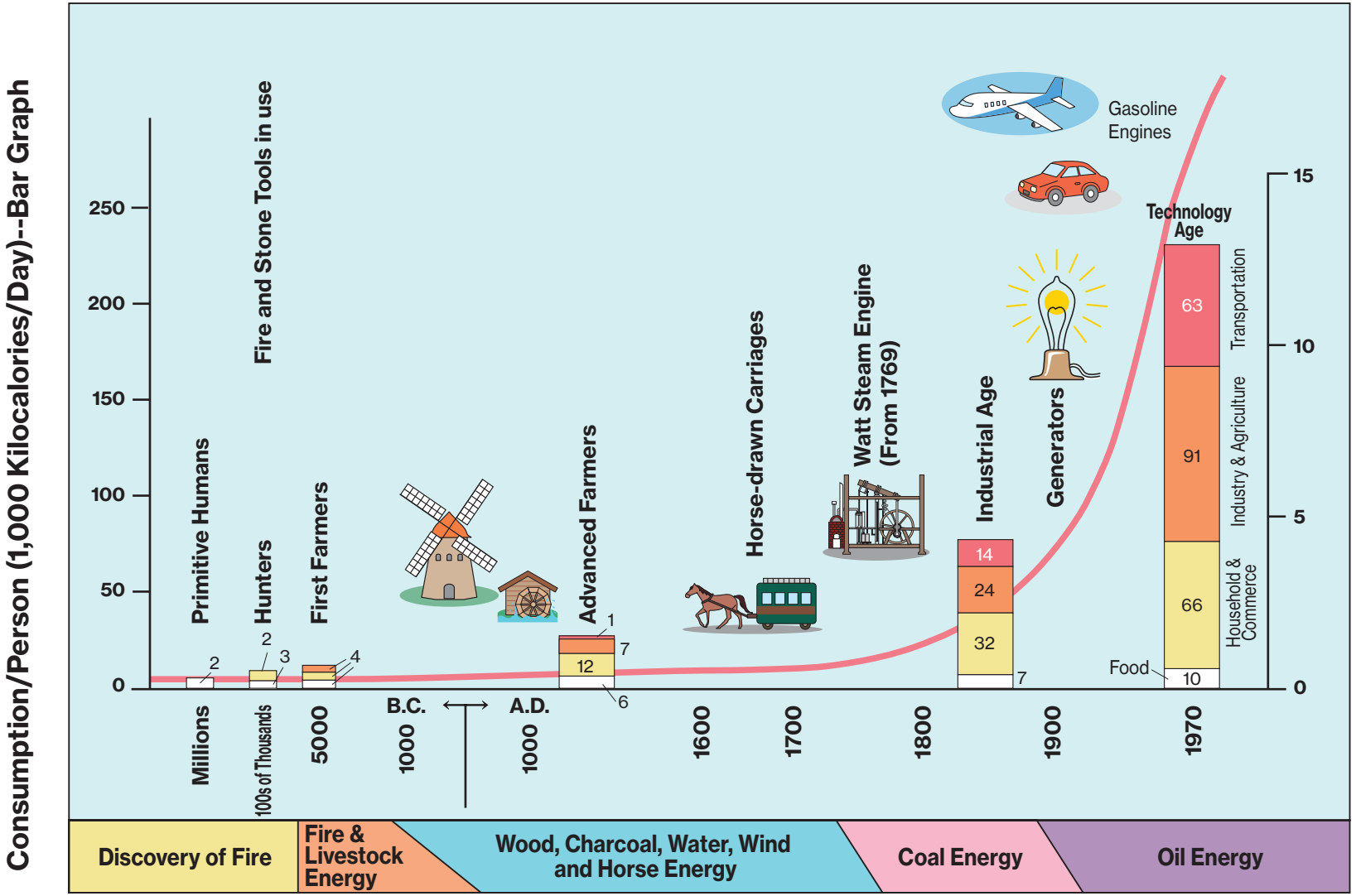
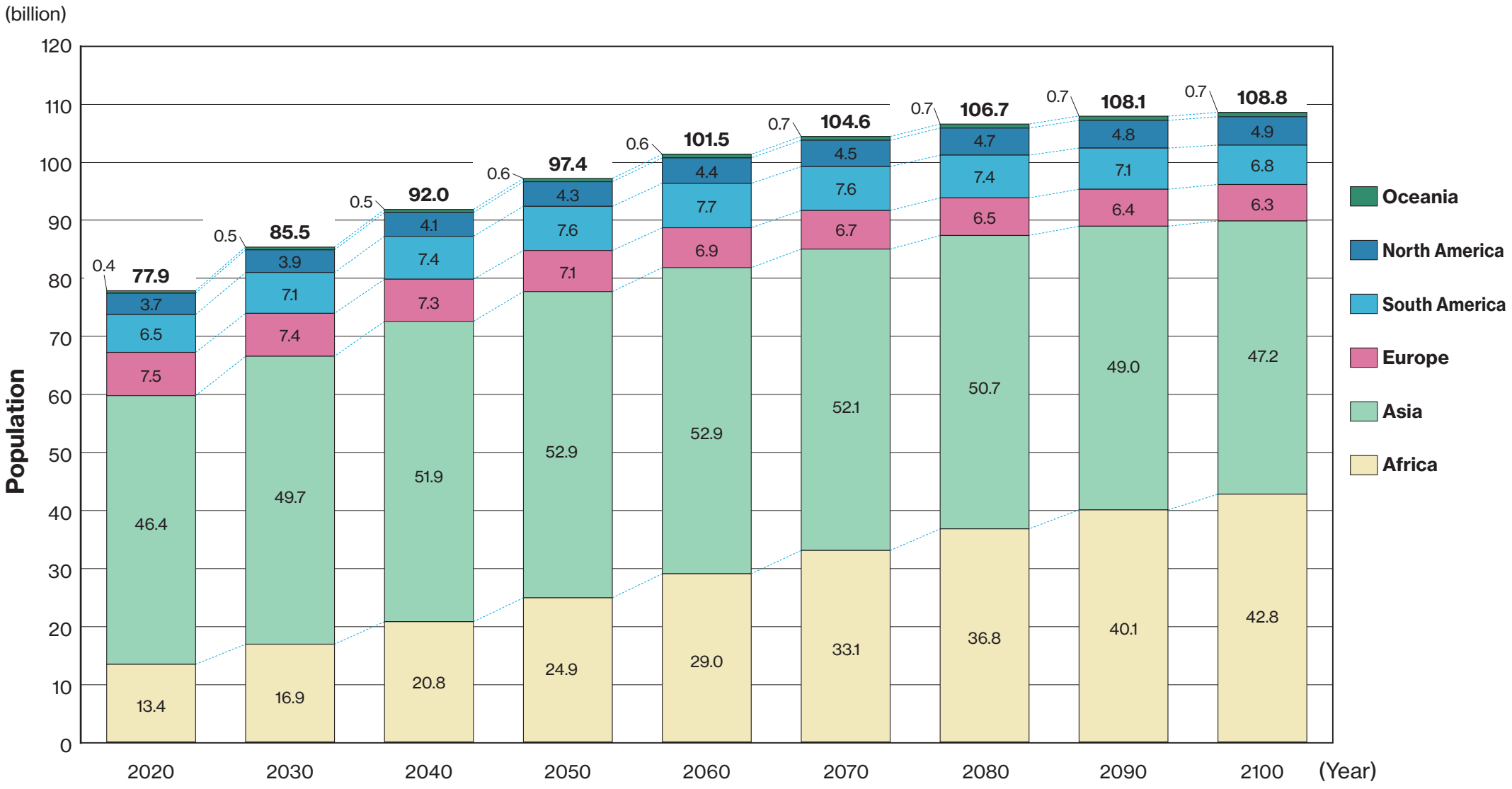
Relationship Between Humans and Energy



Primitive Humans	East Africa 1 million years ago, food only.
Hunters	Europe 100,000 years ago, burned firewood for heat and cooking.
First Farmers	Fertile delta region 5,000 years ago, used energy of livestock for cultivating crops.
Advanced Farmers	Northwest Europe 1,400 years ago, used coal for heating, wind and water power; used livestock for transportation.
Industrial Age	England in 1875, used steam engines.
Technology Age	United States in 1970, used electrical power, food includes for livestock use.

Source: National Institute for Research Advancement, Thinking about Energy

World Population Projections

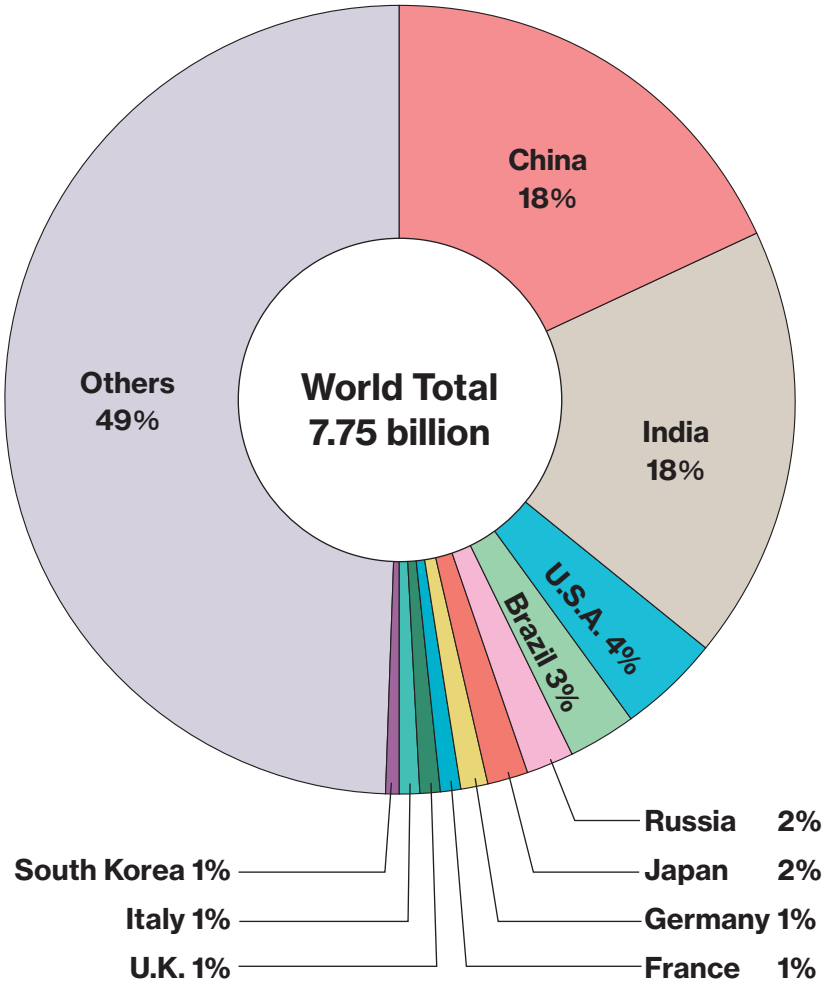


(Note) Figures may not add up to the totals due to rounding.

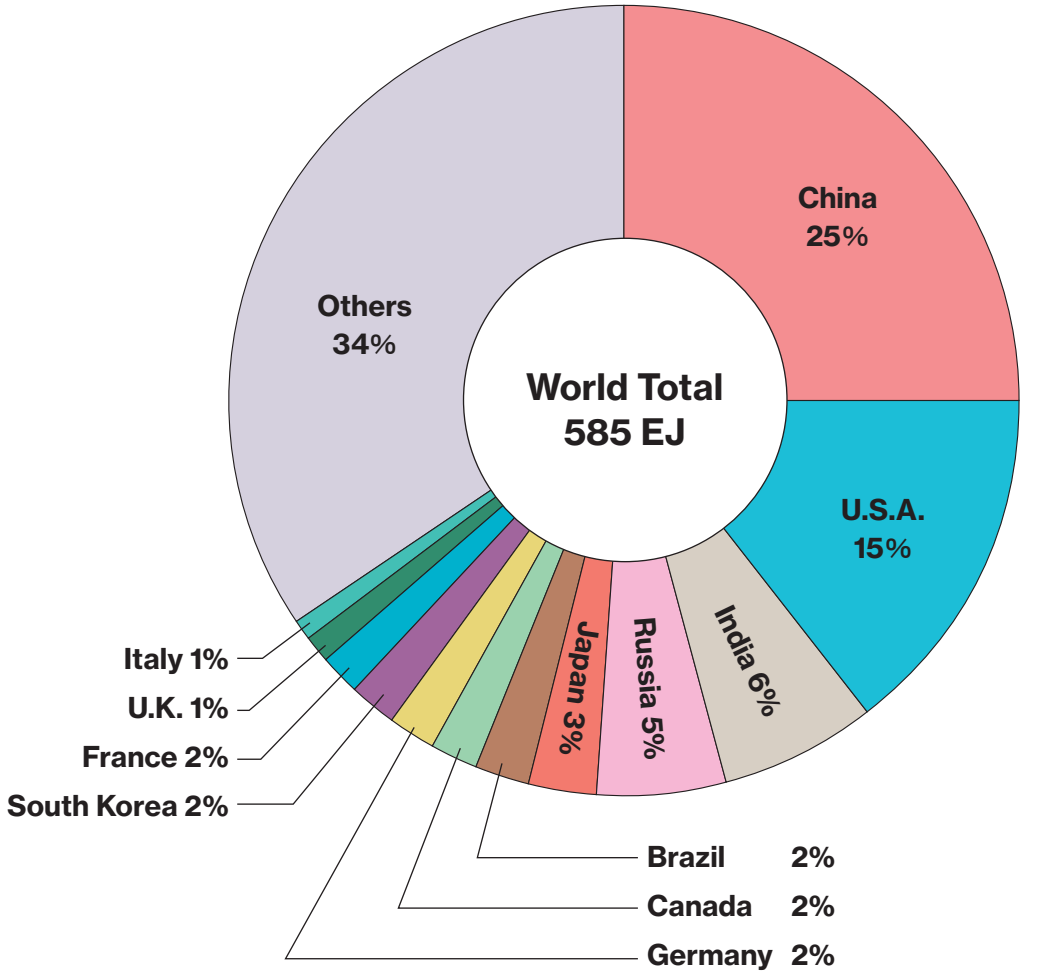
Source: UN, World Population Prospects, the 2019 Revision

World Population and Energy Supply Amount

World Population by Country (2020)



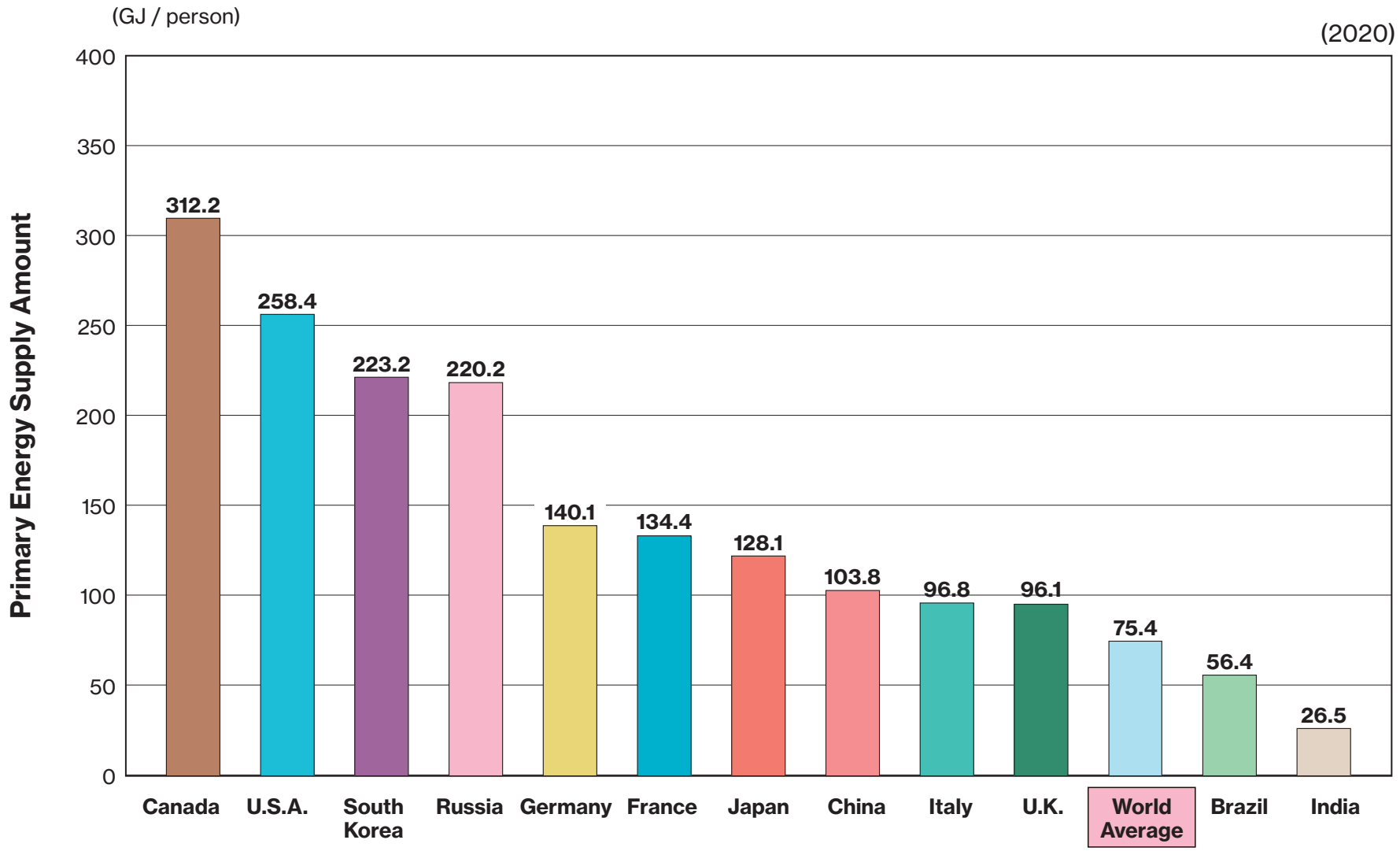
Primary Energy Supply Amount by World Population by Country (2020)



(Note) Figures may not add up to the totals due to rounding.
Btoe: billion tons of oil equivalent

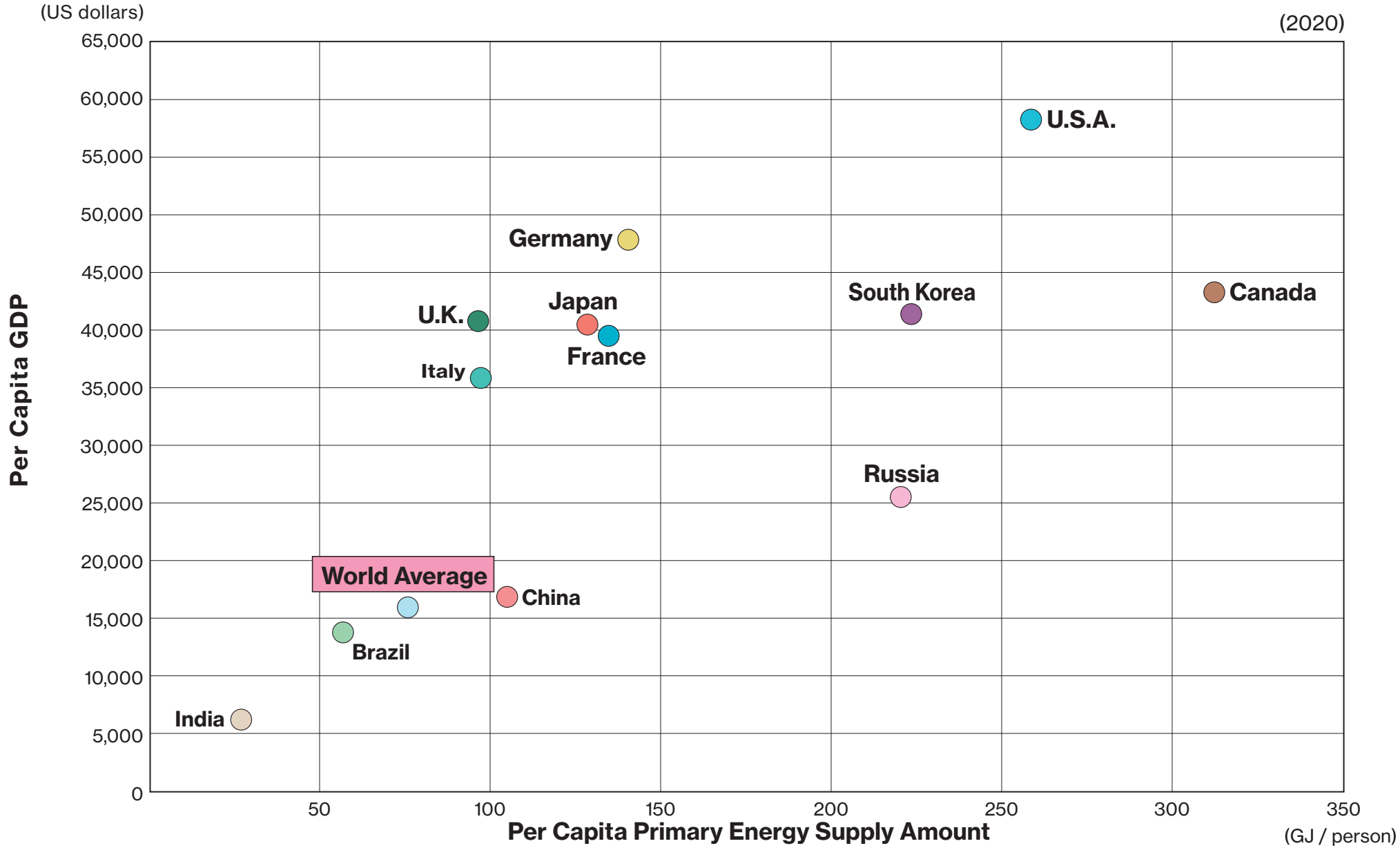
Source:IEA, World Energy Balances 2022

Primary Energy Supply Amount Per Capita in World



Source:IEA, World Energy Balances 2022

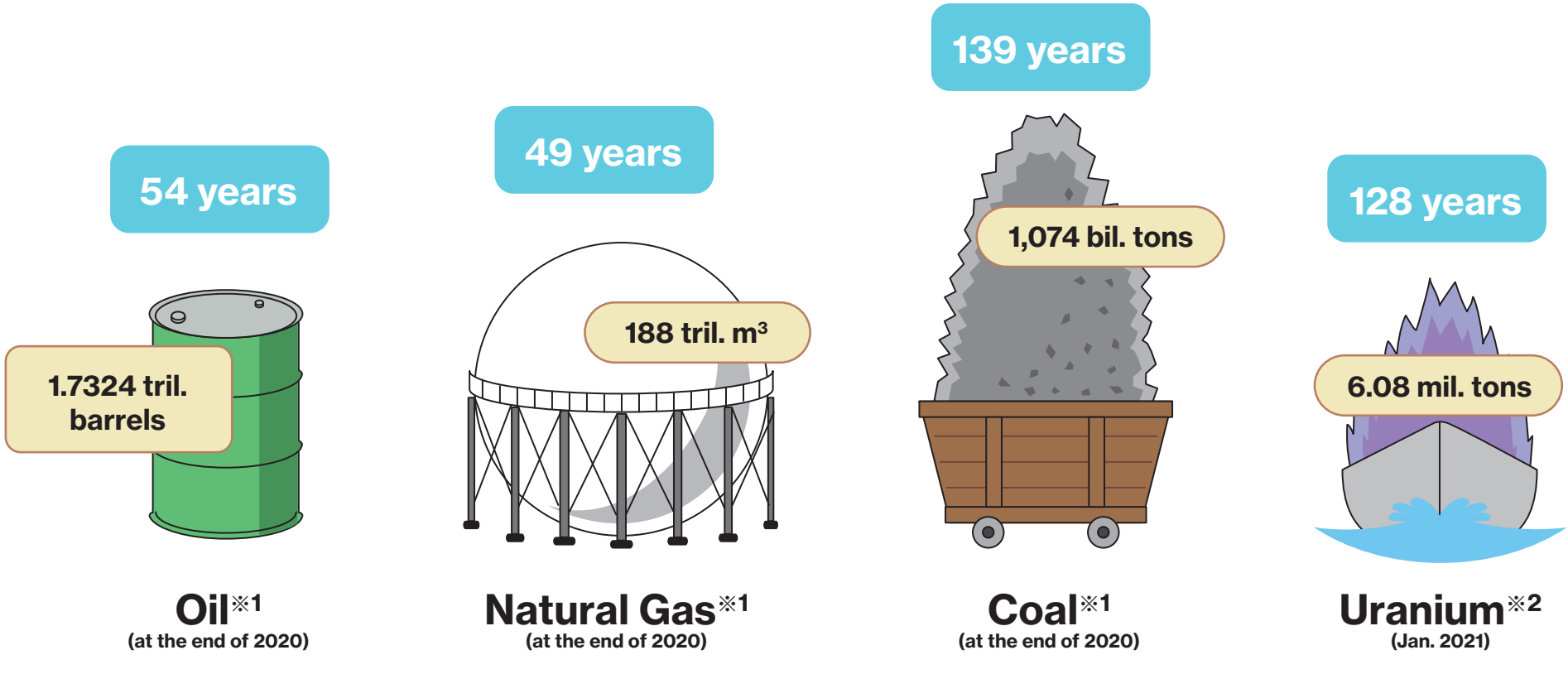
Per Capita GDP and Primary Energy Supply Amount



(Note) Total domestic production based on purchasing power parity conversion (US dollars, 2015 prices)

Source:IEA, World Energy Balances 2022

Proven Reserves of Energy Resources



Oil※1
(at the end of 2020)

Natural Gas※1
(at the end of 2020)

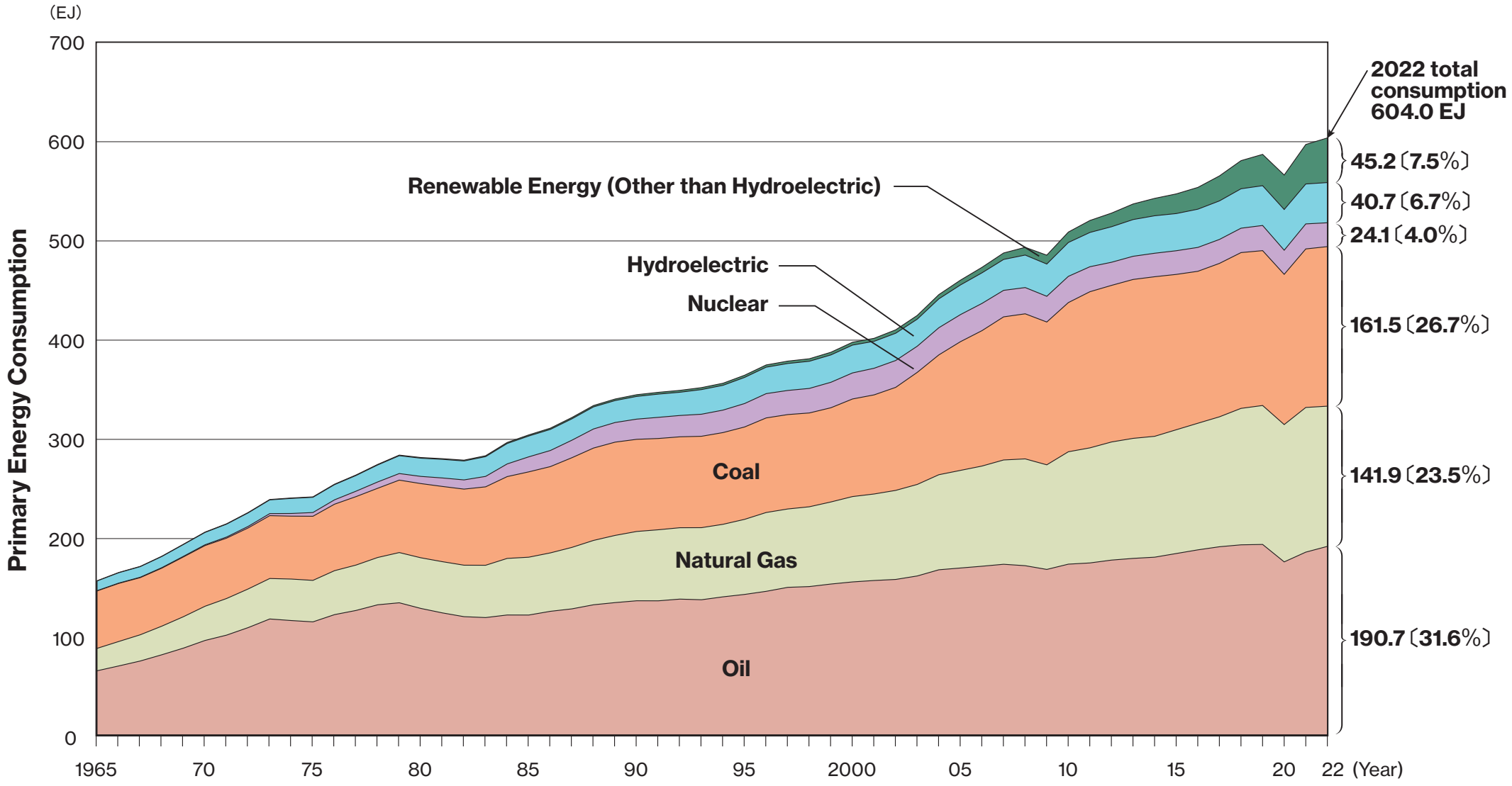
Coal※1
(at the end of 2020)

Uranium※2
(Jan. 2021)

(Note) Reserves-to-production (R/P) ratio = Proven Reserves / Annual Production
RAR (reasonably assured resources) of uranium is estimated at a production cost less than USD 130/kgU.

Source: ※1 BP Statistical Review of World Energy 2021 ※2 OECD/NEA,IAEA, Uranium 2022

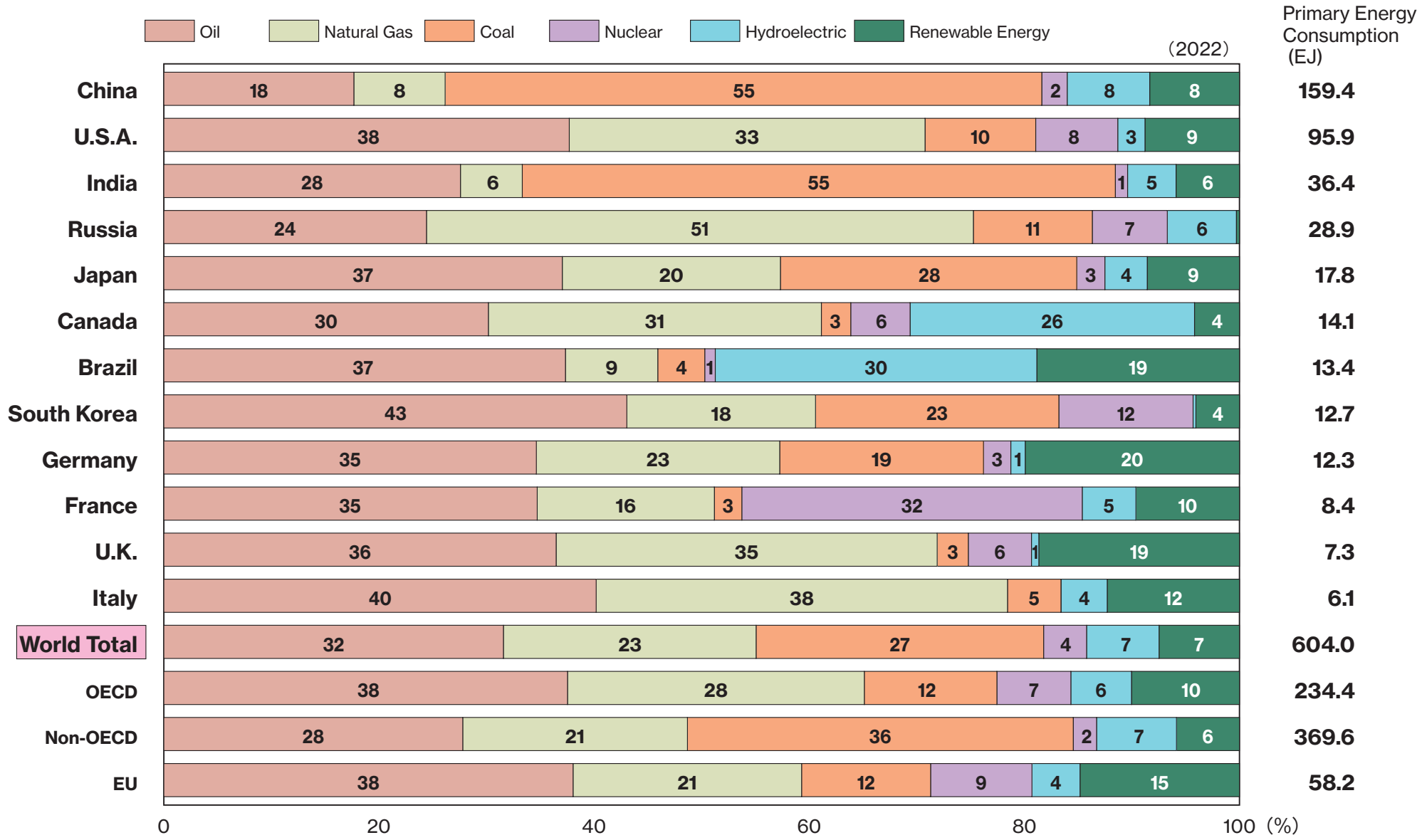
The World's Primary Energy Consumption



(Note) Figures may not add up to the totals due to rounding. The figures in parentheses are the share of the total.
1 EJ (=10^{18} Joules) is equivalent to the amount of heat from approximately 25,800,000 kℓ of crude oil (EJ: exajoule).

Source: Energy Institute Statistical Review of World Energy 2023

Primary Energy Consumption in Major Countries

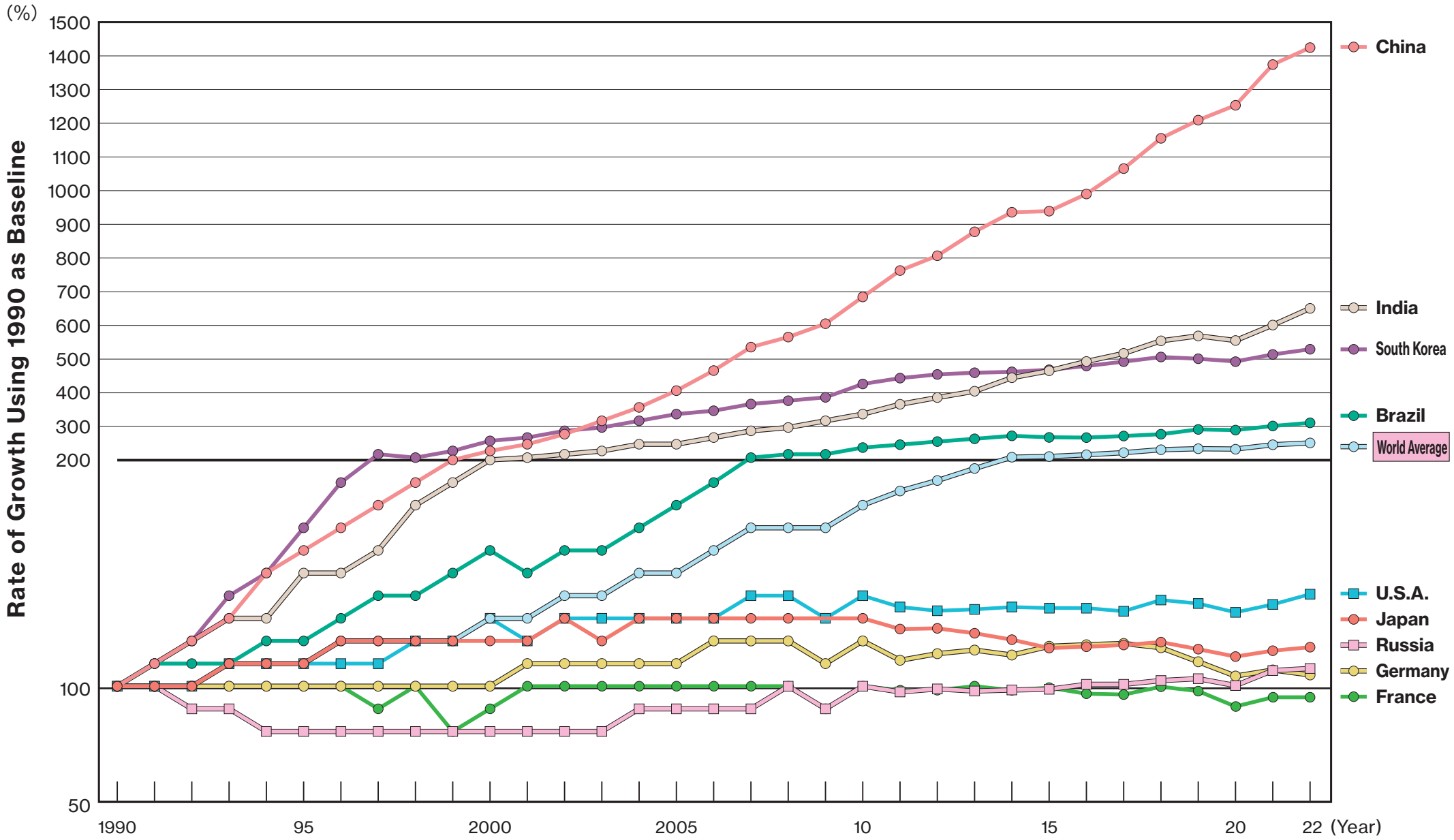


(Note) Figures may not add up to the totals due to rounding.

1 EJ (=10^{18} Joules) is equivalent to the amount of heat from approximately 25,800,000 kℓ of crude oil (EJ: exajoule).

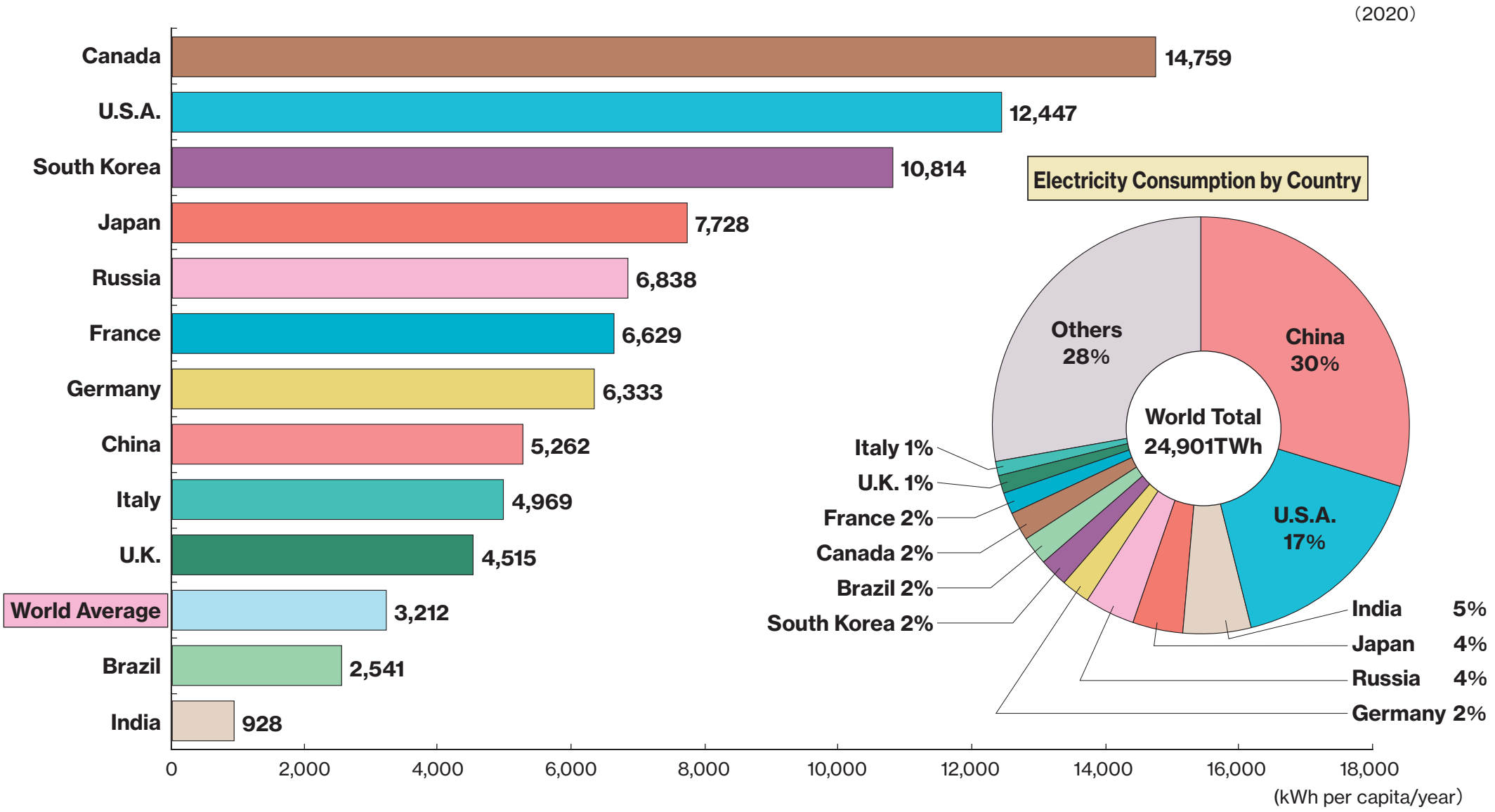
Source: Energy Institute Statistical Review of World Energy 2023

Electricity Generated by Major Countries (Growth Rate)



Source: Energy Institute Statistical Review of World Energy 2023

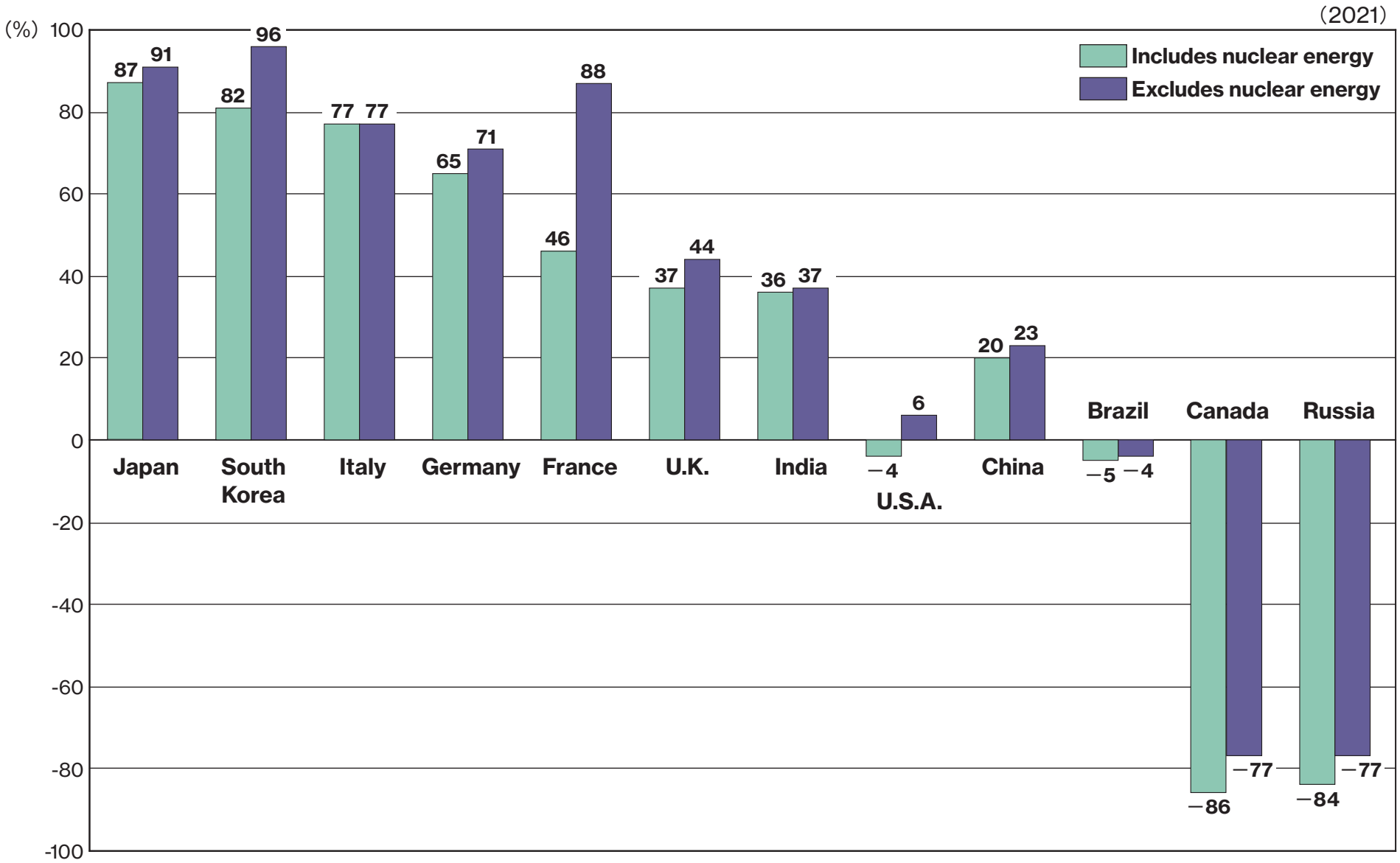
Electricity Consumption Per Capita in Major Countries



(Note) Figures may not add up to the totals due to rounding.

Source:IEA, World Energy Balances 2022

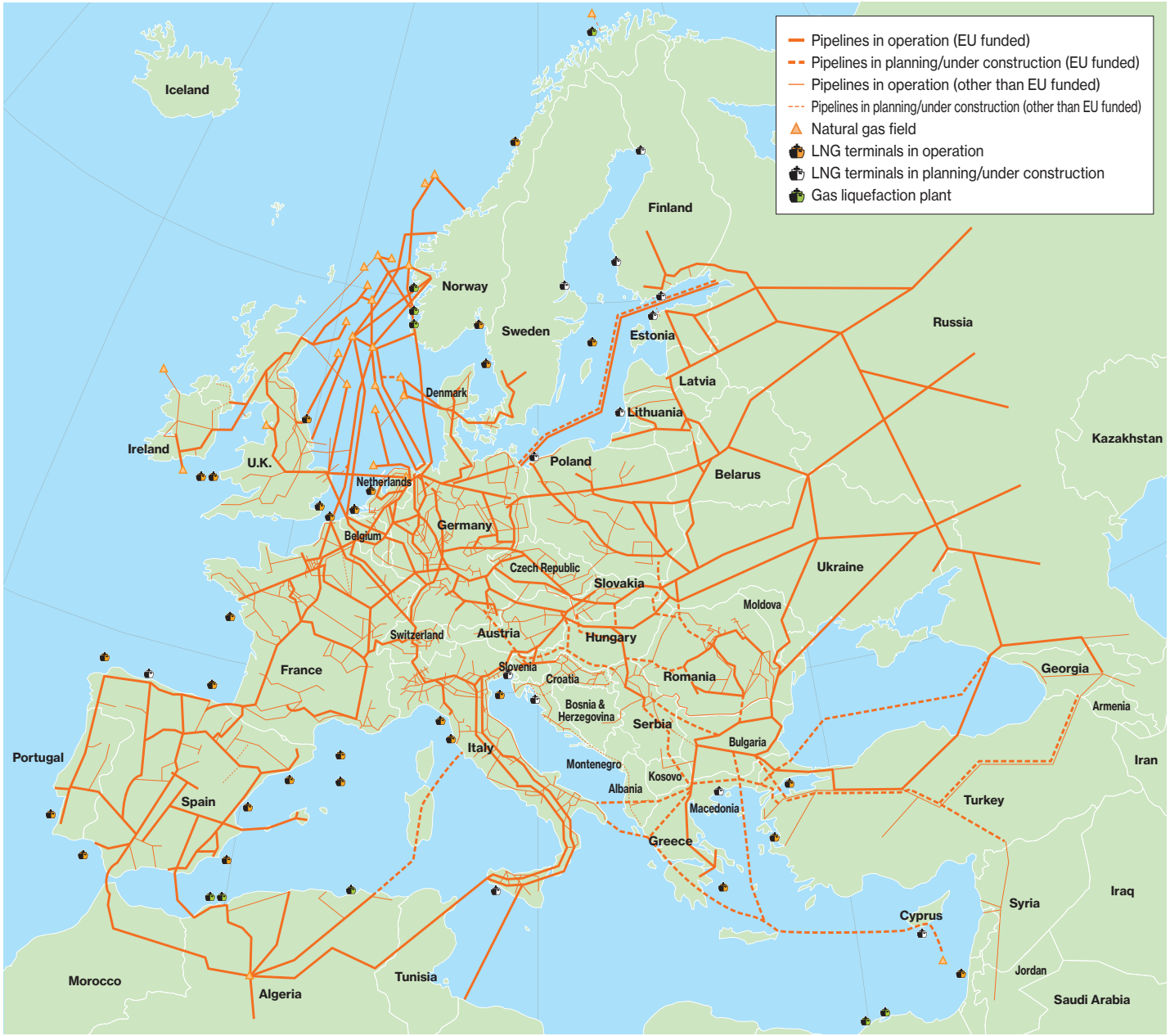
Dependence on Imported Energy Sources in Major Countries



(Note) Canada and Russia are net-exporting countries.

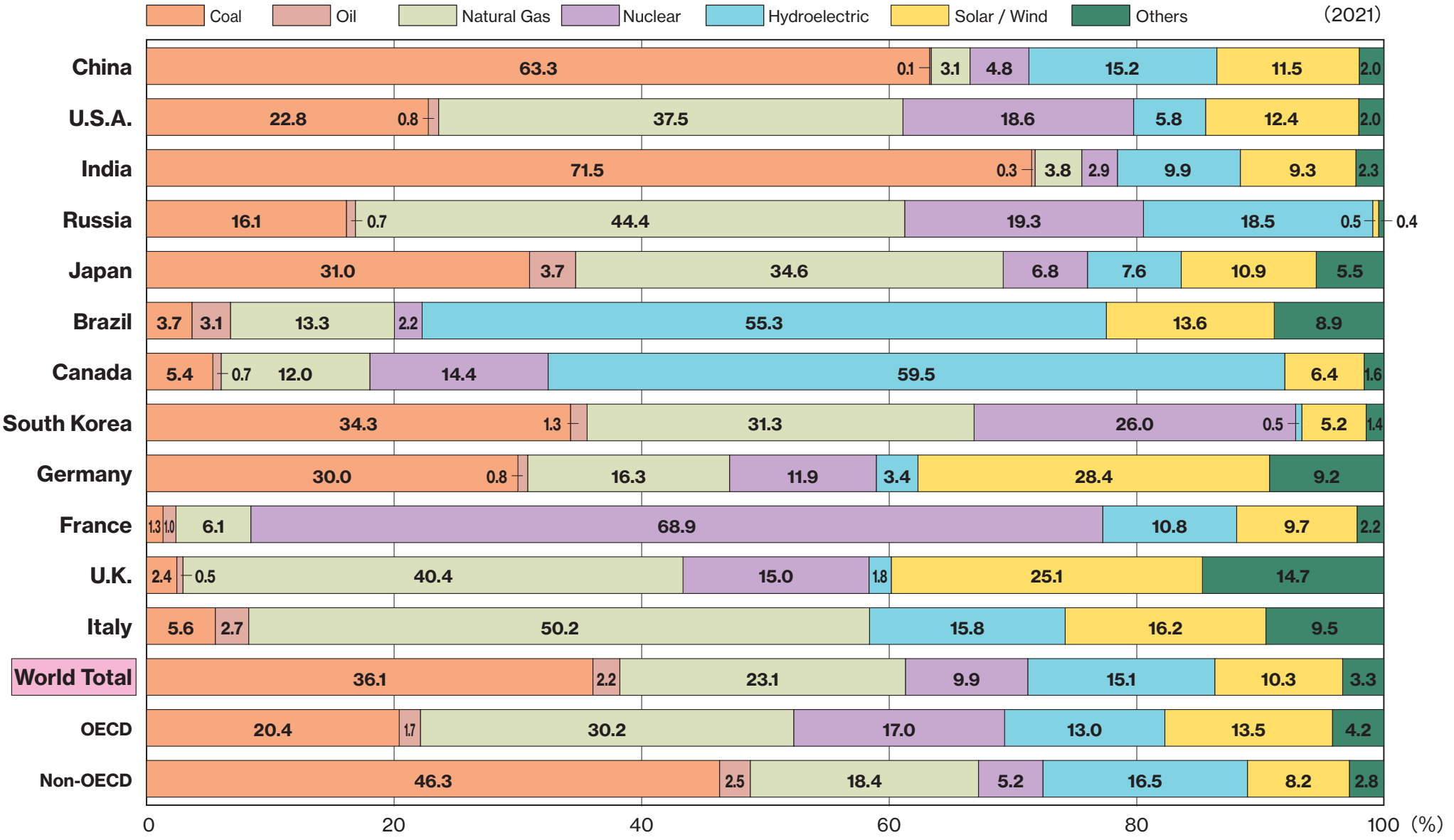
Source: IEA, World Energy Balances 2023

National Gas Pipeline Network in Europe



Source: eurogas, Statistical Report 2015

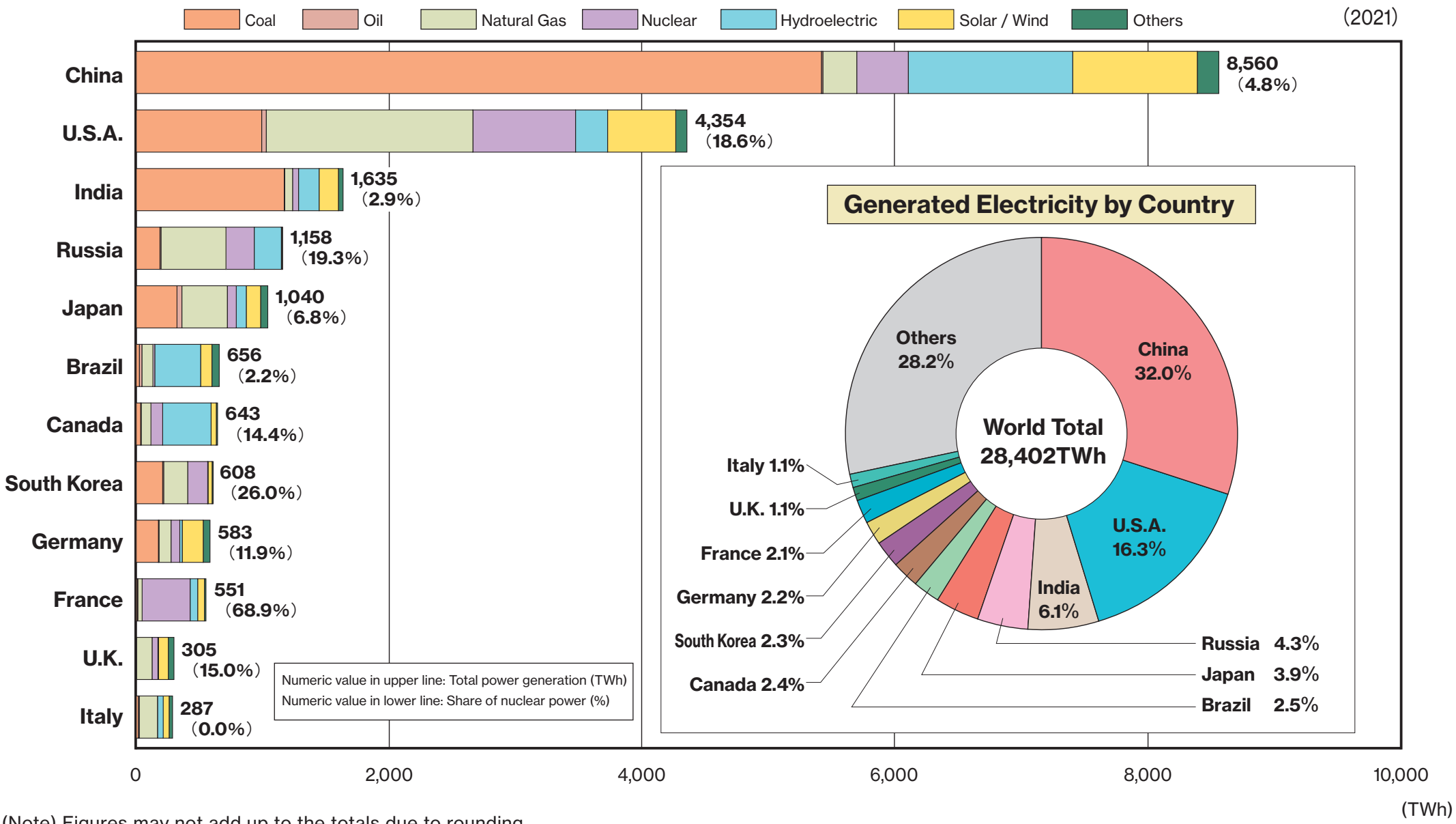
Power Generation Composition by Source in Major Countries



(Note) Figures may not add up to the totals due to rounding.

Source: IEA, World Energy Balances 2023

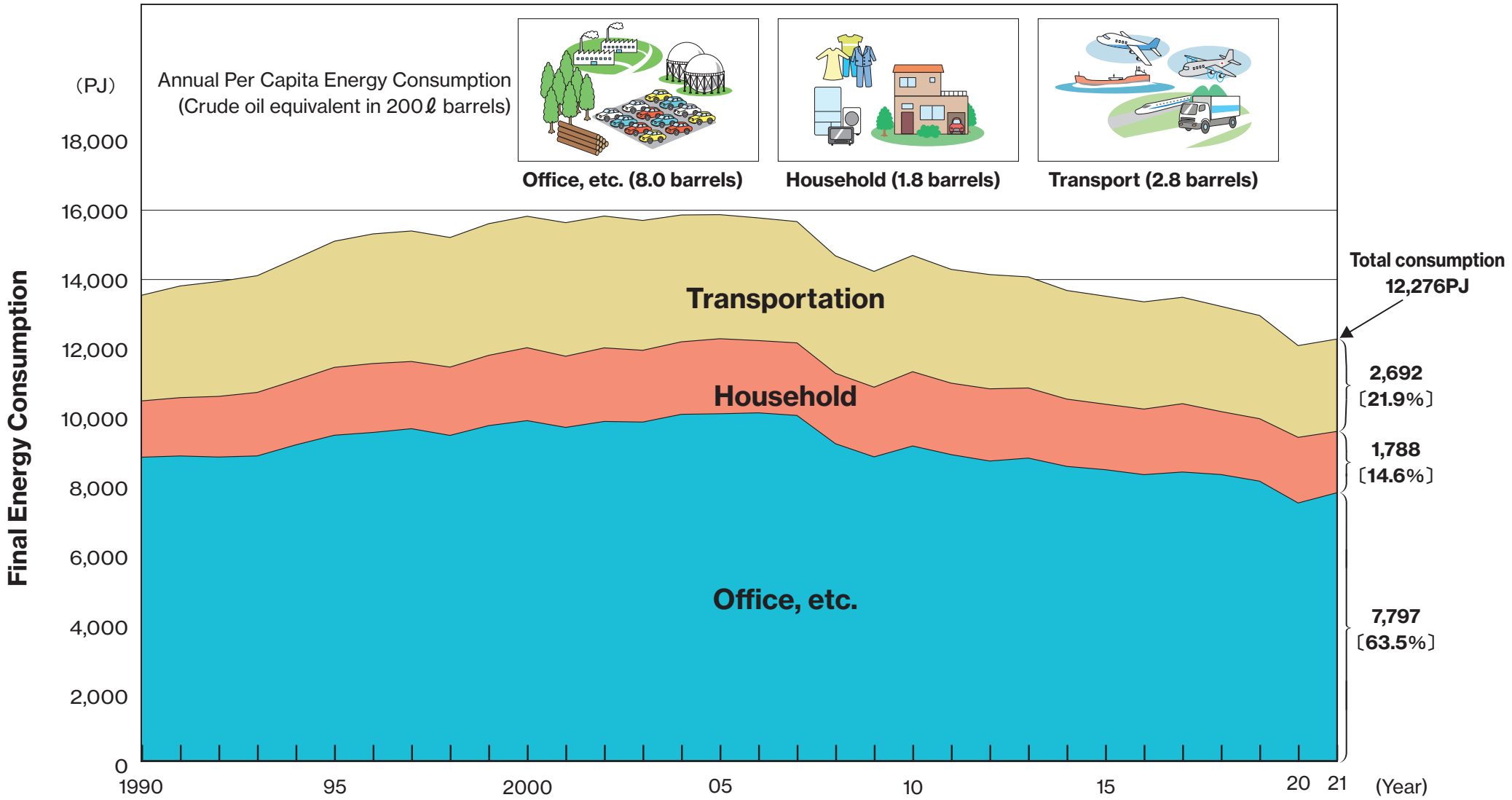
Electricity Generated and Share of Nuclear Power in Major Countries



(Note) Figures may not add up to the totals due to rounding.

Source: IEA, World Energy Balances 2023

How Energy is Used in Japan

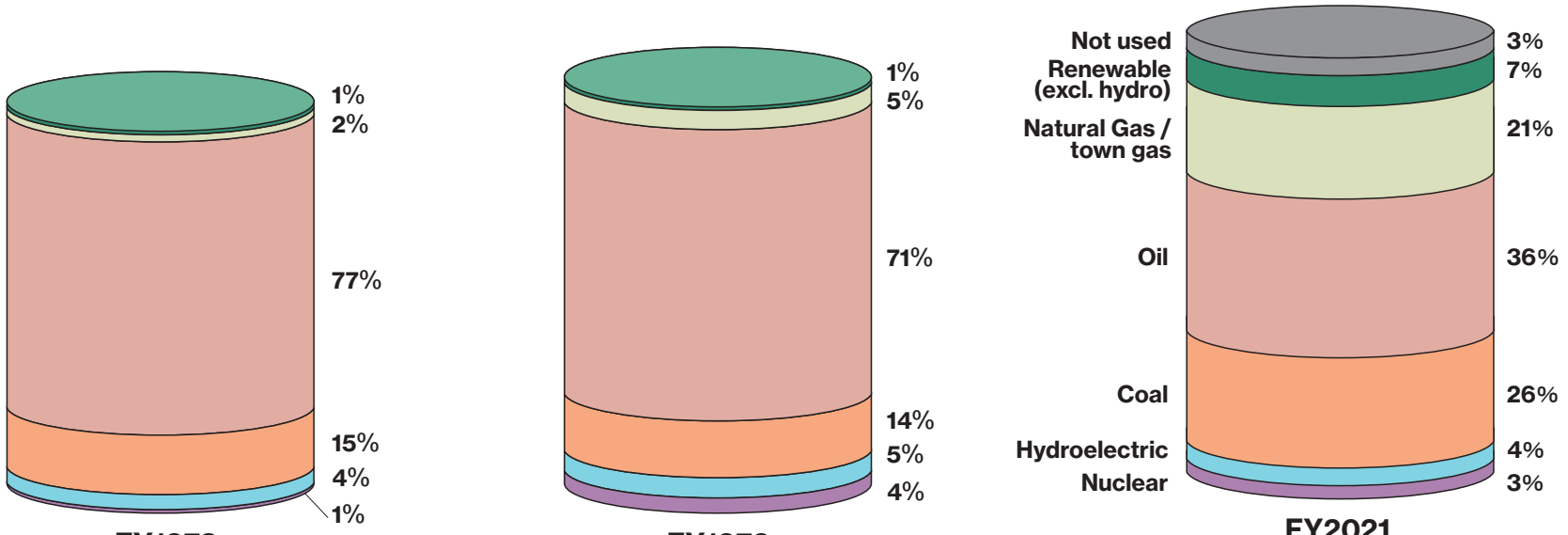


(Note) Figures may not add up to the totals due to rounding.
1 PJ (=10^{15} Joules) is equivalent to the amount of heat from approximately 25,800 kℓ of crude oil (PJ: petajoule).
Content of parentheses is the percentage of the total.
The calculation method of Total Energy Statistics has been changed since FY1990.

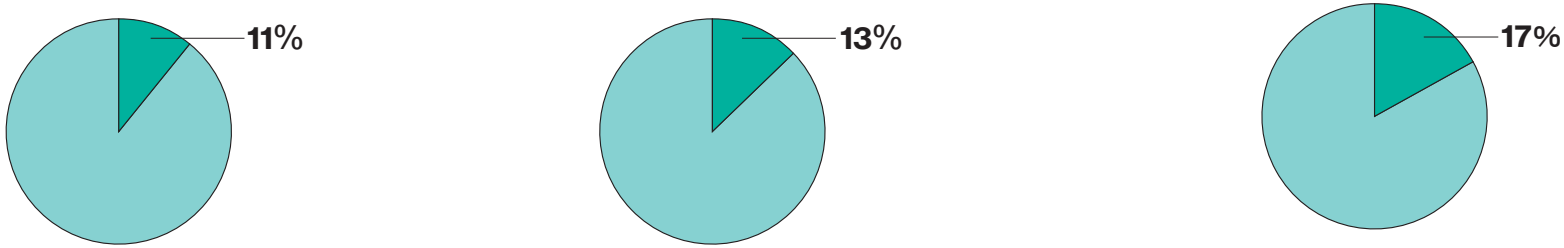
Source: Agency for Natural Resources and Energy, Total Energy Statistics

Changes in Japan's Primary Energy Supply Structure

	FY1973 (The first oil crisis)	FY1979 (The second oil crisis)	FY2021
Total Primary Energy Supply	16,133PJ	17,210PJ	18,670PJ



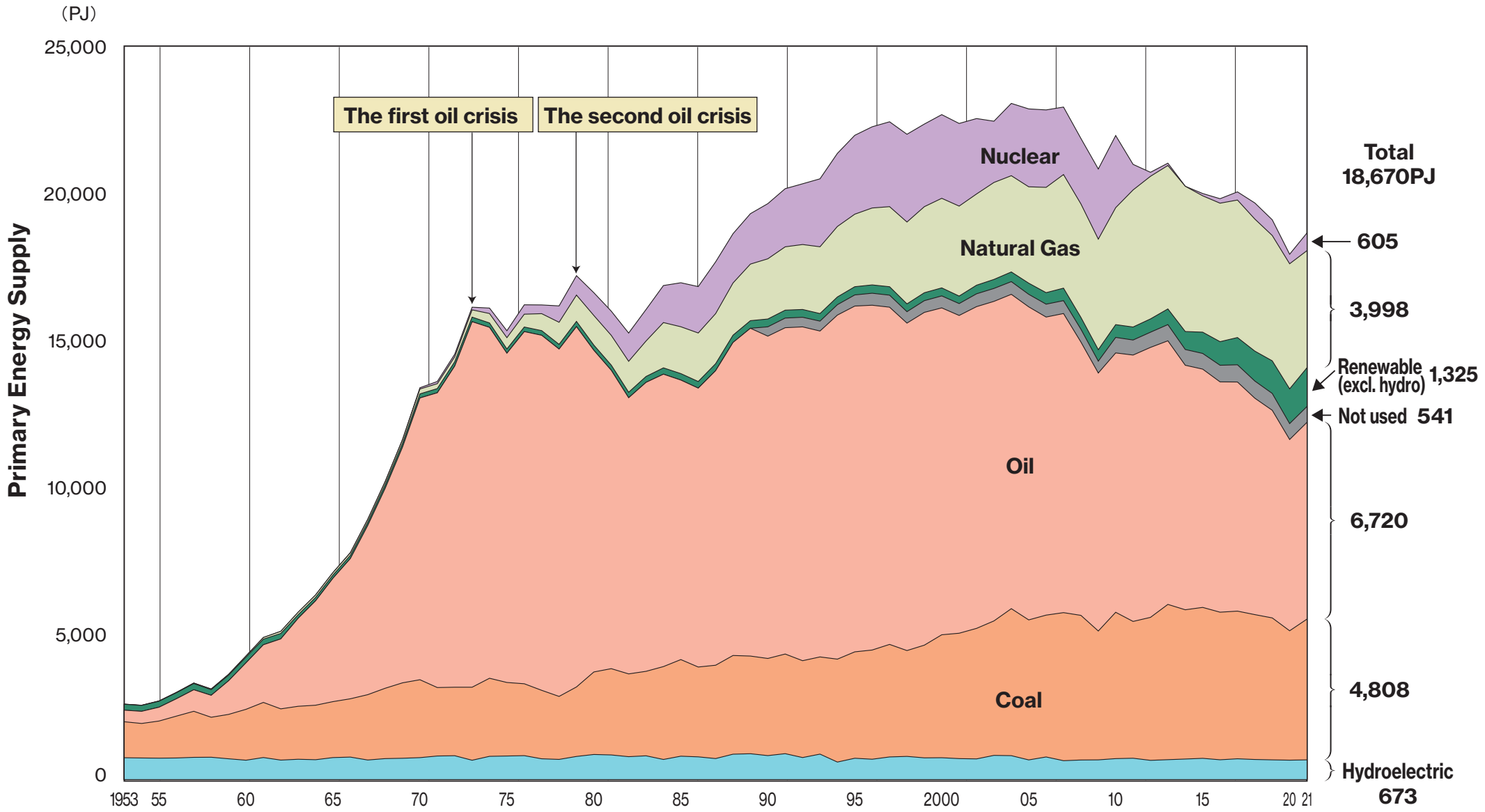
Domestic Energy Ratio



(Note) Figures may not add up to the totals due to rounding.
1 PJ (=10^{15} Joules) is equivalent to the amount of heat from approximately 25,800 kℓ of crude oil (PJ: petajoule).
Nuclear energy is classified into semi-domestic energy due to its characteristics.
The calculation method of Total Energy Statistics has been changed since FY1990.

Source: Agency for Natural Resources and Energy, Total Energy Statistics

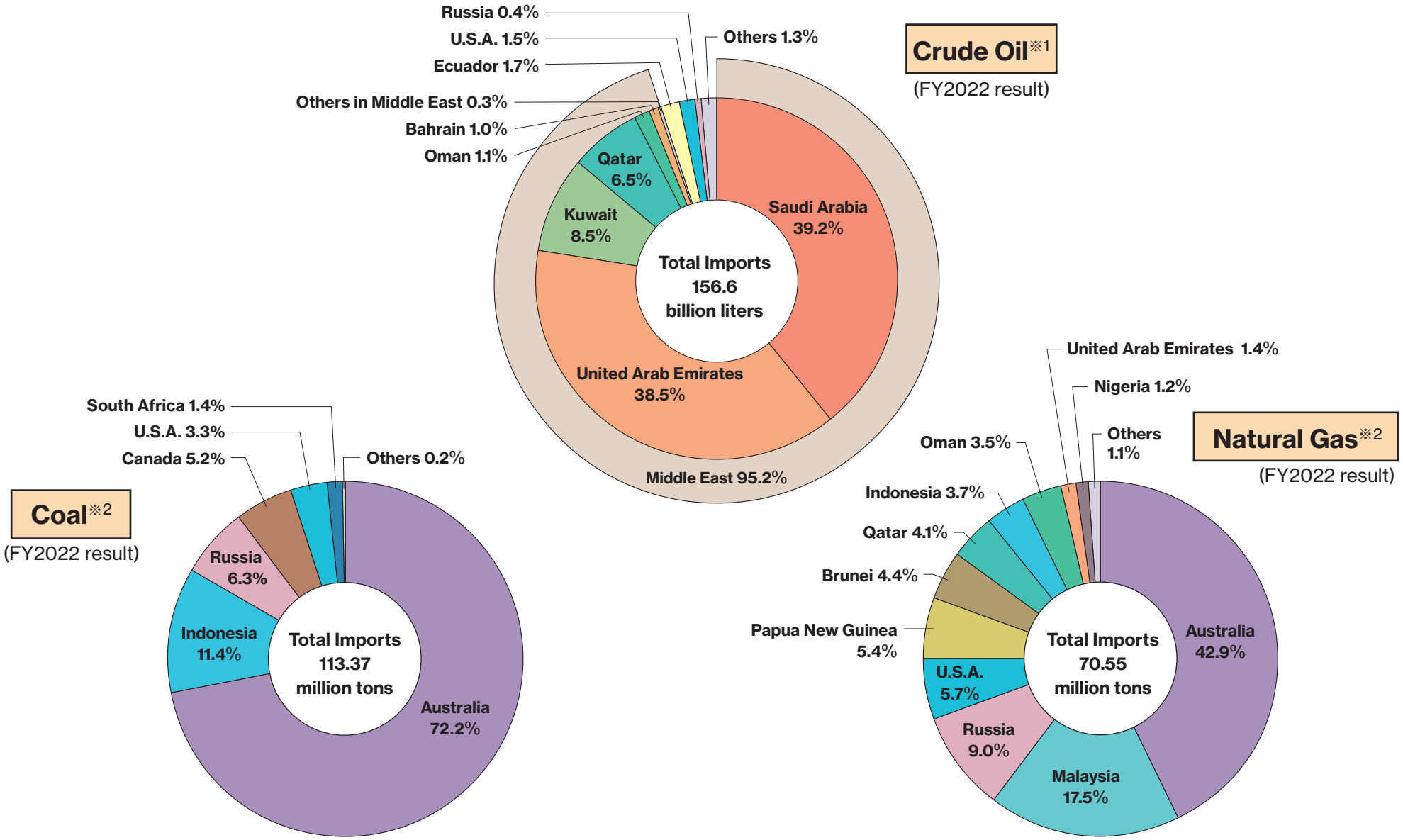
Historical Trends in Japan's Primary Energy Supply



(Note) 1 PJ (=10^{15} Joules) is equivalent to the amount of heat from approximately 25,800 kℓ of crude oil (PJ: petajoule).
The calculation method of Total Energy Statistics has been changed since FY1990.

Source: Agency for Natural Resources and Energy, Total Energy Statistics

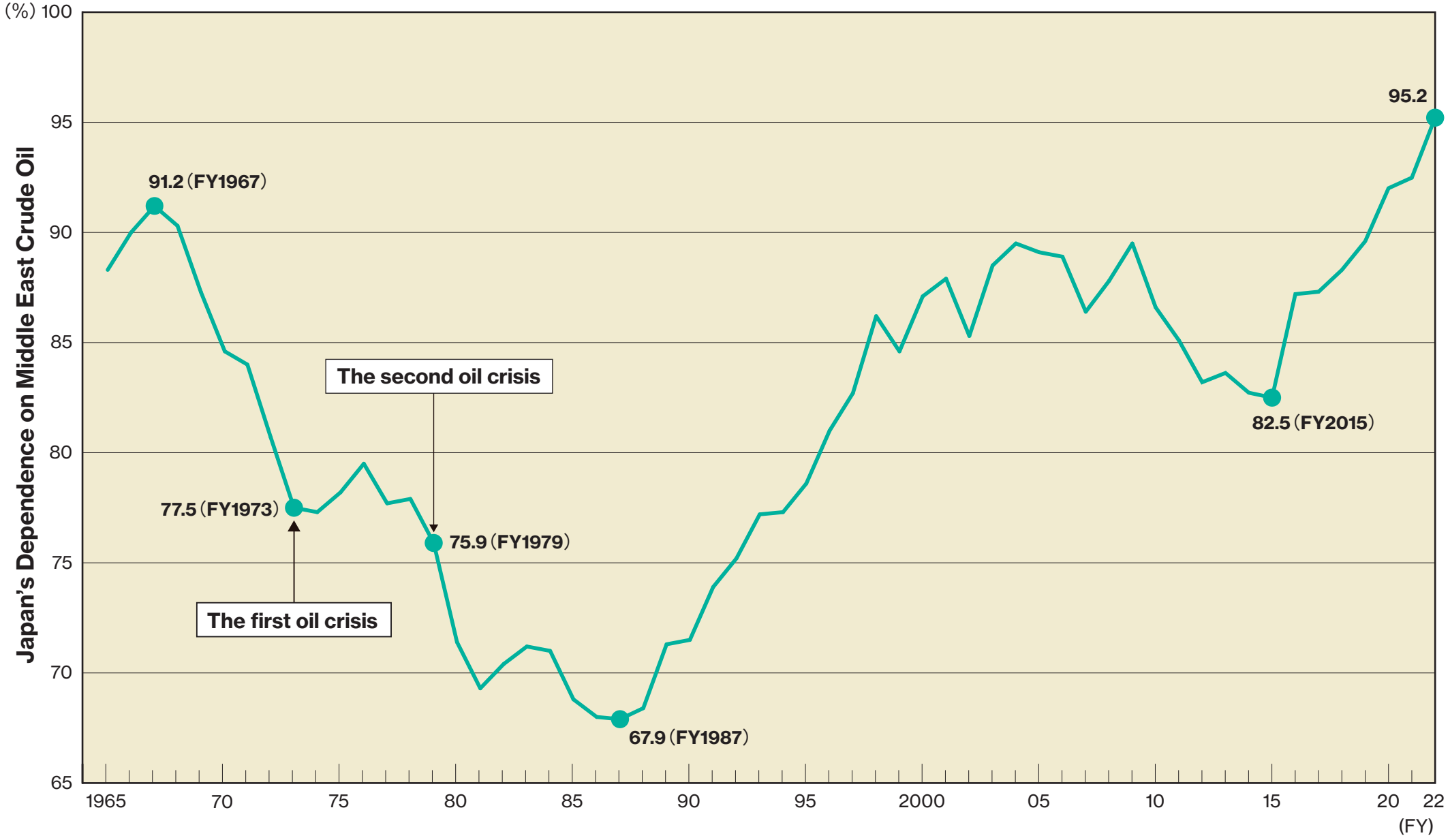
Japan's Fossil Fuel Imports by Country of Origin



(Note) Figures may not add up to the totals due to rounding.

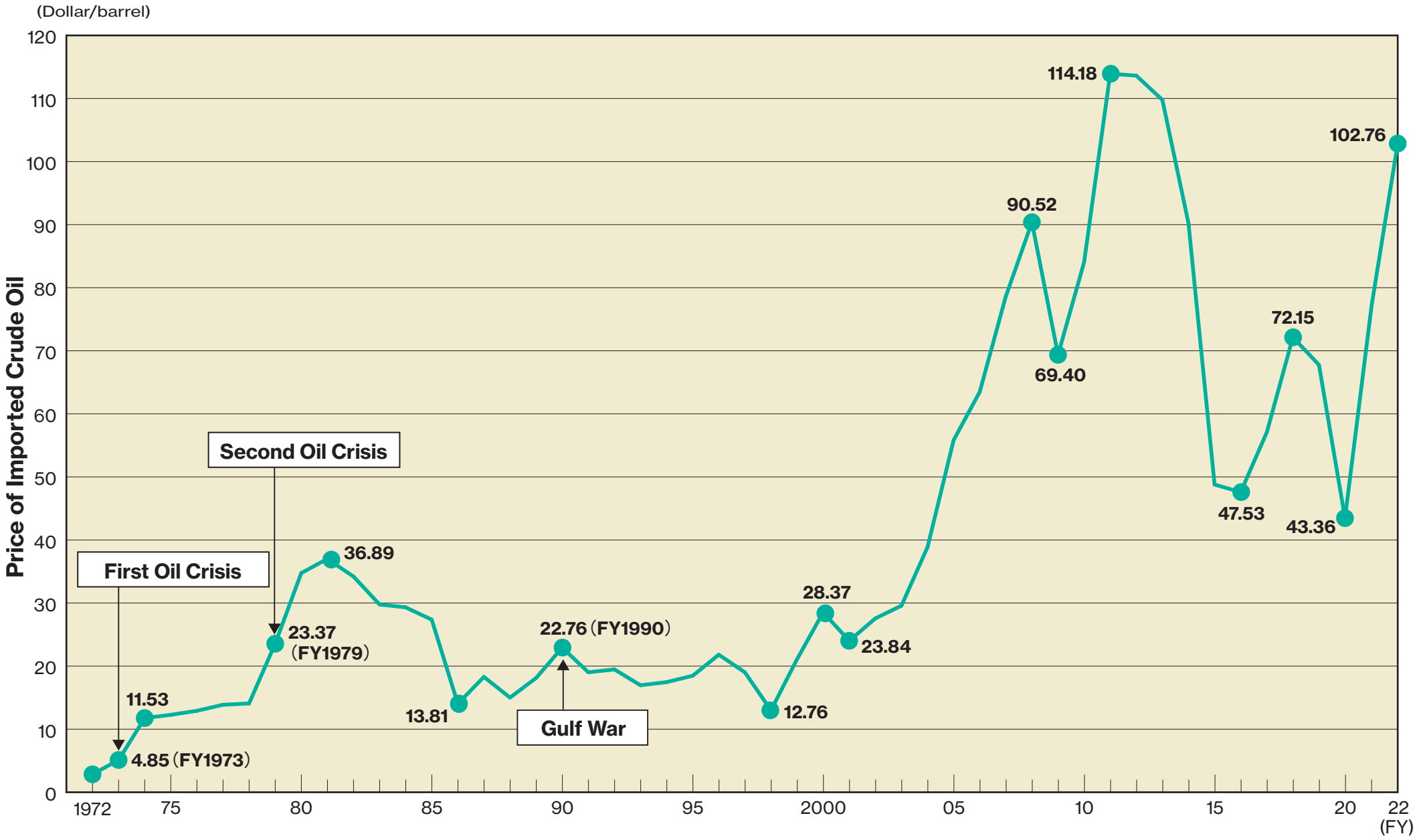
Source: ※1 Petroleum Association of Japan ※2 Trade Statistics of Japan

Japan's Dependence on Middle East Crude Oil Imports



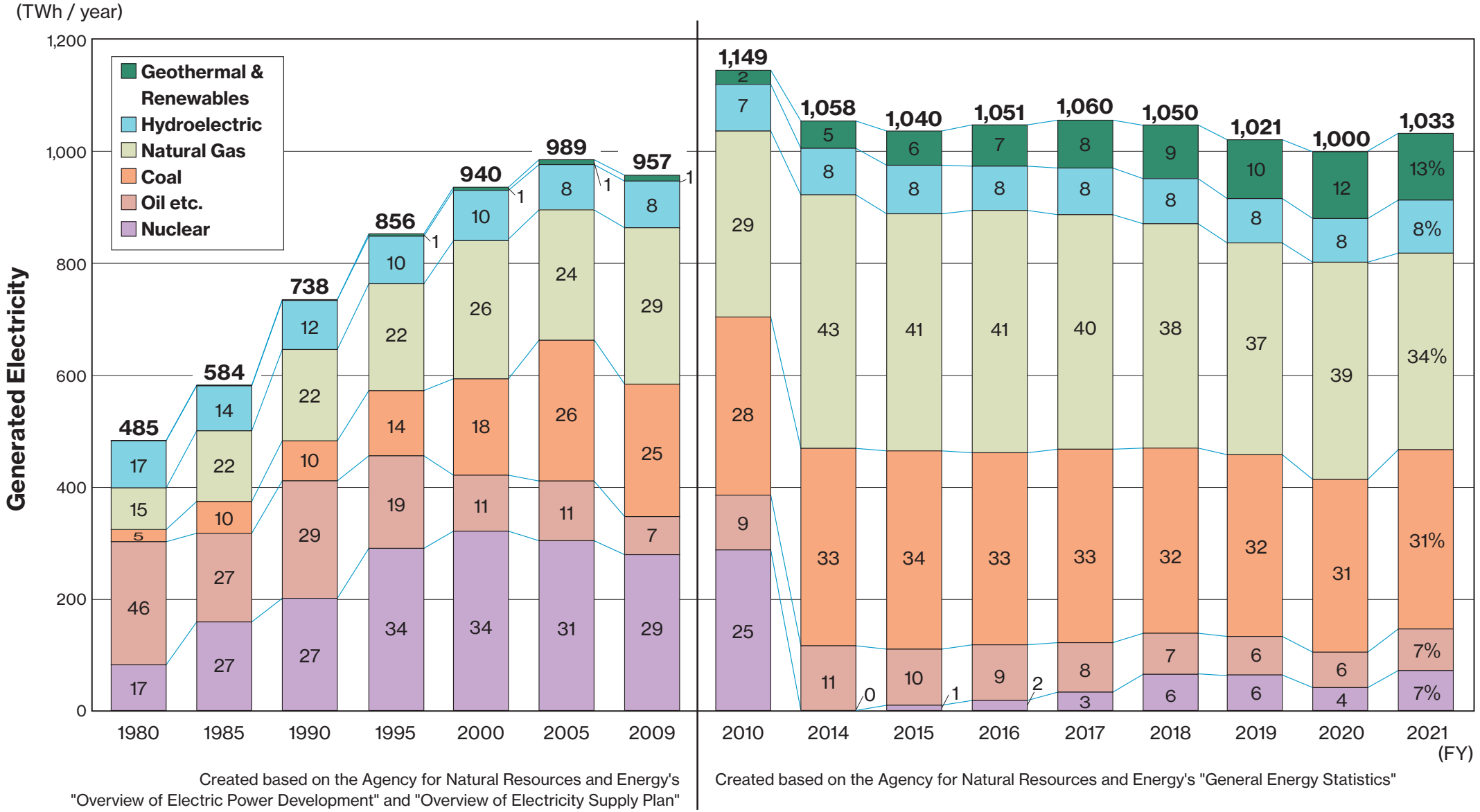
Source: Petroleum Association of Japan

Changes in the Price of Imported Crude Oil



Source: Petroleum Association of Japan

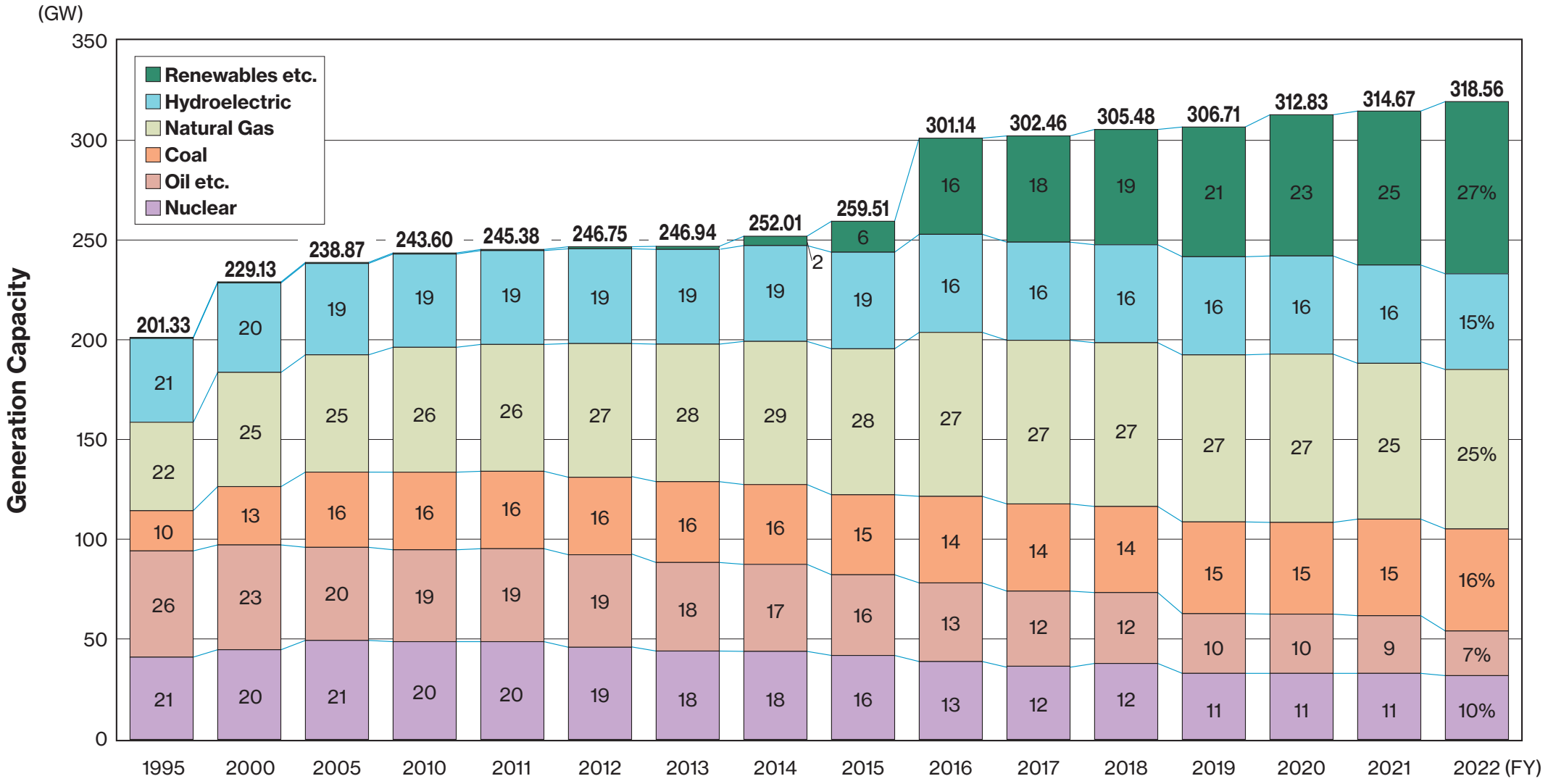
Japan Power Generation and Purchase Volume by Source



(Note) Oil etc. includes LPG, other gases and bituminous mixtures. Figures may not add up to the totals due to rounding. Numerical values depicted in this graph are composition ratios (%).

Source: Agency for Natural Resources and Energy, Energy White Paper 2023

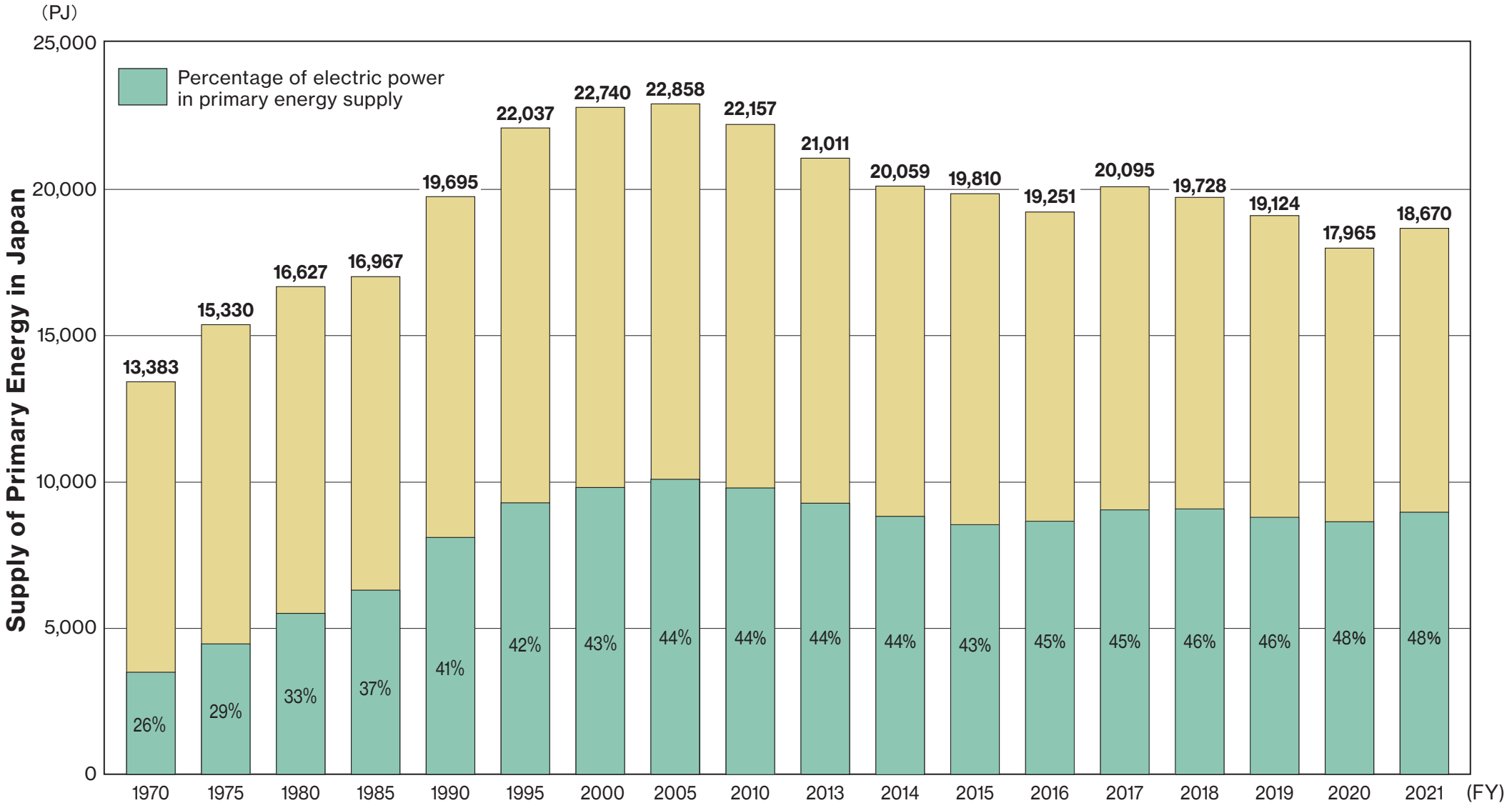
Historical Trends in Japan Power Generation Capacity by Source



(Note) Oil etc. include LPG, other gases and bituminous mixtures.
Figures may not add up to the totals due to rounding.
Numerical values depicted in this graph are composition ratios (%).

Source: Before FY 2015, Agency for Natural Resources and Energy, Energy White Paper.
After FY 2016, Organization for Cross-Regional Coordination of Transmission Operators (OCCTO), Aggregation of Electricity Supply Plans.

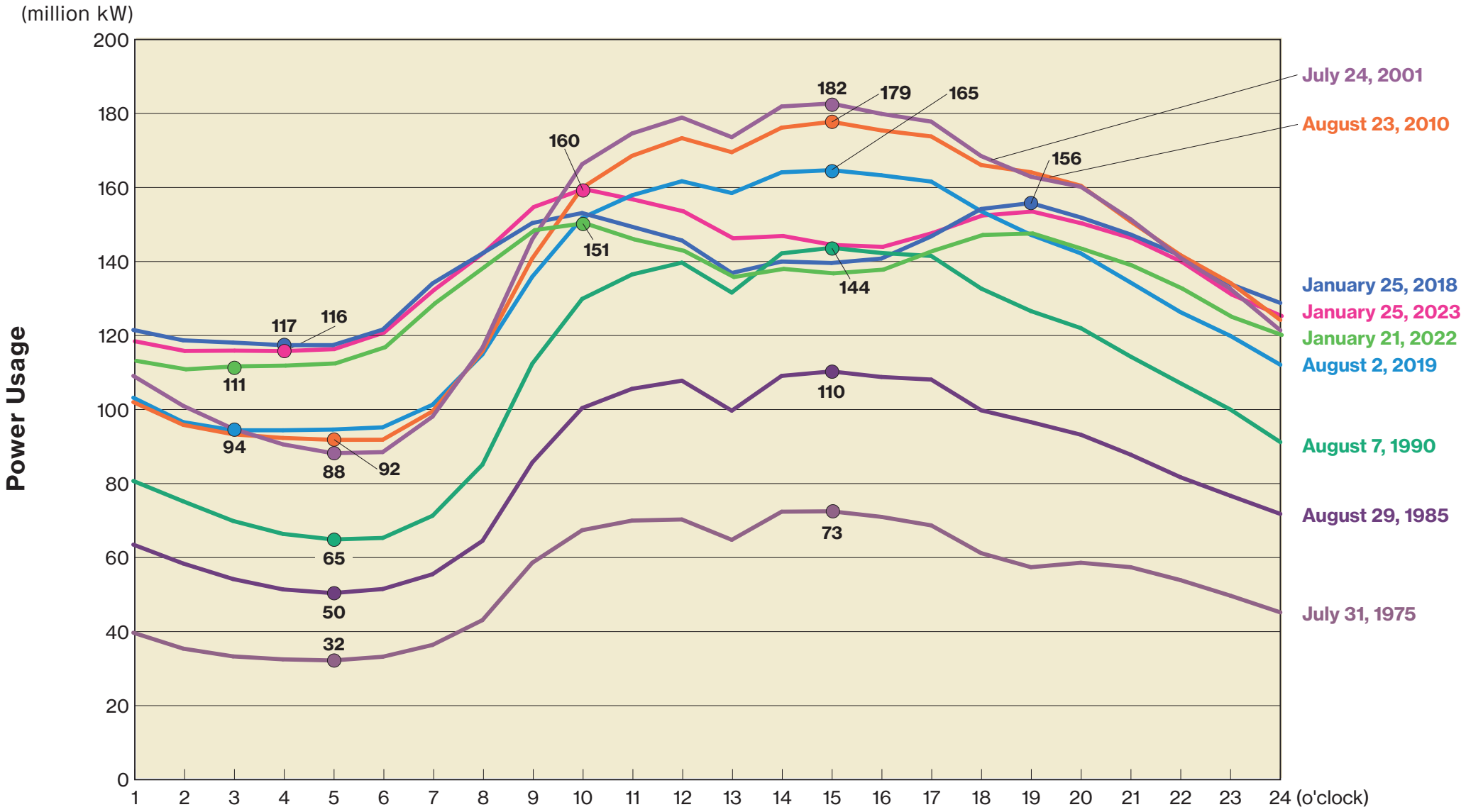
Percentage of Electric Power in Primary Energy (Electrification Ratio)



(Note) 1 PJ (=10^{15} Joules) is equivalent to the amount of heat from approximately 25,800 kℓ of crude oil (PJ: petajoule).

Source: Agency for Natural Resources and Energy, Total Energy Statistics

Hourly Power Usage on Peak Power Days

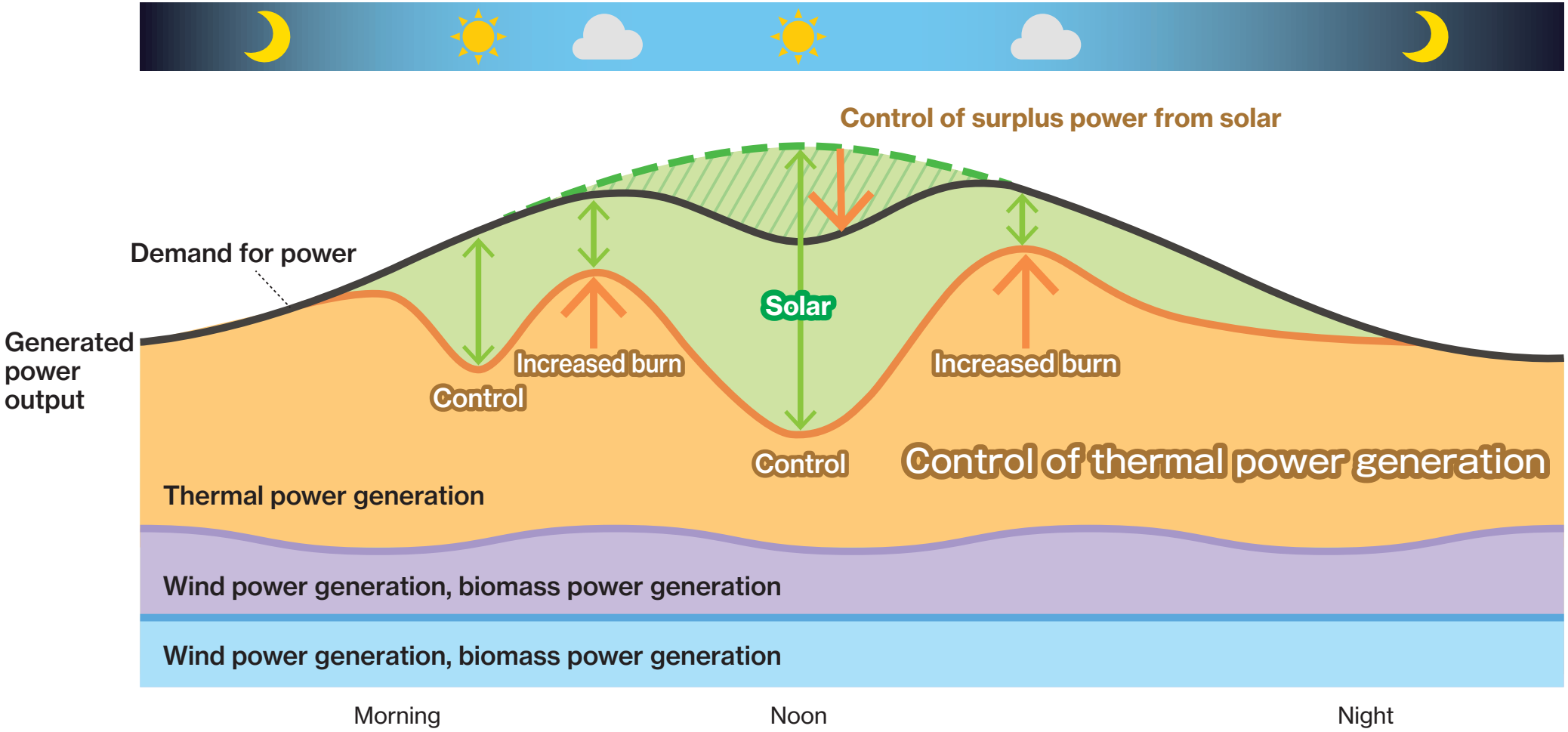


Note: 1975 only is total of 9 power companies (generating end), 1985–2015 is total of 10 power companies (generating end), and 2016 onward is total of 10 areas (sending end).

Source: The Federation of Electric Power Companies

Combinations of Power Generation Methods to Correspond to Power Supply and Demand

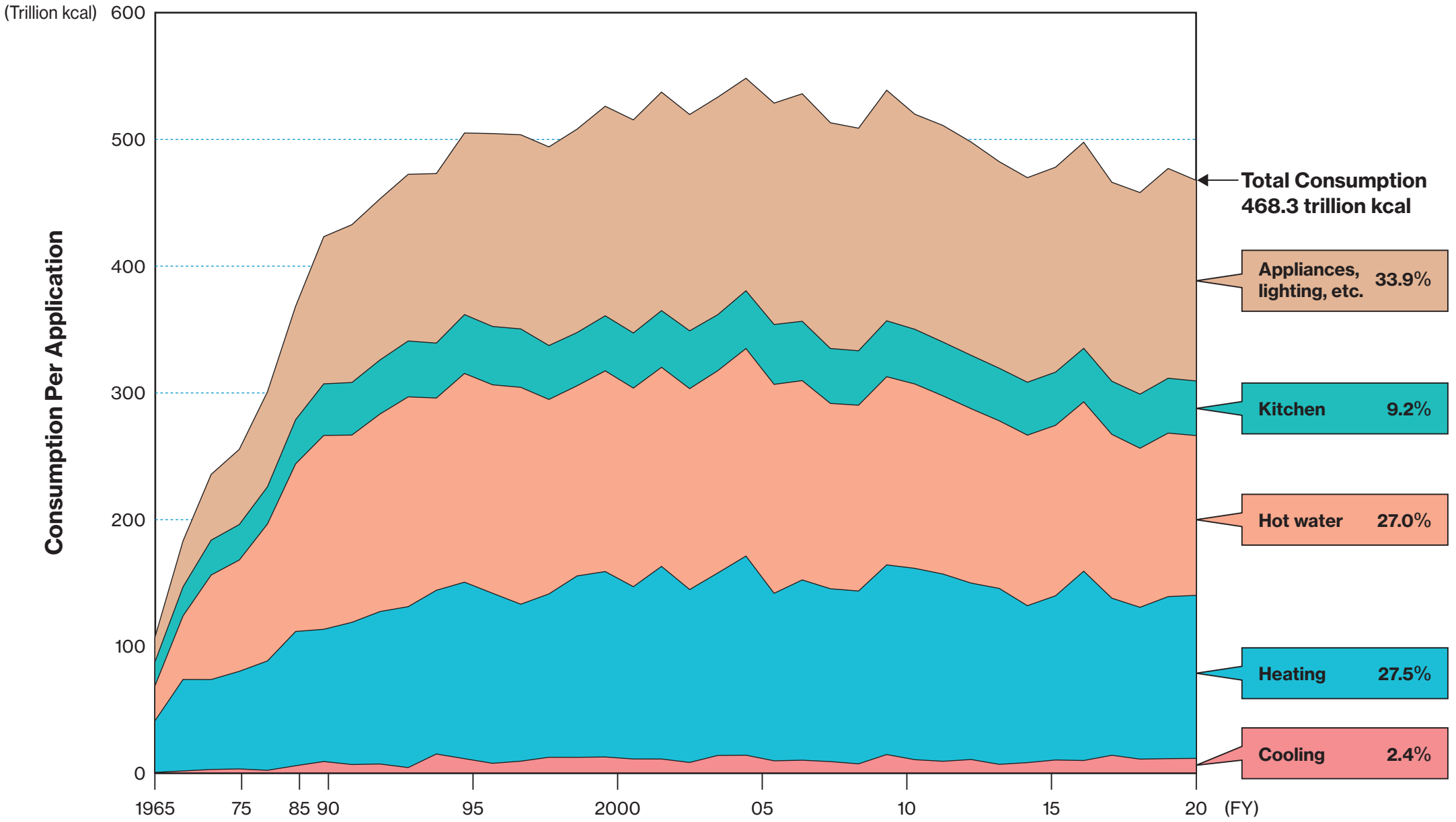
Concept image of supply and demand on day of lowest demand (sunny day in May, etc.)



In order to achieve stable usage of power, the amount of power generated (supply) and amount of power consumed (demand) must be made always equal.
For that purpose, the amount of power generated and the amount of power consumed must be balanced using methods such as thermal power generation that can compensate for the fluctuations in output from renewable energy.

Source: Agency for Natural Resources and Energy, Japan's Energy

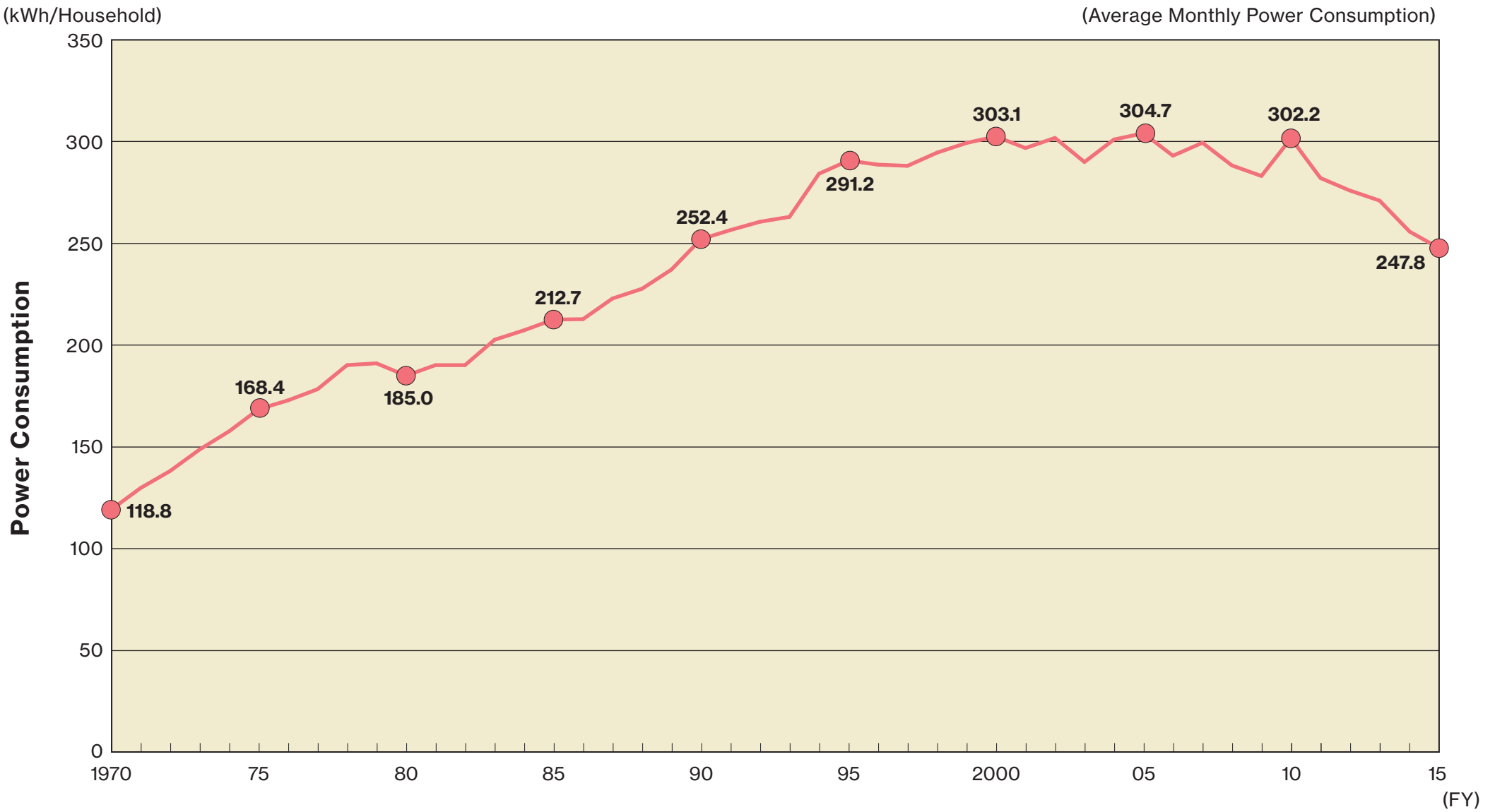
Household Energy Consumption Per Application



(Note) The category "Appliances, lightning, etc." includes washing machines, clothes dryers, futon dryers, TVs, VCRs, stereos, CD players, DVD players, record players, vacuum cleaners, PCs and electric bidet toilets.

Source: The Institute of Energy Economics, Japan, 2023 EDMC Handbook of Energy and Economic Statistics in Japan

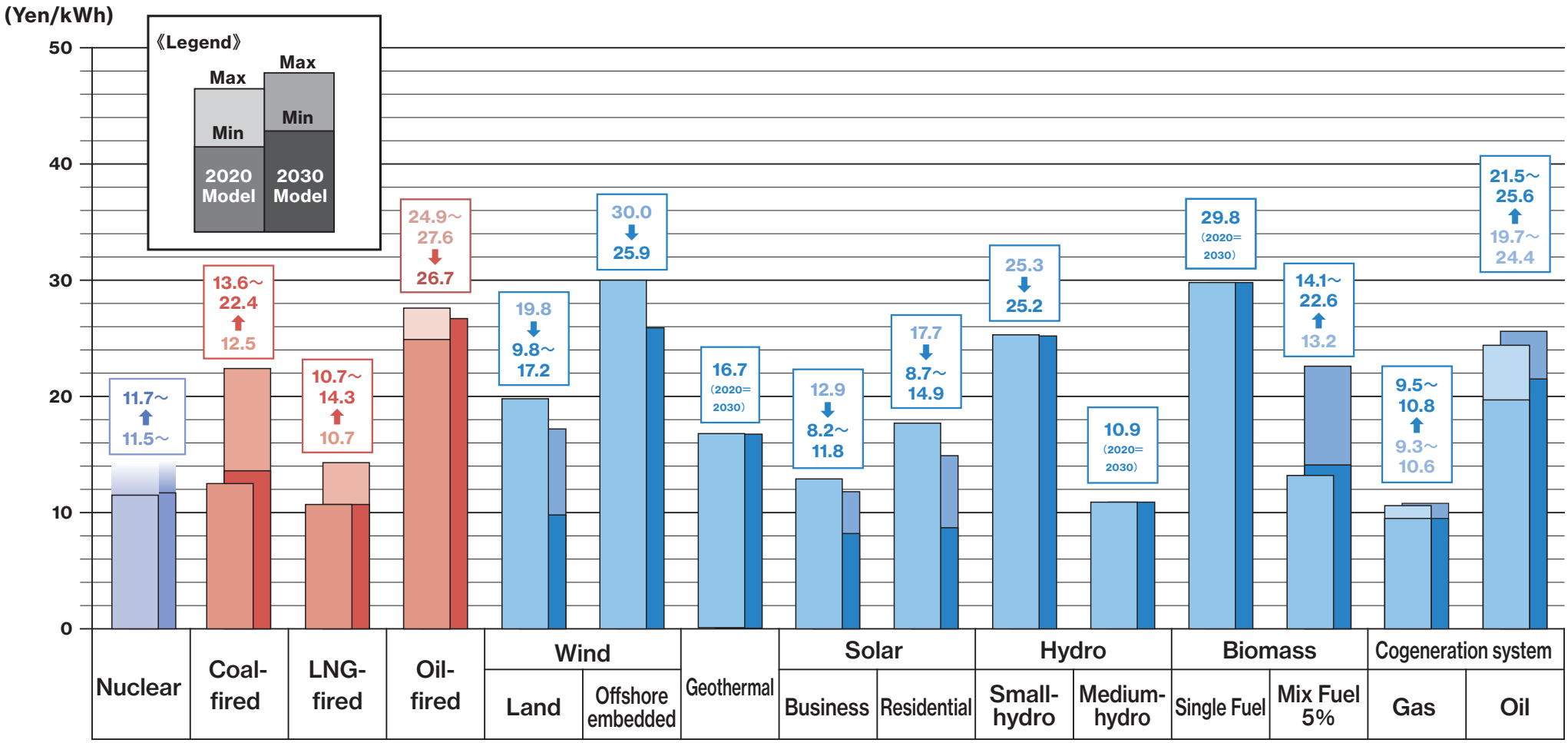
Power Consumption Per Household



(Note) The values are the average across nine power companies.

Source: The Federation of Electric Power Companies

Generation Cost Per Kilowatt Hour (kWh)



	Nuclear	Coal-fired	LNG-fired	Oil-fired	Wind Land	Wind Offshore embedded	Geothermal	Solar Business	Solar Residential	Hydro Small-hydro	Hydro Medium-hydro	Biomass Single Fuel	Biomass Mix Fuel 5%	Cogeneration system Gas	Cogeneration system Oil
Capacity Factor	70%	70%	70%	30%	25.4%	30% (2030 : 33.2%)	83%	17.2%	13.8%	60%	60%	87%	70%	72.3%	36%
Lifespan	40 years	40 years	40 years	40 years	25 years	25 years	40 years	25 years	25 years	40 years	40 years	40 years	40 years	30 years	30 years

Source: Power Generation Cost Verification Working Group Group, Report on Power Generation Cost Verification to the Basic Policy Subcommittee (Sep. 2021)