total	853	1 411	1 411	2 768	2 768	5 661	5 661
Nuclear	8	33	42	69	108	77	187
Nuclear as % of Electricity Production	*0.9%*	*2.3%*	*3.0%*	*2.5%*	*3.9%*	*1.4%*	*3.3%*

Western Asia

304

million people

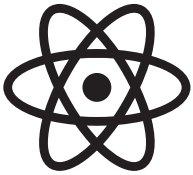
Energy Overview 2023

20.0%

of final energy consumed was electricity

1 341 TW·h

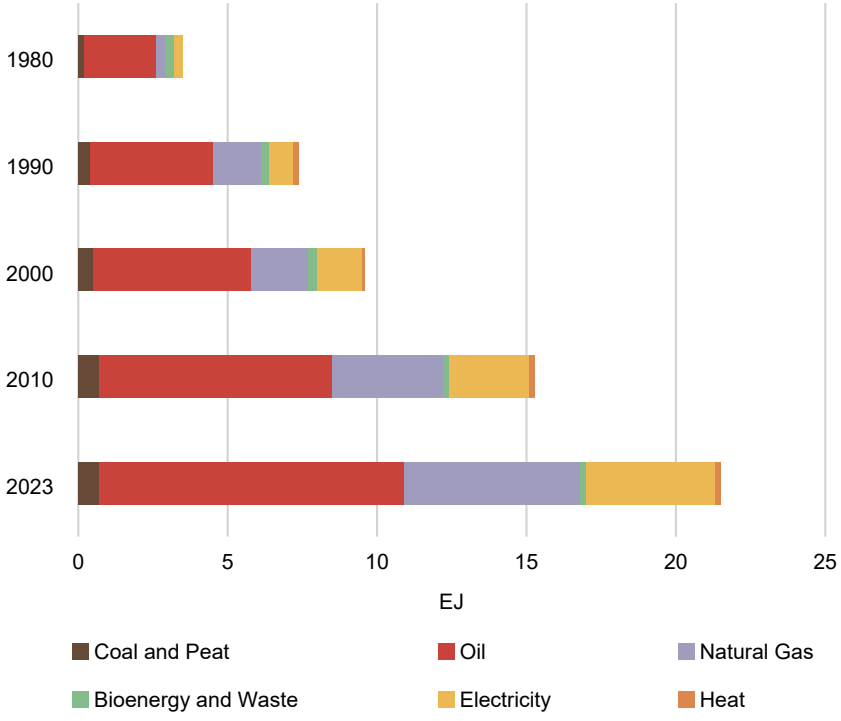
of electricity produced



2.5%

of electricity produced by nuclear

FIGURE 40. FINAL ENERGY CONSUMPTION BY ENERGY SOURCE IN THE WESTERN ASIA REGION



Final Energy Consumption

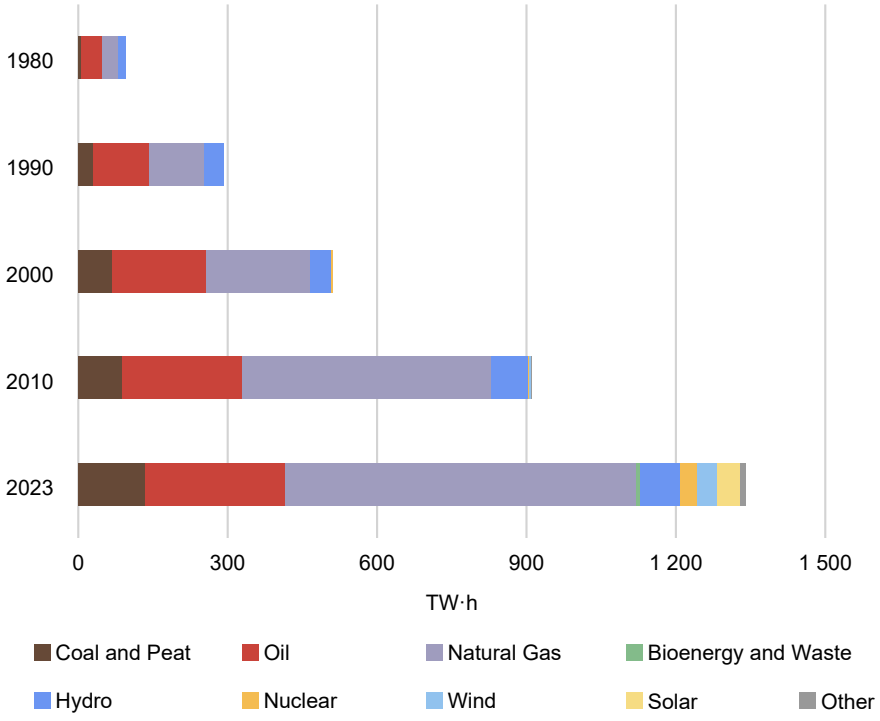
At 20% in 2023, the share of electricity in final energy consumption has more than doubled since 1980.

Fossil fuels have continued to dominate final energy consumption, with a stable share of about 80% since 1980.

At about 47%, oil accounted for the largest share of final energy of all fossil fuels in 2023, despite a reduction of 22 percentage points since 1980. The share of natural gas has tripled since 1980, accounting for about a quarter of final energy consumption in 2023. The share of coal was about 3% in 2023, remaining relatively small and decreasing by a few percentage points since 1980.

The share of bioenergy and waste in final energy consumption has declined gradually over the years, decreasing from about 9% in 1980 to about 1% in 2023.

FIGURE 41. ELECTRICITY PRODUCTION BY ENERGY SOURCE IN THE WESTERN ASIA REGION



Electricity Production

The share of nuclear in electricity production was about 2.5% in 2023.

Hydro remains the largest source of low carbon electricity and accounted for about 6% of total production in 2023, although its share has declined by more than half since 1980.

With a share of 84%, fossil fuels have remained dominant energy sources for electricity production since 1980, particularly natural gas, which had a share of more than 50% in 2023. The share of oil has fallen approximately 50% since 1980, although it remains high at about 20%. Coal's share in electricity production has almost doubled since 1980 and was about 10% in 2023.

In recent years, solar and wind have begun being used to generate electricity, and in 2023 their combined share was almost 7%.

Energy and Electricity Projections

- Final energy consumption is expected to increase about 10% over the 2023 level by 2050, at an average annual rate of approximately 0.3%.
- Electricity consumption is expected to more than double by 2050, at an average annual rate of 3.5%.
- The share of electricity in final energy consumption is expected to reach about 47% by 2050, an increase of about 27 percentage points from 2023.

FIGURE 42. FINAL CONSUMPTION OF ENERGY AND ELECTRICITY IN THE WESTERN ASIA REGION

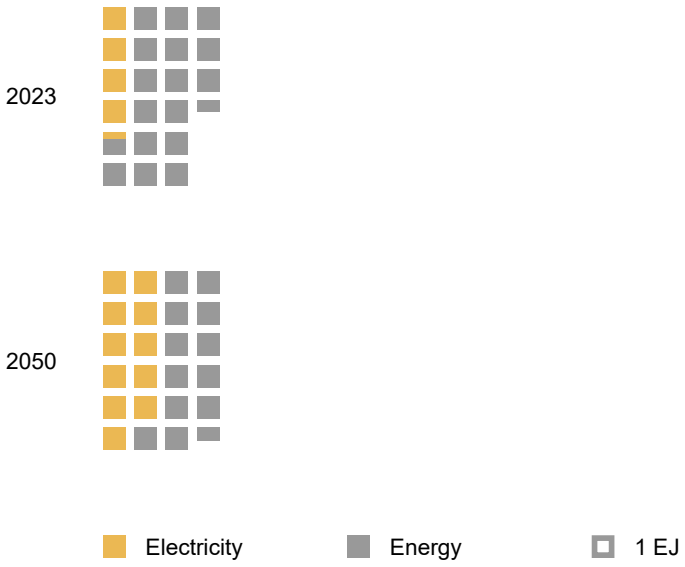


TABLE 22. FINAL CONSUMPTION OF ENERGY AND ELECTRICITY IN THE WESTERN ASIA REGION, EJ

Final Consumption	2023	2030	2040	2050
Energy	21.5	22.0	22.8	23.6
Electricity	4.3	5.5	7.8	11.0
Electricity as % of Energy	*20.0%*	*25.0%*	*34.2%*	*46.6%*

Nuclear Electrical Generating Capacity Projections

- Total electrical generating capacity is expected to increase by 27% by 2030 and to almost triple by 2050.
- In the high case, nuclear electrical generating capacity is projected to more than double by 2030 and to increase sevenfold by 2050 compared with 2023 capacity.
- In the low case, nuclear electrical generating capacity is projected to more than double by 2030 and to increase about fourfold by 2050 compared with 2023 capacity.
- The share of nuclear in total electrical generating capacity is expected to more than double by 2050 in the high case and to see an increase of 0.4 percentage points in the low case.

FIGURE 43. NUCLEAR ELECTRICAL GENERATING CAPACITY IN THE WESTERN ASIA REGION

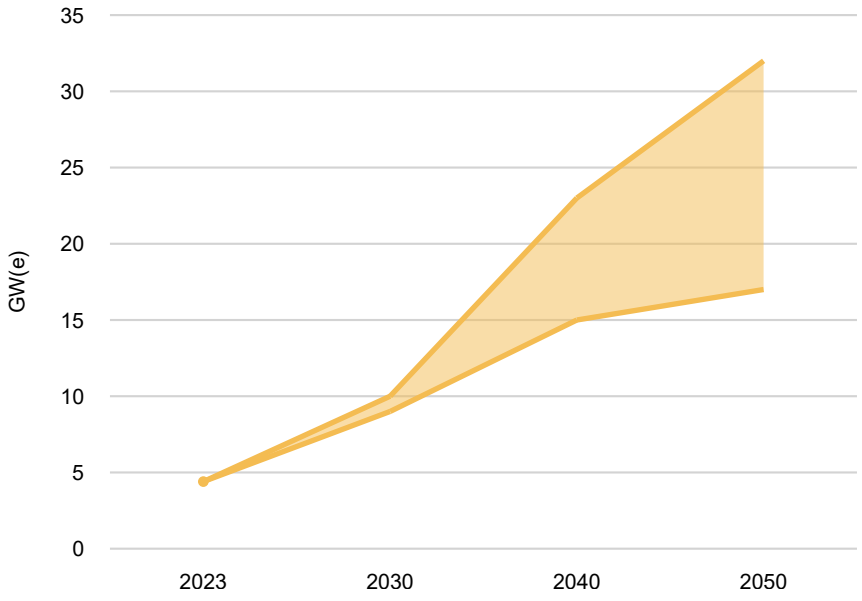


TABLE 23. TOTAL AND NUCLEAR ELECTRICAL GENERATING CAPACITY IN THE WESTERN ASIA REGION, GW(e)

Electrical Capacity	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
Total	394	500	500	763	763	1 149	1 149
Nuclear	4.4	9	10	15	23	17	32
Nuclear as % of Electrical Capacity	*1.1%*	*1.8%*	*2.0%*	*2.0%*	*3.0%*	*1.5%*	*2.8%*

Electricity and Nuclear Production Projections

- Total electricity production is projected to increase by 28% by 2030 and to almost triple by 2050.
- In the high case, nuclear electricity production is expected to increase almost eightfold by 2050. The share of nuclear in total electricity production is expected to increase by 4.6 percentage points.
- In the low case, nuclear electricity production is expected to increase almost fourfold by 2050. The share of nuclear in total electricity production is expected to increase by 1.2 percentage points.

FIGURE 44. NUCLEAR ELECTRICITY PRODUCTION IN THE WESTERN ASIA REGION

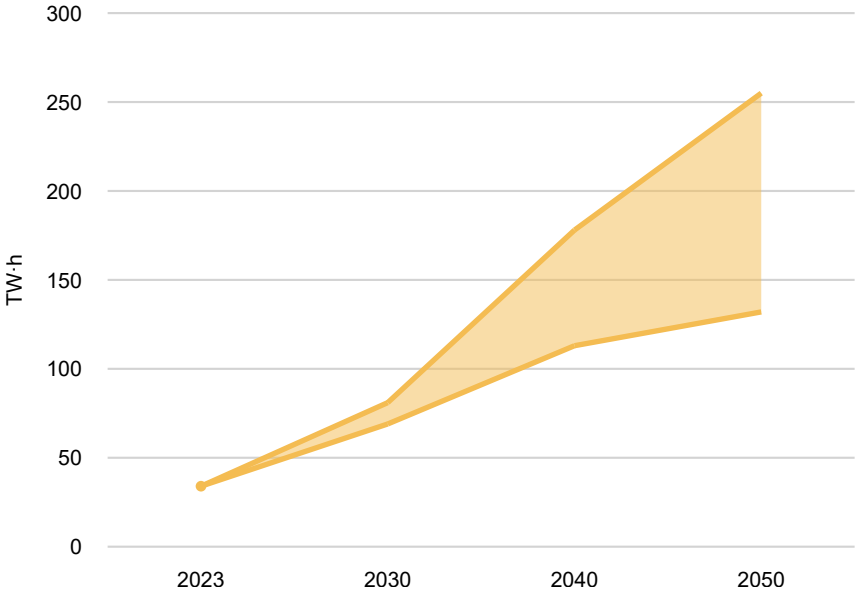


TABLE 24. TOTAL AND NUCLEAR ELECTRICITY PRODUCTION IN THE WESTERN ASIA REGION, TW·h

Electricity Production	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
Total	1 341	1 716	1 716	2 527	2 527	3 597	3 597
Nuclear	34	69	81	113	178	132	255
Nuclear as % of Electricity Production	*2.5%*	*4.0%*	*4.7%*	*4.5%*	*7.0%*	*3.7%*	*7.1%*

Southern Asia

2 043

million people

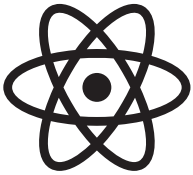
Energy Overview 2023

16.0%

of final energy consumed was electricity

2 553 TW·h

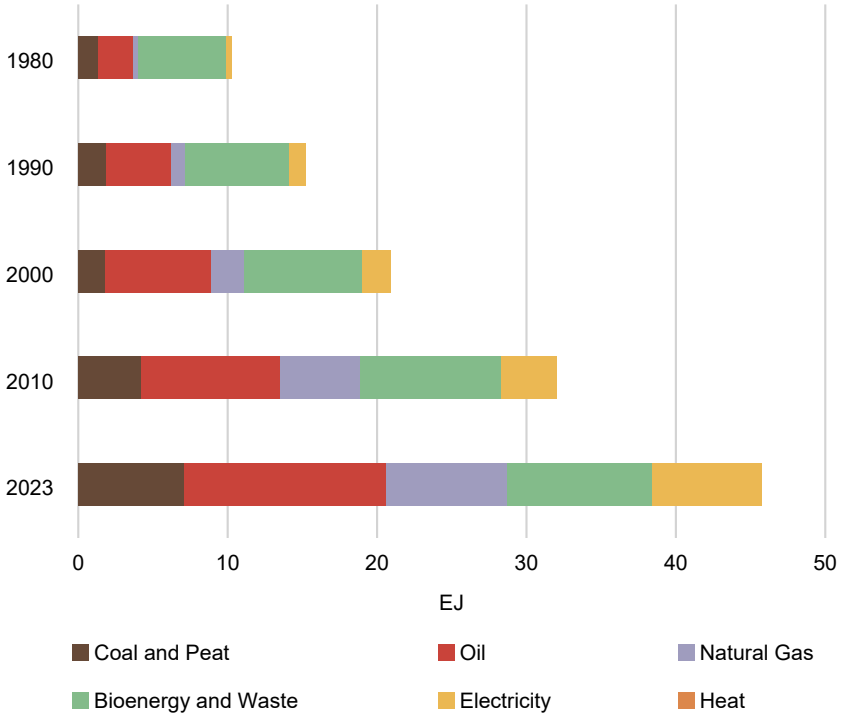
of electricity produced



2.9%

of electricity produced by nuclear

FIGURE 45. FINAL ENERGY CONSUMPTION BY ENERGY SOURCE IN THE SOUTHERN ASIA REGION



Final Energy Consumption

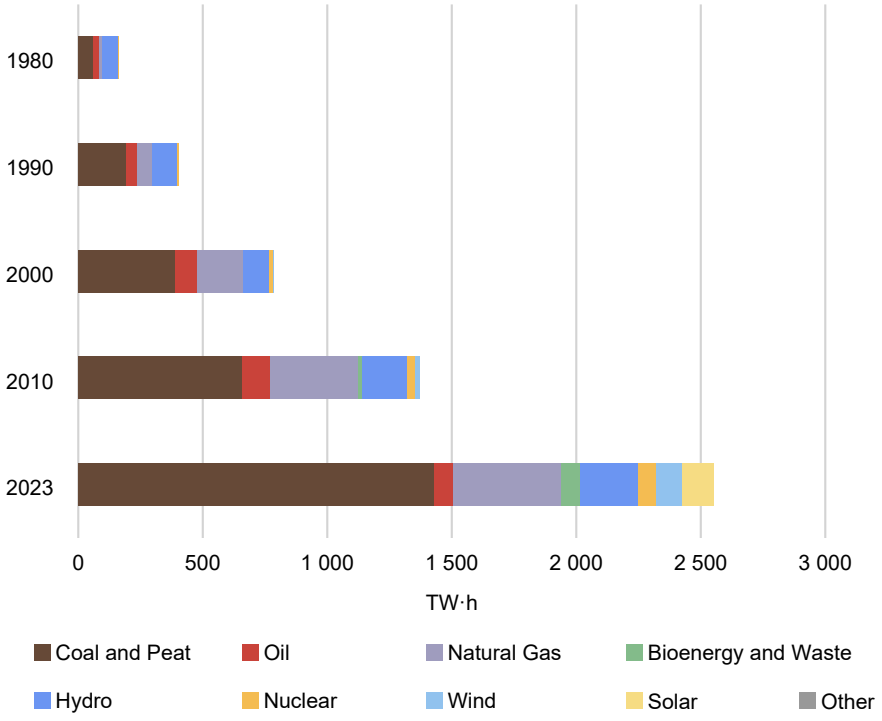
In 2023 the share of electricity in final energy consumption was 16%, quadrupling since 1980.

Since 1980 the share of fossil fuels in final energy consumption has been increasing steadily from approximately 40% in 1980 to 63% in 2023.

The share of natural gas has tripled since 1980 to reach about 18% in 2023. The share of oil has also been gradually increasing, accounting for almost one third of final energy consumption in 2023, which is an increase of about 7 percentage points since 1980. The share of coal has increased by 3 percentage points since 1980 to 16% in 2023.

The share of bioenergy and waste has declined by more than half since 1980, although it is still relatively large at about one fifth of overall final energy in 2023.

FIGURE 46. ELECTRICITY PRODUCTION BY ENERGY SOURCE IN THE SOUTHERN ASIA REGION



Electricity Production

The share of nuclear in total electricity production was about 3% in 2023.

From 1980 to 2000, fossil fuels increased their share of electricity production from about 60% to more than 80%. Their share has since declined, reaching about 76% in 2023.

Coal is the largest source of electricity with a share of 56%, an increase of about 18 percentage points since 1980. The share of natural gas has more than doubled since 1980, accounting for about 17% of the electricity produced in 2023. The share of oil has decreased about 10 percentage points since 1980 to about 3% in 2023.

Hydro remains the largest source of low carbon electricity, accounting for 9% of total electricity production, although its share has decreased by about 30 percentage points since 1980. In recent years, the share of solar and wind has increased rapidly, rising from less than 1% in 2000 to 9% in 2023.

Energy and Electricity Projections

- Final energy consumption is expected to increase by about 40% from the 2023 level by 2050, at an average annual rate of approximately 1.2%.
- Electricity consumption is expected to grow at a faster rate of about 5% per year. Electricity consumption is expected to almost quadruple by 2050.
- By 2050 the share of electricity in final energy consumption is expected to increase by about 26 percentage points from its 2023 share.

FIGURE 47. FINAL CONSUMPTION OF ENERGY AND ELECTRICITY IN THE SOUTHERN ASIA REGION

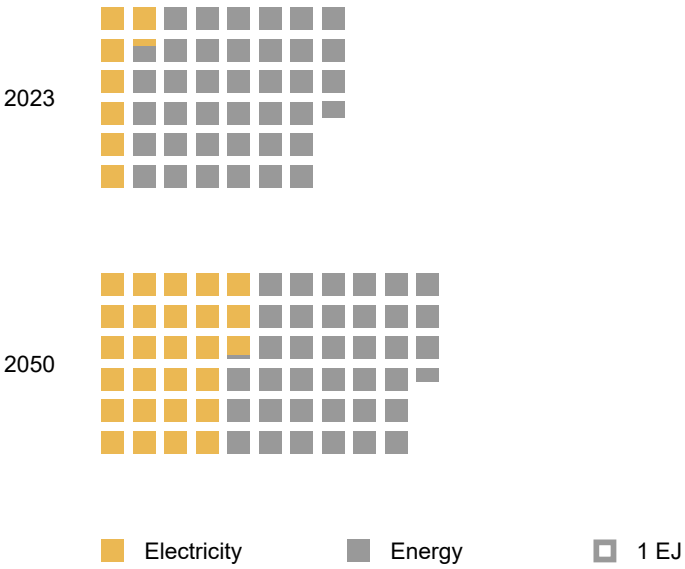


TABLE 25. FINAL CONSUMPTION OF ENERGY AND ELECTRICITY IN THE SOUTHERN ASIA REGION, EJ

Final Consumption	2023	2030	2040	2050
Energy	45.7	49.8	56.3	63.6
Electricity	7.3	10.2	16.5	26.8
Electricity as % of Energy	*16.0%*	*20.5%*	*29.3%*	*42.1%*

Nuclear Electrical Generating Capacity Projections

- Total electrical generating capacity is expected to increase by about 50% by 2030 and to increase more than fourfold by 2050.
- In the high case, nuclear electrical generating capacity is projected to more than double by 2030 and to increase almost ninefold by 2050 compared with 2023 capacity. The share of nuclear in total electrical generating capacity is expected to approximately double to more than 3% by 2050.
- In the low case, nuclear electrical generating capacity is projected to increase by about 80% by 2030 and to increase more than fourfold by 2050. The share of nuclear in total electrical generating capacity is expected to remain almost unchanged from 2023 to 2050.

FIGURE 48. NUCLEAR ELECTRICAL GENERATING CAPACITY IN THE SOUTHERN ASIA REGION

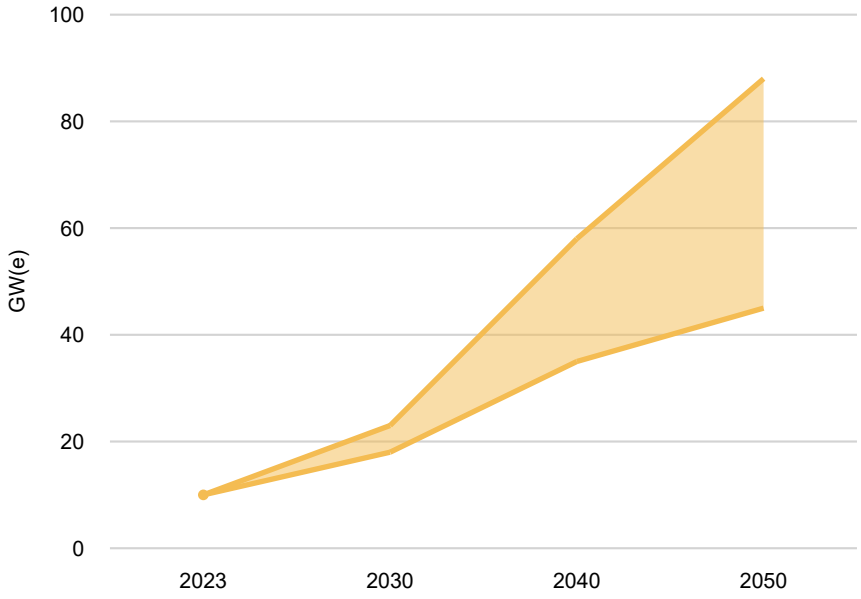


TABLE 26. TOTAL AND NUCLEAR ELECTRICAL GENERATING CAPACITY IN THE SOUTHERN ASIA REGION, GW(e)

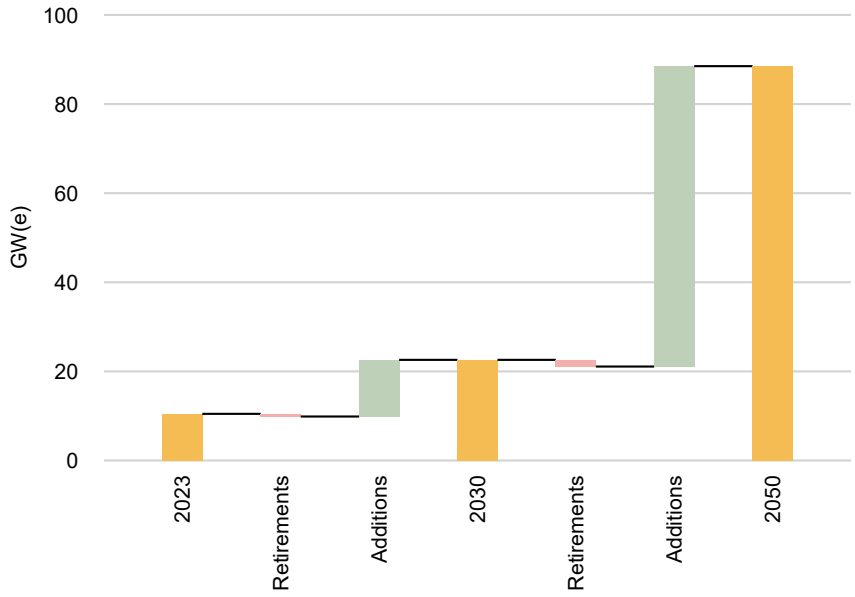
Electrical Capacity	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
Total	678	1 025	1 025	1 651	1 651	2 775	2 775
Nuclear	10	18	23	35	58	45	88
Nuclear as % of Electrical Capacity	*1.5%*	*1.8%*	*2.2%*	*2.1%*	*3.5%*	*1.6%*	*3.2%*

Reactor Retirements and Additions

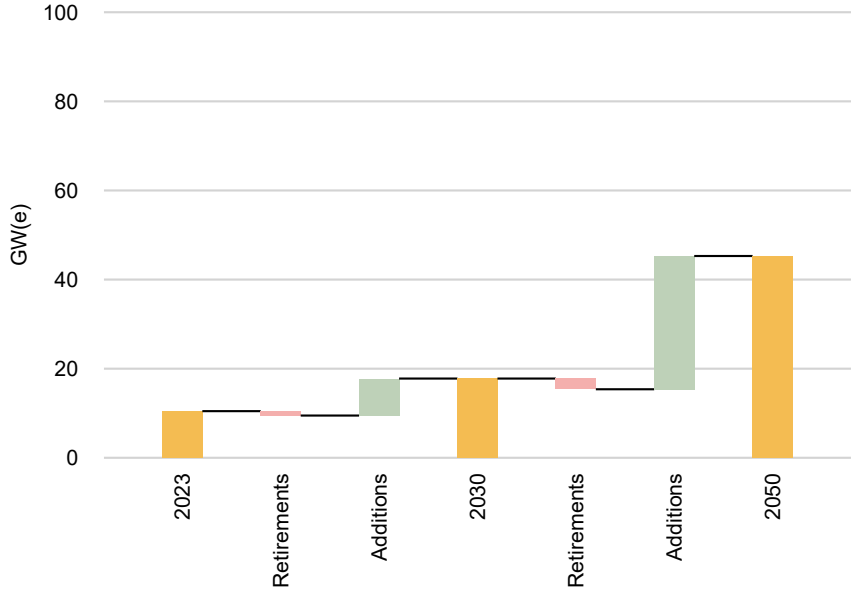
- In the high case, it is assumed that about 2 GW(e) will be retired by 2050, resulting in net capacity additions of 78 GW(e) by 2050, with most of the capacity (67 GW(e)) added from 2030 onwards. This highlights the importance of new reactor additions for this region.
- In the low case, there will be about 3 GW(e) of capacity retired by 2050. Net capacity additions will be about 35 GW(e) by 2050. About 20% of capacity additions are expected to be built before 2030.

FIGURE 49. NUCLEAR CAPACITY IN THE SOUTHERN ASIA REGION: ACTUAL, RETIREMENTS AND ADDITIONS

HIGH CASE



LOW CASE



Electricity and Nuclear Production Projections

- Total electrical production is projected to increase by about 40% by 2030 and 3.5 times by 2050 compared with 2023 production.
- In the high case, nuclear electricity production is expected to increase almost tenfold by 2050. The share of nuclear in total electricity production is expected to increase by 5 percentage points.
- In the low case, nuclear electricity production is expected to increase about fivefold by 2050. The share of nuclear in total electricity production is expected to increase by about one percentage point.

FIGURE 50. NUCLEAR ELECTRICITY PRODUCTION IN THE SOUTHERN ASIA REGION

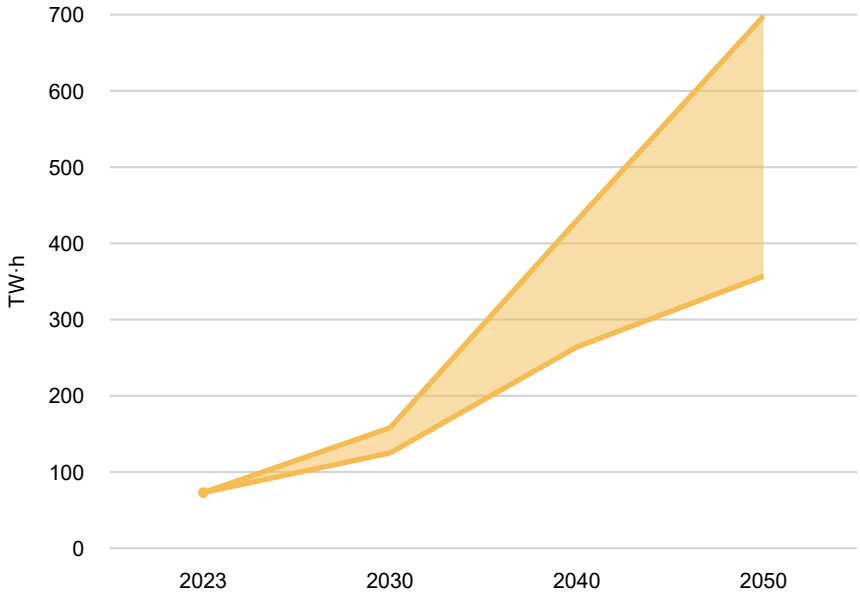


TABLE 27. TOTAL AND NUCLEAR ELECTRICITY PRODUCTION IN THE SOUTHERN ASIA REGION, TW·h

Electricity Production	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
Total	2 553	3 568	3 568	5 518	5 518	8 827	8 827
Nuclear	73	125	158	264	430	357	698
Nuclear as % of Electricity Production	*2.9%*	*3.5%*	*4.4%*	*4.8%*	*7.8%*	*4.0%*	*7.9%*

Central and Eastern Asia

1 741

million people

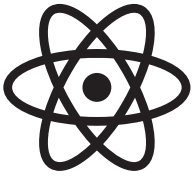
Energy Overview 2023

27.2%

of final energy consumed was electricity

11 134TW·h

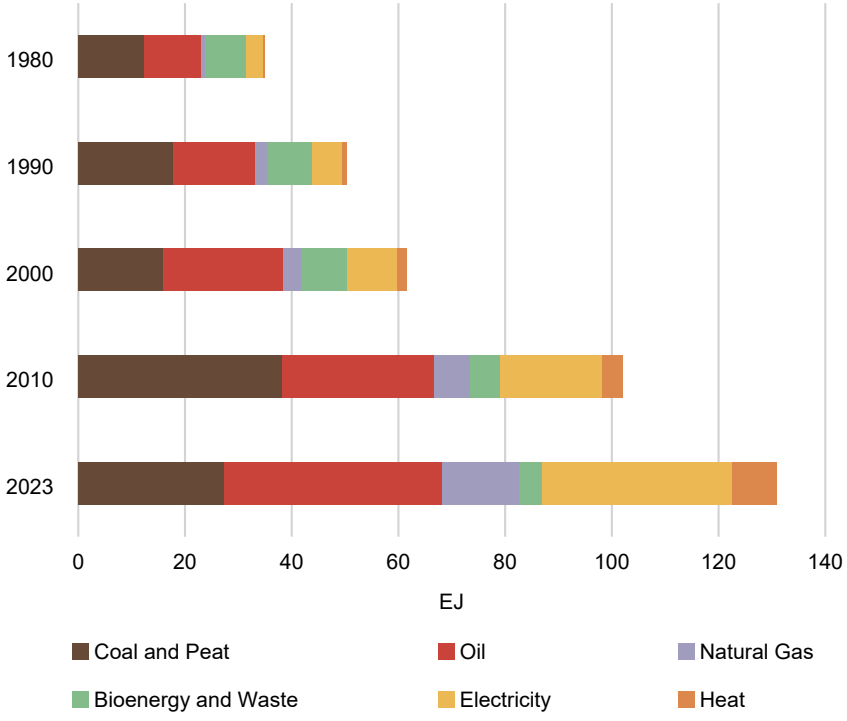
of electricity produced



6.0%

of electricity produced by nuclear

FIGURE 51. FINAL ENERGY CONSUMPTION BY ENERGY SOURCE IN THE COMBINED REGIONS OF CENTRAL AND EASTERN ASIA



Final Energy Consumption

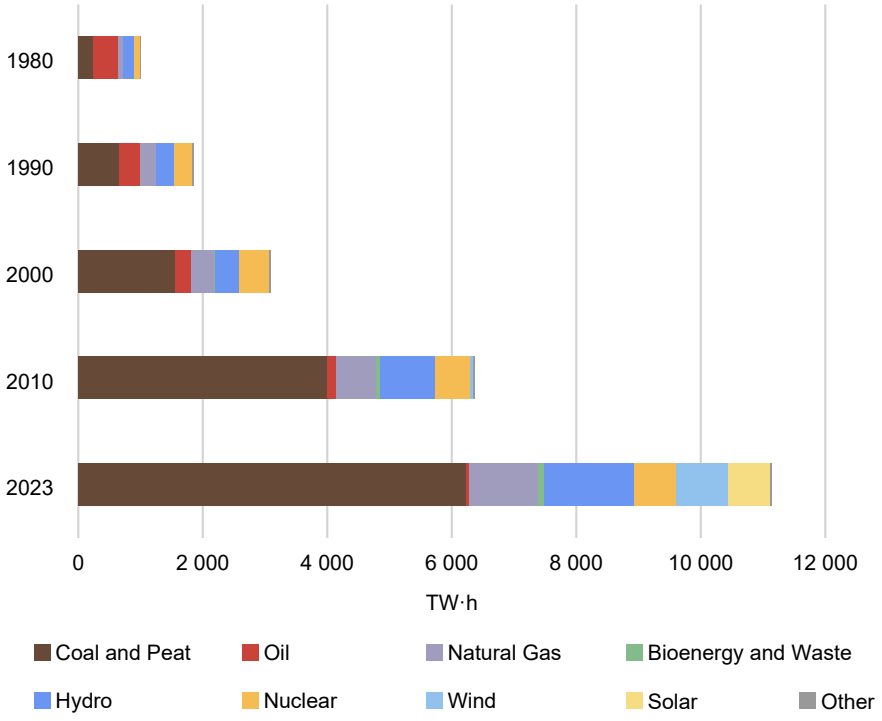
The share of electricity has tripled since 1980, accounting for more than a quarter of final energy consumption in 2023.

Since 1980 fossil fuels have dominated final energy consumption with a combined share that has remained around 65–70%. In 2023 this combined share decreased slightly to 63%. Over the past 40 years, the share of natural gas has increased by 9 percentage points, whereas the share of coal has declined by 15 percentage points to a share of about 20% in 2023. The share of oil stayed relatively constant at about 30%.

The share of bioenergy and waste in final energy consumption has decreased by about 19 percentage points since 1980, from about 20% of final energy consumption in 1980 to 3% in 2023.

The share of heat has increased from less than 1% in 1980 to about 6% in 2023.

FIGURE 52. ELECTRICITY PRODUCTION BY ENERGY SOURCE IN THE COMBINED REGIONS OF CENTRAL AND EASTERN ASIA



Electricity Production

The share of nuclear increased between 1980 and 2000 but has since declined, accounting for about 6% in 2023.

With a share of about 66% in 2023, fossil fuels — particularly coal — have remained dominant energy sources for electricity production since 1980. The share of fossil fuels in 2023 was about 8 percentage points lower than in 1980.

The share of coal was more than 50% in 2023. It has increased 32 percentage points since 1980. The share of natural gas increased from 1980 to 1990 and then declined to about 10%. Of all fossil fuels, the share of oil has experienced the most significant change, decreasing from about 42% in 1980 to below 1% in 2023.

Hydro was the largest source of low carbon electricity, accounting for 13% of total electricity production in 2023. Its share has remained relatively stable over the past 40 years. In recent years, the share of solar and wind has increased rapidly, rising from less than 1% in 2010 to almost 14% in 2023.

Energy and Electricity Projections

- Final energy consumption is expected to decline by approximately 20% by 2050 compared with the 2023 level.
- Electricity consumption is expected to grow at a rate of about 1.1% per year. Electricity consumption is expected to increase by about 35% from the 2023 level by 2050.
- By 2050 the share of electricity in final energy consumption is expected to increase by about 20 percentage points from its 2023 share.

FIGURE 53. FINAL CONSUMPTION OF ENERGY AND ELECTRICITY IN THE COMBINED REGIONS OF CENTRAL AND EASTERN ASIA

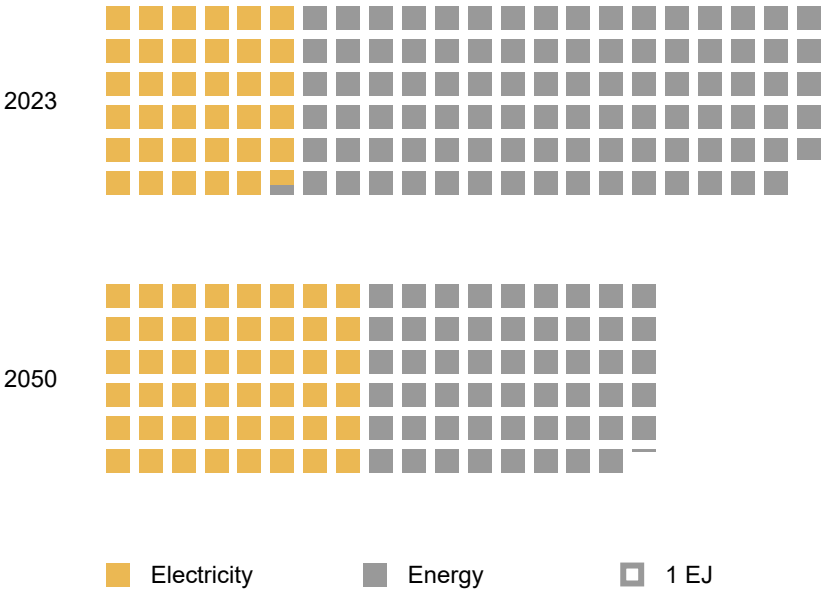


TABLE 28. FINAL CONSUMPTION OF ENERGY AND ELECTRICITY IN THE COMBINED REGIONS OF CENTRAL AND EASTERN ASIA, EJ

Final Consumption	2023	2030	2040	2050
Energy	130.9	122.4	111.3	101.1
Electricity	35.6	36.4	41.6	48.0
Electricity as % of Energy	*27.2%*	*29.7%*	*37.4%*	*47.5%*

Nuclear Electrical Generating Capacity Projections

- Total electrical generating capacity is expected to increase by 50% by 2050.
- In the high case, nuclear electrical generating capacity is projected to more than double by 2040 and to more than triple by 2050 compared with 2023 capacity. The share of nuclear in total electrical generating capacity is expected to increase by about 3 percentage points by 2050.
- In the low case, nuclear electrical generating capacity is projected to more than double by 2050 compared with 2023 capacity. The share of nuclear in total electrical generating capacity is expected to increase by 1.3 percentage points by 2050.

FIGURE 54. NUCLEAR ELECTRICAL GENERATING CAPACITY IN THE COMBINED REGIONS OF CENTRAL AND EASTERN ASIA

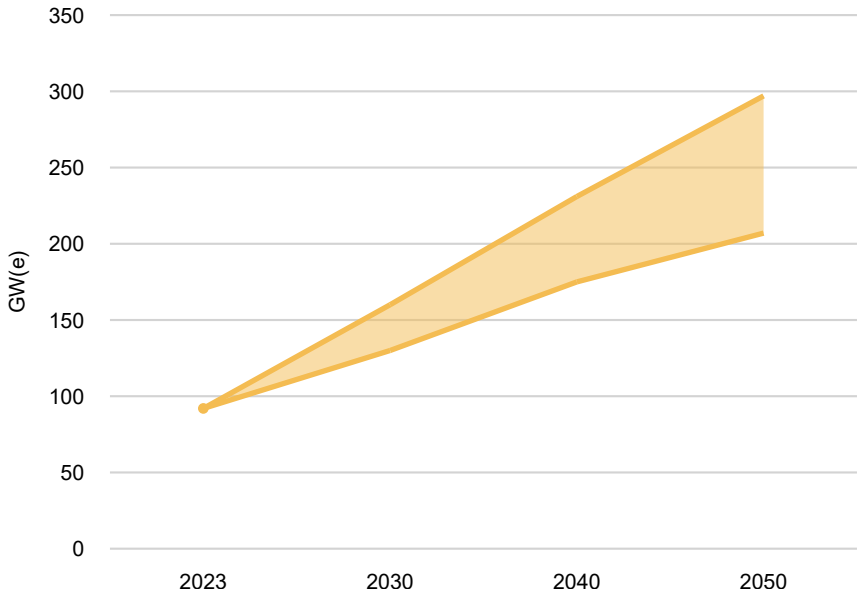


TABLE 29. TOTAL AND NUCLEAR ELECTRICAL GENERATING CAPACITY IN THE COMBINED REGIONS OF CENTRAL AND EASTERN ASIA, GW(e)

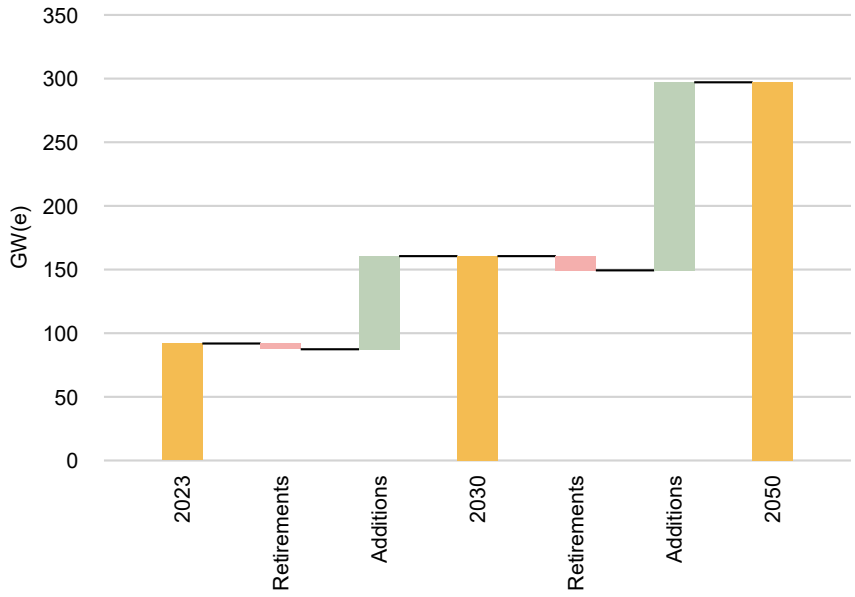
Electrical Capacity	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
Total	3 579	3 666	3 666	4 311	4 311	5 372	5 372
Nuclear	92	130	160	175	231	207	297
Nuclear as % of Electrical Capacity	*2.6%*	*3.5%*	*4.4%*	*4.1%*	*5.4%*	*3.9%*	*5.5%*

Reactor Retirements and Additions

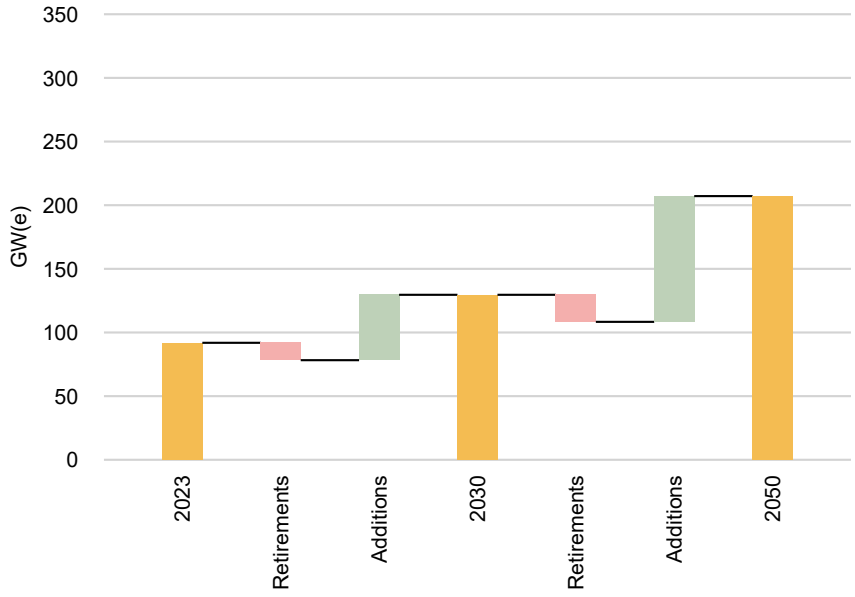
- In the high case, it is assumed that new capacity equivalent to about 50% of the 2023 capacity will be added by 2030 and that a further almost 150 GW(e) will be added over the subsequent 20 years. Only about 10% of the 2023 capacity is expected to be retired by 2050. This will result in net capacity additions of about 185 GW(e) by 2050. This highlights the importance of new capacity additions for attaining the high case in this region.
- In the low case, it is assumed that there will be a greater number of retirements — amounting to about 35 GW(e) by 2050 — most of which are expected by 2040. This will still result in net capacity additions of almost 100 GW(e) by 2050, with most of the new additions expected by 2040.

FIGURE 55. NUCLEAR CAPACITY IN THE COMBINED REGIONS OF CENTRAL AND EASTERN ASIA: ACTUAL, RETIREMENTS AND ADDITIONS

HIGH CASE



LOW CASE



Electricity and Nuclear Production Projections

- Total electricity production is projected to increase by about 30% by 2050.
- In the high case, nuclear electricity production is expected to increase almost fourfold by 2050. The share of nuclear in total electricity production is expected to increase by about 10 percentage points.
- In the low case, nuclear electricity production is expected to increase to 2.5 times the 2023 level by 2050. The share of nuclear in total electricity production is expected increase by about 5 percentage points.

FIGURE 56. NUCLEAR ELECTRICITY PRODUCTION IN THE COMBINED REGIONS OF CENTRAL AND EASTERN ASIA

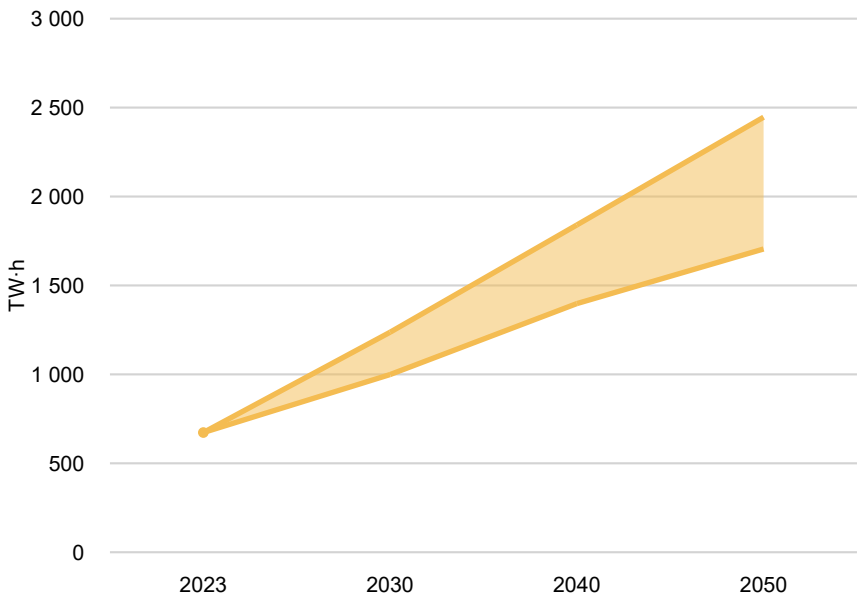


TABLE 30. TOTAL AND NUCLEAR ELECTRICITY PRODUCTION IN THE COMBINED REGIONS OF CENTRAL AND EASTERN ASIA, TW·h

Electricity Production	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
Total	11 134	11 384	11 384	12 712	12 712	14 693	14 693
Nuclear	673	999	1 237	1 398	1 840	1 705	2 446
Nuclear as % of Electricity Production	*6.0%*	*8.8%*	*10.9%*	*11.0%*	*14.5%*	*11.6%*	*16.6%*

South-eastern Asia

690

million people

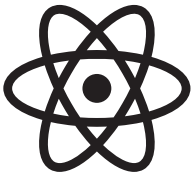
Energy Overview 2023

19.4%

of final energy consumed was electricity

1 199 TW·h

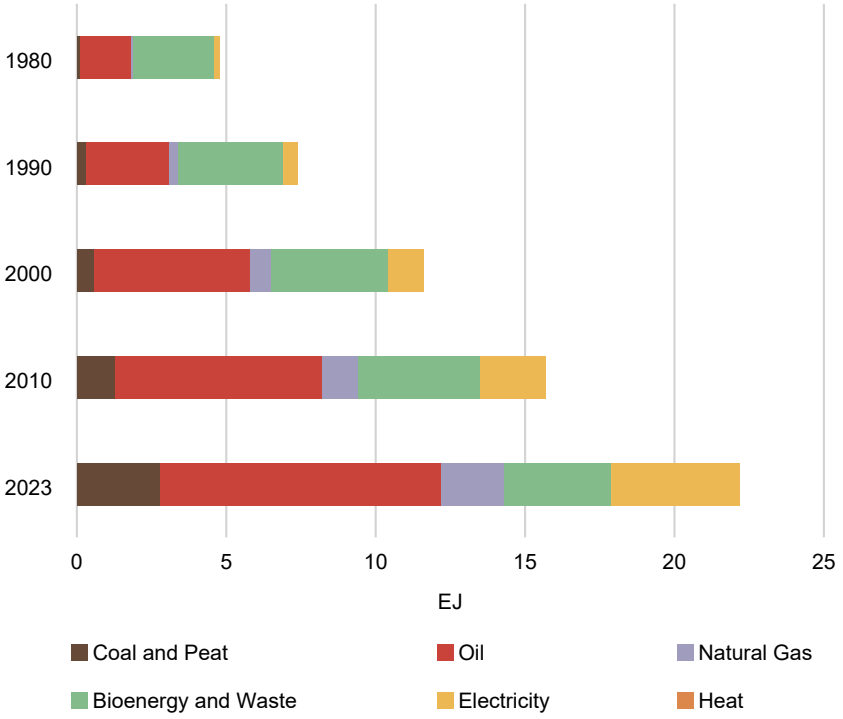
of electricity produced



0%

of electricity produced by nuclear

FIGURE 57. FINAL ENERGY CONSUMPTION BY ENERGY SOURCE IN THE SOUTH-EASTERN ASIA REGION



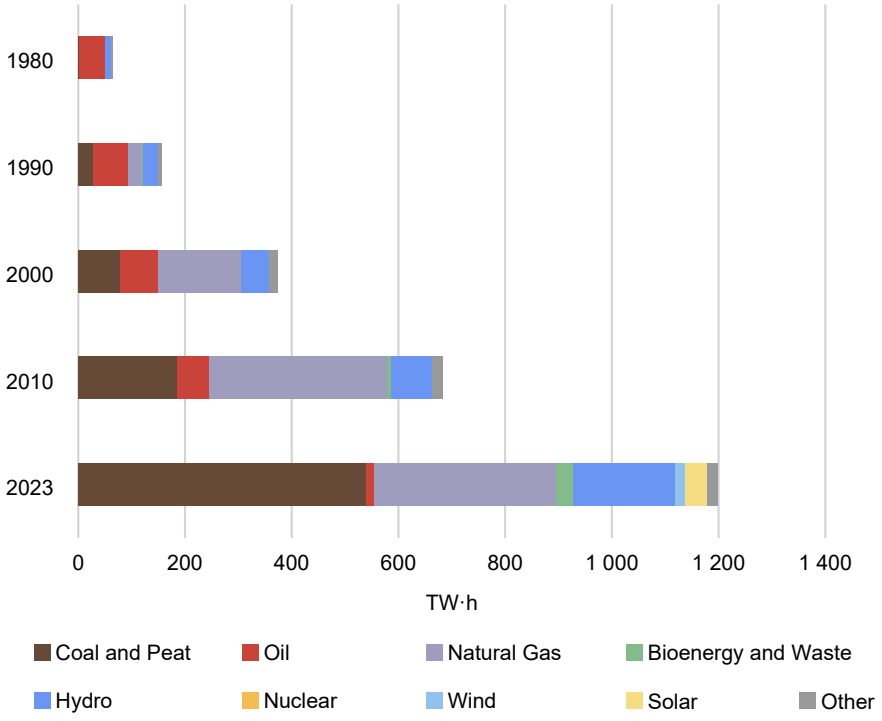
Final Energy Consumption

At almost 20% in 2023, electricity's share in final energy consumption has increased fivefold since 1980.

From 1980 to 1990, bioenergy and waste accounted for the largest share of final energy consumption. Their share has declined by 40 percentage points since 1980, accounting for 16% of the total in 2023.

Fossil fuels have dominated final energy consumption since 2000, with oil having the largest share at about 42% in 2023. The share of coal has gradually increased over the past 40 years, reaching 13% in 2023, an increase of 11 percentage points since 1980. The share of natural gas has more than quadrupled since 1980, reaching about 9% in 2023.

FIGURE 58. ELECTRICITY PRODUCTION BY ENERGY SOURCE IN THE SOUTH-EASTERN ASIA REGION



Electricity Production

Nuclear does not currently contribute to electricity production in this region.

With a share of about 80% over the past 40 years, fossil fuels have remained principal energy sources for electricity production. By 2023 the share of fossils had declined slightly to 75%.

Since 1980 the share of coal has increased 40 percentage points to reach 45% in 2023, whereas oil's share has declined by some 70 percentage points to about 1% in 2023. The share of natural gas has increased about 30 percentage points since 1980.

Hydro remains the largest source of low carbon electricity, accounting for 16% of total electricity production in 2023. The share of 'other' sources (mainly geothermal) increased by about 1 percentage point between 1980 and 2000, peaking at about 4%. It has since fallen to about 2% in 2023. Solar and wind have recently begun contributing to electricity generation, accounting for 5% in 2023.

Energy and Electricity Projections

- Final energy consumption is expected to increase by about 23% by 2050, at an average annual rate of approximately 0.8%.
- Electricity consumption is expected to grow at a faster rate of 4% per year, almost tripling by 2050.
- By 2050 the share of electricity in final energy consumption is expected to increase by about 27 percentage points from its 2023 share.

FIGURE 59. FINAL CONSUMPTION OF ENERGY AND ELECTRICITY IN THE SOUTH-EASTERN ASIA REGION

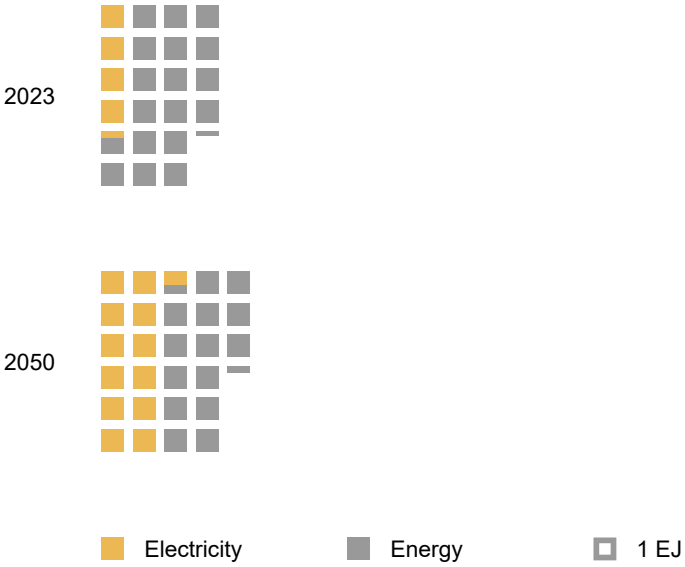


TABLE 31. FINAL CONSUMPTION OF ENERGY AND ELECTRICITY IN THE SOUTH-EASTERN ASIA REGION, EJ

Final Consumption	2023	2030	2040	2050
Energy	22.2	23.4	25.3	27.3
Electricity	4.3	5.6	8.4	12.6
Electricity as % of Energy	*19.4%*	*23.9%*	*33.2%*	*46.2%*

Nuclear Electrical Generating Capacity Projections

- Total electrical generating capacity is expected to increase by 36% by 2030 and to almost quadruple by 2050.
- Total electricity production is projected to increase by 30% by 2030 compared with 2023 production levels and to more than triple by 2050.
- In the high case, nuclear reactors are projected to be operational by 2040 and by 2050 nuclear electrical generating capacity is expected to be about 11 GW(e). The share of nuclear in total electricity production is expected to reach 2.2%.
- In the low case, nuclear reactors are also projected to be operational by 2040 and by 2050 nuclear electrical generating capacity is expected to be about 3 GW(e). The share of nuclear in total electricity production is expected to reach 0.6%.

TABLE 32. TOTAL AND NUCLEAR ELECTRICAL GENERATING CAPACITY IN THE SOUTH-EASTERN ASIA REGION, GW(e)

Electrical Capacity	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
Total	325	442	442	787	787	1 235	1 235
Nuclear	0.0	0	0	1	1	3	11
Nuclear as % of Electrical Capacity	*0.0%*	*0.0%*	*0.0%*	*0.1%*	*0.1%*	*0.2%*	*0.9%*

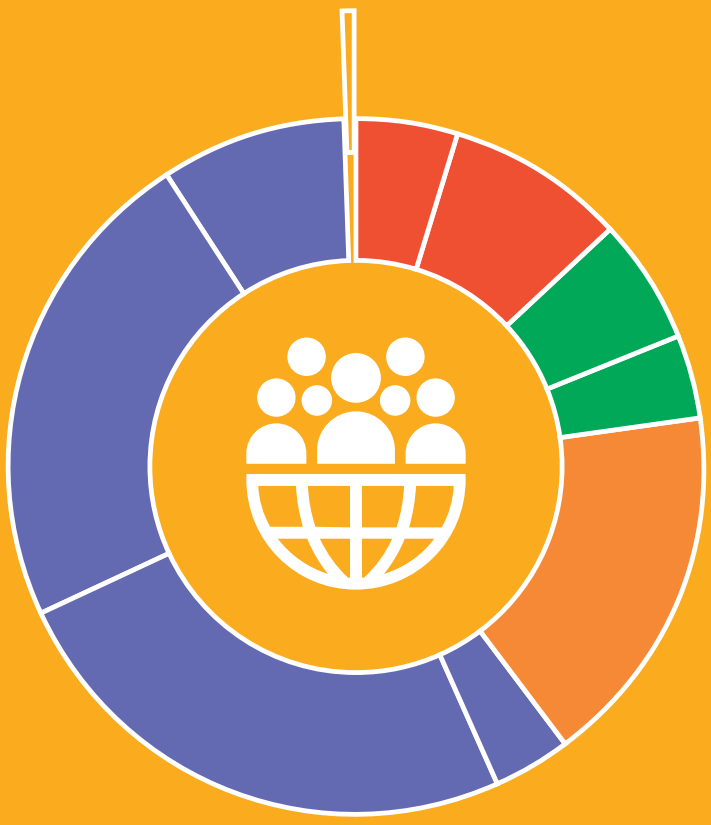
TABLE 33. TOTAL AND NUCLEAR ELECTRICITY PRODUCTION IN THE SOUTH-EASTERN ASIA REGION, TW·h

Electricity Production	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
Total	1 199	1 561	1 561	2 632	2 632	3 872	3 872
Nuclear	0	0	0	8	8	24	87
Nuclear as % of Electricity Production	*0.0%*	*0.0%*	*0.0%*	*0.3%*	*0.3%*	*0.6%*	*2.2%*

Oceania

46

million people



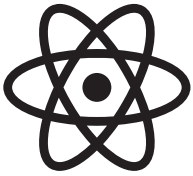
Energy Overview 2023

20.9%

of final energy consumed was electricity

309 TW·h

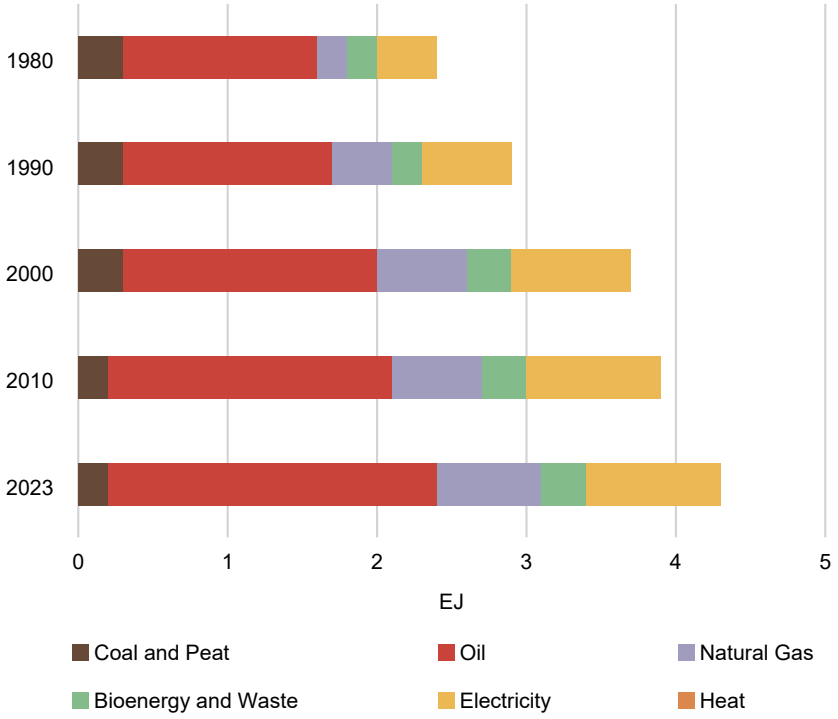
of electricity produced



0%

of electricity produced by nuclear

FIGURE 60. FINAL ENERGY CONSUMPTION BY ENERGY SOURCE IN THE OCEANIA REGION



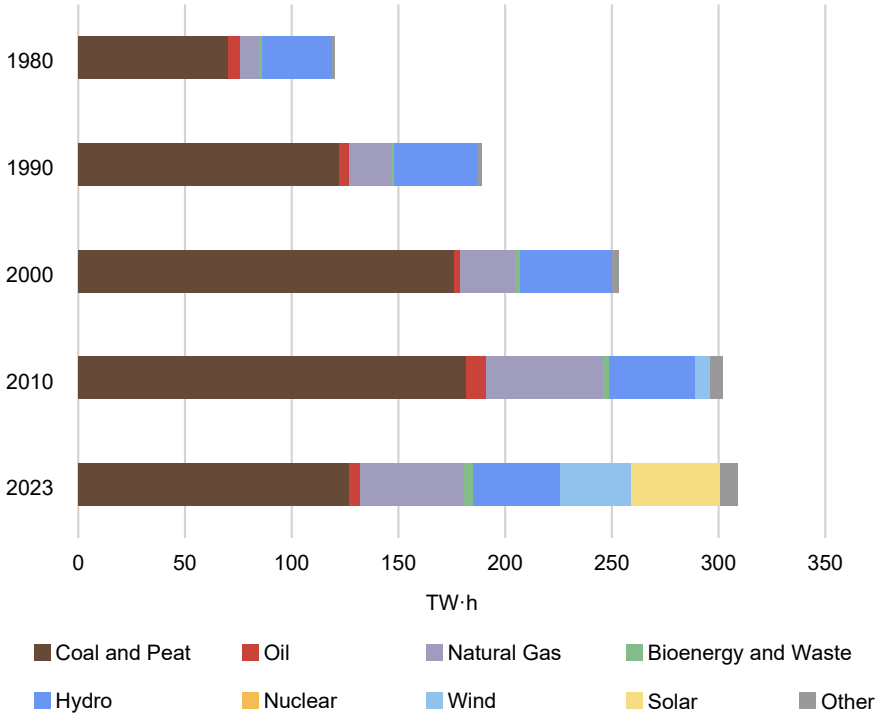
Final Energy Consumption

The share of electricity was about one fifth of final energy consumption in 2023, an increase of 4 percentage points since 1980.

Since 1980 fossil fuels have continued to dominate final energy consumption, although there was a gradual reduction in their combined share from 76% in 1980 to 69% in 2022. In 2023, the combined share increased slightly to 72%.

Oil has the largest share of all the fossil fuels, having remained at about 50% since 1990. The share of natural gas has remained at about 15% since 1990, whereas coal's share has declined by almost 5 percentage points during the same period.

FIGURE 61. ELECTRICITY PRODUCTION BY ENERGY SOURCE IN THE OCEANIA REGION



Electricity Production

Nuclear does not currently contribute to electricity production in this region.

With a share of about 60%, fossil fuels — particularly coal — have remained dominant energy sources for electricity production over the past 40 years. From 1980 to 2010 their share increased some 10 percentage points to more than 80% and then declined by 22 percentage points by 2023.

The share of coal increased from almost 60% in 1980 to about 70% by 2000, and then fell, reaching about 40% in 2023. The share of natural gas has doubled since 1980, whereas oil's share has fallen from 5% to less than 2%.

The share of hydro has declined by more than half since 1980 to about 13% in 2023. The combined share of solar and wind has increased rapidly from 0.1% in 2000 to about 24% in 2023.

Energy and Electricity Projections

- Final energy consumption is expected to increase 7% by 2050, at an average annual rate of approximately 0.3%.
- Electricity consumption is expected to grow at a faster rate of about 3.4% per year, more than doubling by 2050.
- By 2050 the share of electricity in final energy consumption is expected to increase by about 27 percentage points from its 2023 share.

FIGURE 62. FINAL CONSUMPTION OF ENERGY AND ELECTRICITY IN THE OCEANIA REGION

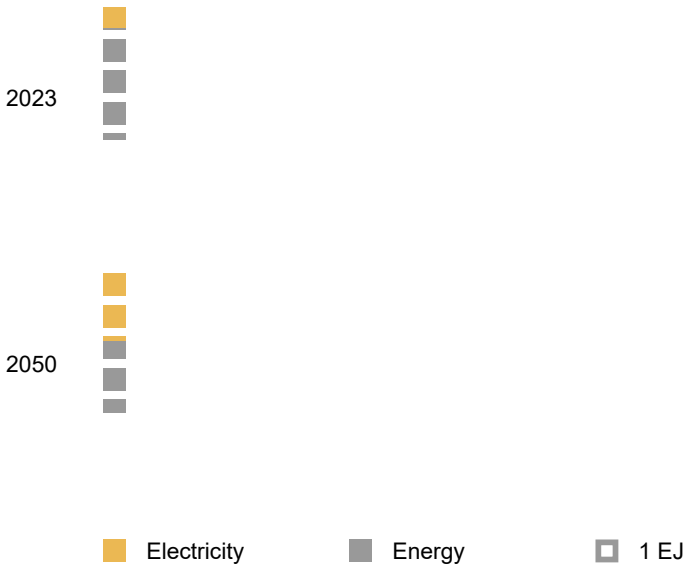


TABLE 34. FINAL CONSUMPTION OF ENERGY AND ELECTRICITY IN THE OCEANIA REGION, EJ

Final Consumption	2023	2030	2040	2050
Energy	4.3	4.4	4.5	4.6
Electricity	0.9	1.1	1.5	2.2
Electricity as % of Energy	*20.9%*	*25.0%*	*33.3%*	*47.8%*

Nuclear Electrical Generating Capacity Projections

- Total electrical generating capacity is expected to more than double by 2050 compared with the 2023 level.
- Total electricity production is projected to increase by 22% by 2030 and to more than double by 2050 compared with 2023 production levels.
- In the high case, nuclear power is projected to produce electricity by the middle of the century. The share of nuclear in total electrical generating capacity is expected to reach about 2.4%.
- In the low case, nuclear power is not projected to be introduced into the electricity generation system.

TABLE 35. TOTAL AND NUCLEAR ELECTRICAL GENERATING CAPACITY IN THE OCEANIA REGION, GW(e)

Electrical Capacity	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
Total	118	129	129	164	164	259	259
Nuclear	0.0	0	0	0	0	0	2
Nuclear as % of Electrical Capacity	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.8%*

TABLE 36. TOTAL AND NUCLEAR ELECTRICITY PRODUCTION IN THE OCEANIA REGION, TW·h

Electricity Production	2023	2030		2040		2050	
		Low	High	Low	High	Low	High
Total	309	378	378	447	447	669	669
Nuclear	0	0	0	0	0	0	16
Nuclear as % of Electricity Production	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*0.0%*	*2.4%*

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The 44th edition of Reference Data Series No. 1 (RDS-1) contains estimates of energy, electricity and nuclear power trends up to the year 2050. The publication is organized into world and regional subsections with low and high case projections for nuclear capacity and starts with a summary of the status of nuclear power in IAEA Member States as of the end of 2023 based on the latest statistical data collected by the IAEA's Power Reactor Information System (PRIS). Relative to a global nuclear operational capacity of 372 GW(e) at the end of 2023, the low case projects an increase of about 40% to 514 GW(e) by 2050. In the high case, world nuclear capacity is projected to increase to 2.5 times the current capacity, reaching 950 GW(e) by 2050. Enabling factors would be necessary to reach the high case, including supportive national policies and strategies, more favourable financing frameworks, investment in grids and work force development. The intended audience includes policy makers, energy analysts and industry.

International Atomic Energy Agency
Vienna, 2024
www.iaea.org