Japan‘s Recent Energy Affairs

January 2025

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Energy Policy Principle ~ S+3E

Safety

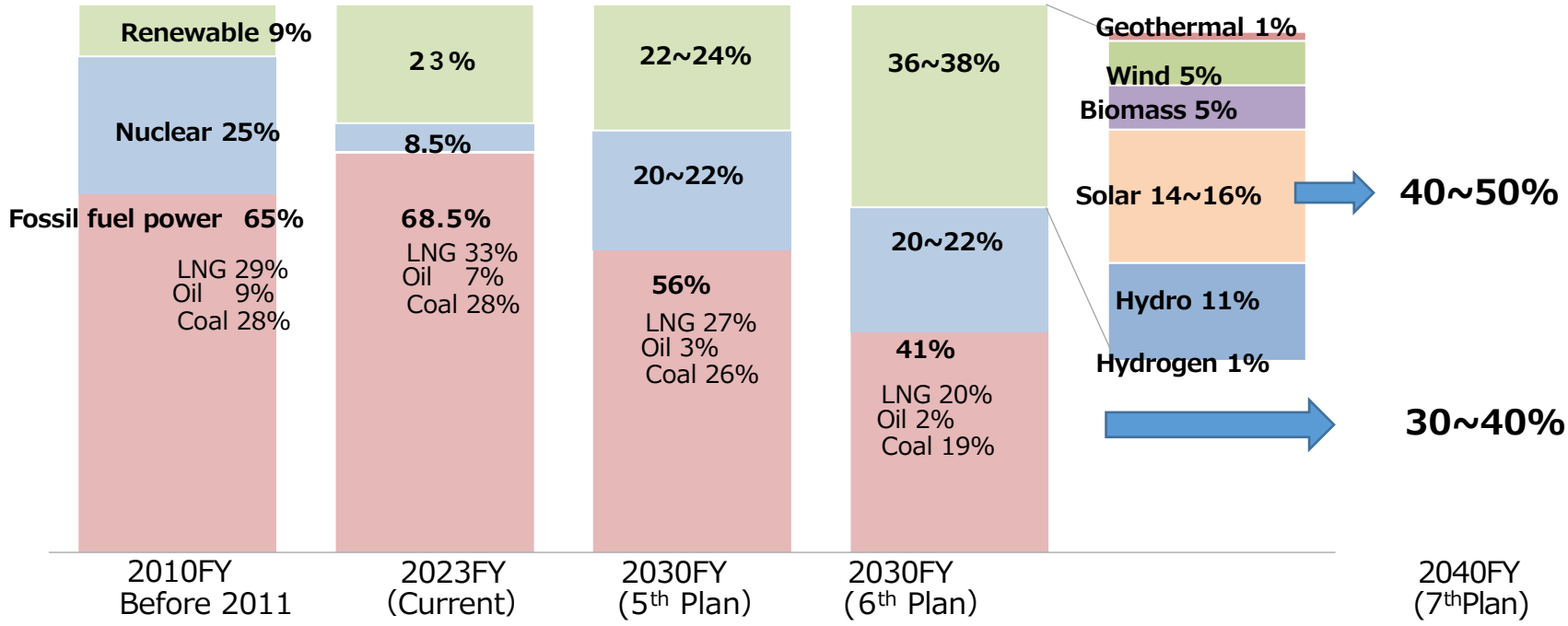
+

Energy Supply (Stability)

Economic Efficiency (Cost)

Environment (CO2 Emission)

Japan's Power Supply Configuration

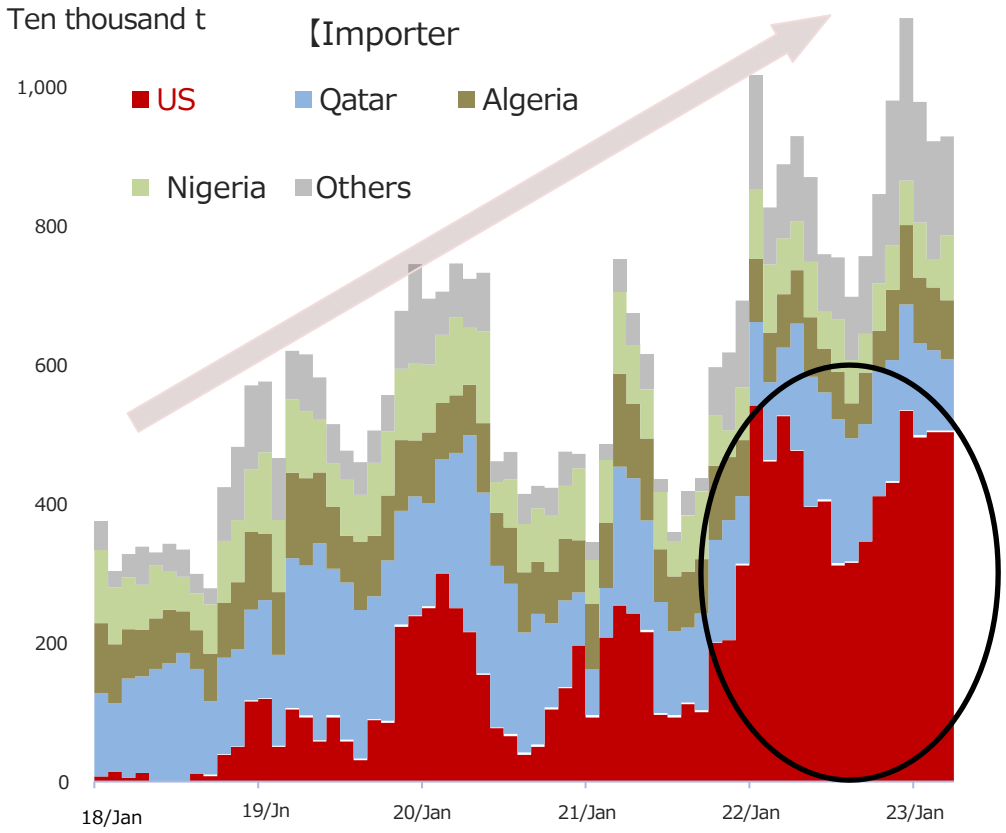


Russia's Invasion to Ukraine ⇒ Energy Security

- Since Russia's invasion, tight LNG supply-demand balance and price hikes.
- Since the destruction of the pipeline, Europe has increased imports from the US LNG.

→Energy Security Revisited

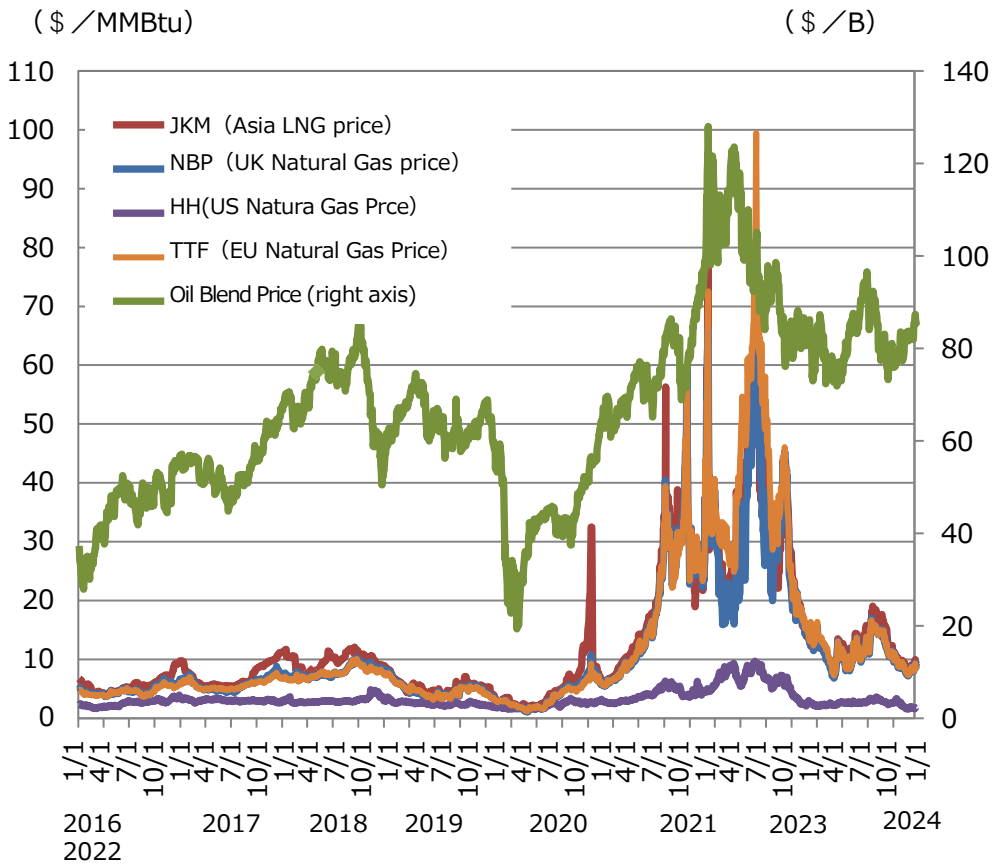
Europe(EU＋Uk)'s LNG Import



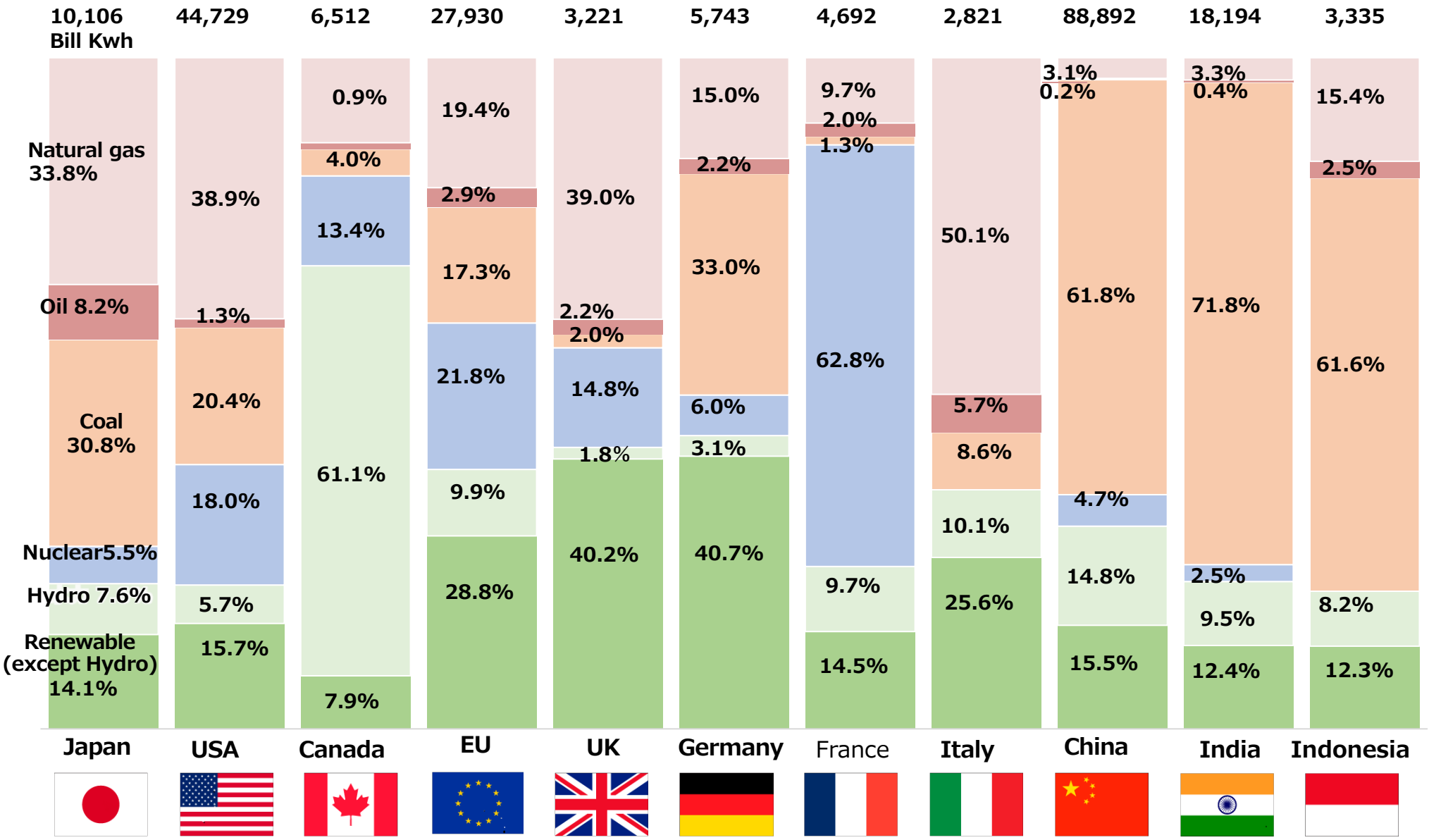
Source:「Energy White Paper 2023」

Increase in LNG imports from the U.S

LNG Spot Price Trend

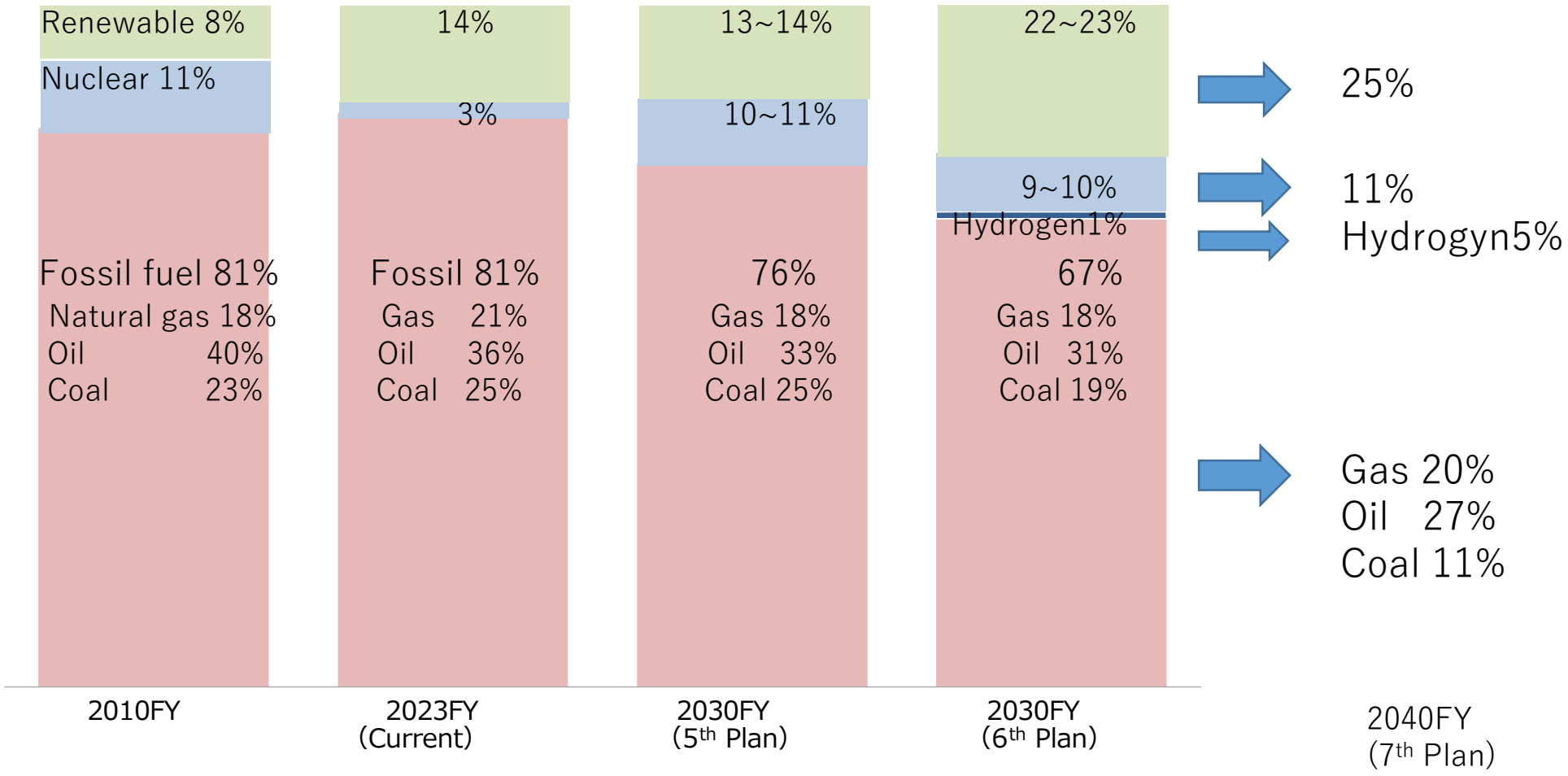


Comparison of power source mixes in various countries(2022)



Source ： IEA World Energy Balances etc

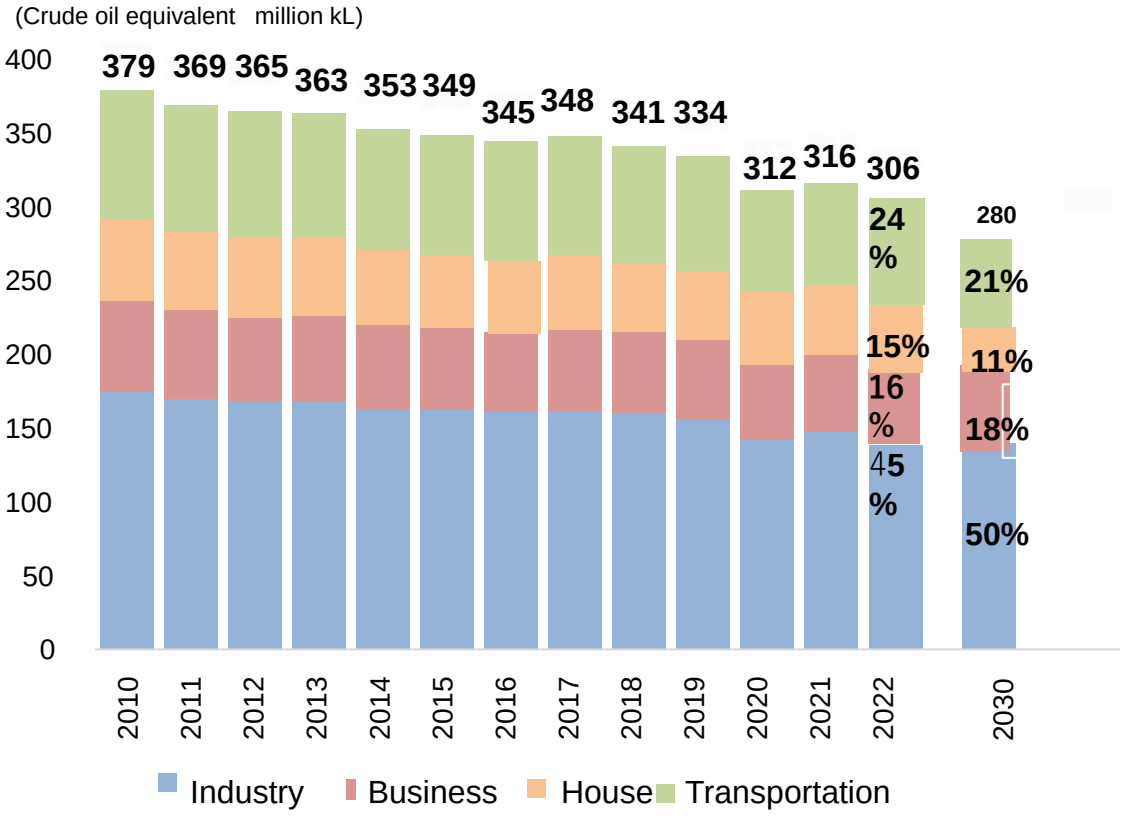
Primary Energy Supply



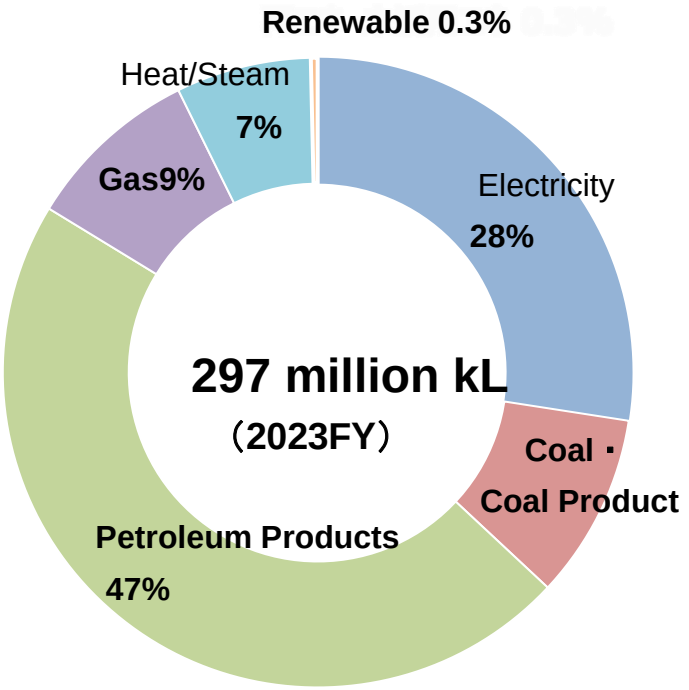
Final Energy Consumption

- Final Energy Consumption is declining.
- Sectoral final consumption by energy source is 30% for Electricity and 70% for Heat.

Sectoral final Consumption



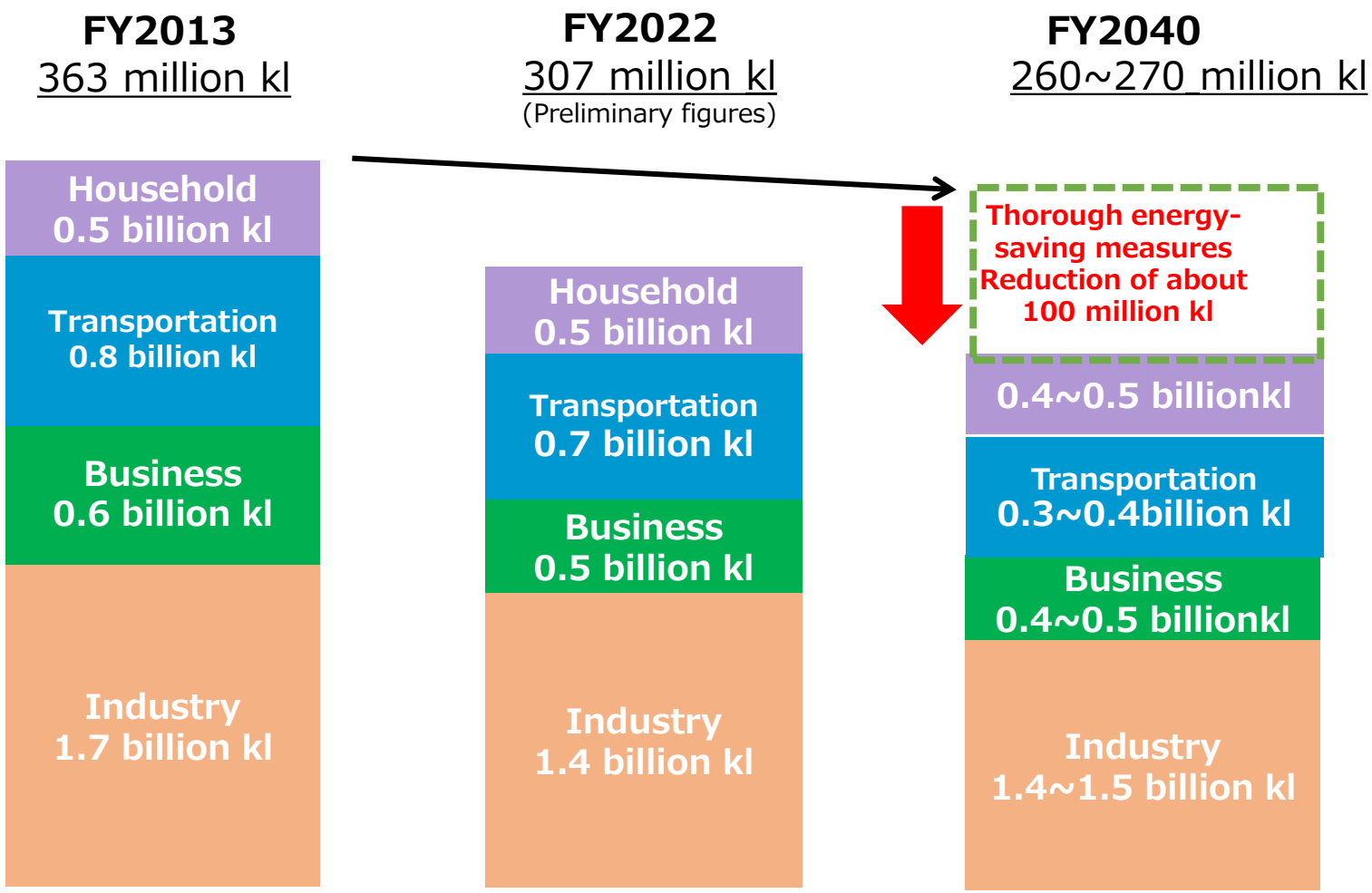
Sectoral final consumption by energy source



Source : ANRE Comprehensive Energy Statistics

Energy Conservation Targets in the 7th Basic Energy Plan(unfinished)

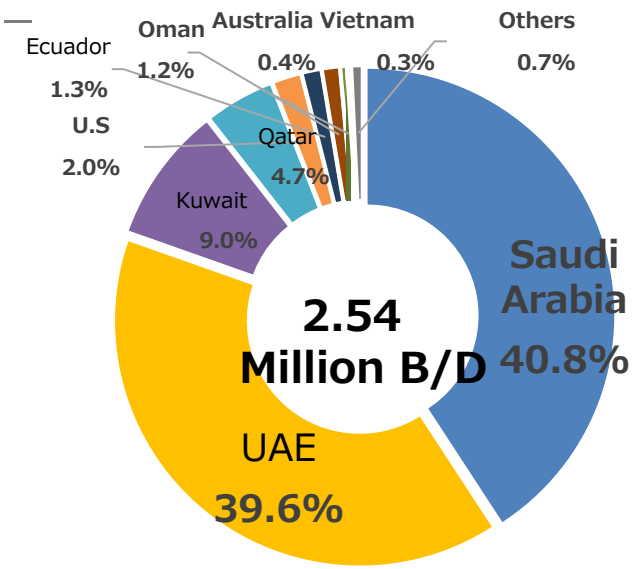
The 7th Strategic Energy Plan projects a reduction of about 100 million kl in crude oil equivalent from the final energy demand in FY2040, which is assumed based on economic growth of 1.4~1.7%, etc., by implementing thorough energy conservation measures.



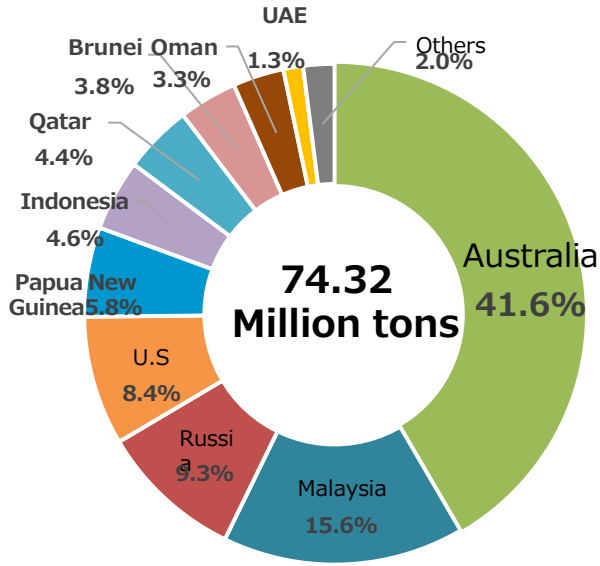
Japan's Fossil Fuel Import Source (2023)

- **The Energy Structure is still dependent on imports from overseas.**
- **In addition to maximizing the use of decarbonized power sources, securing a stable supply of fossil fuel from overseas is essential.**

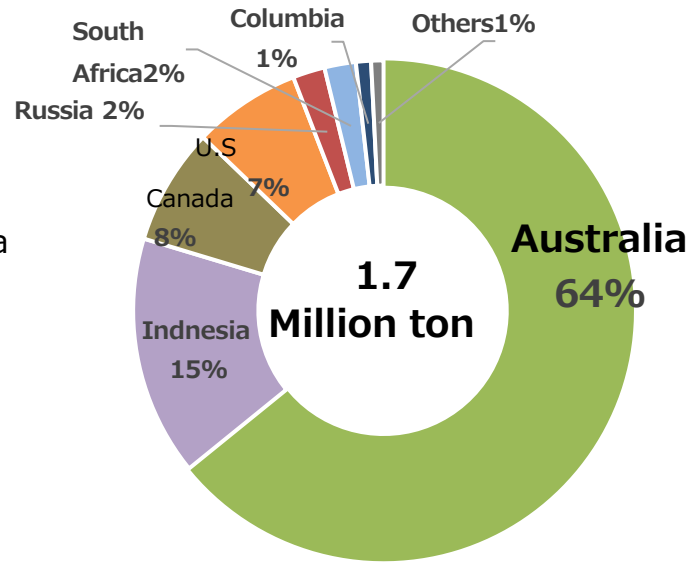
Crude oil import destination/volume



LNG import destination/volume



Coal import destination/volume

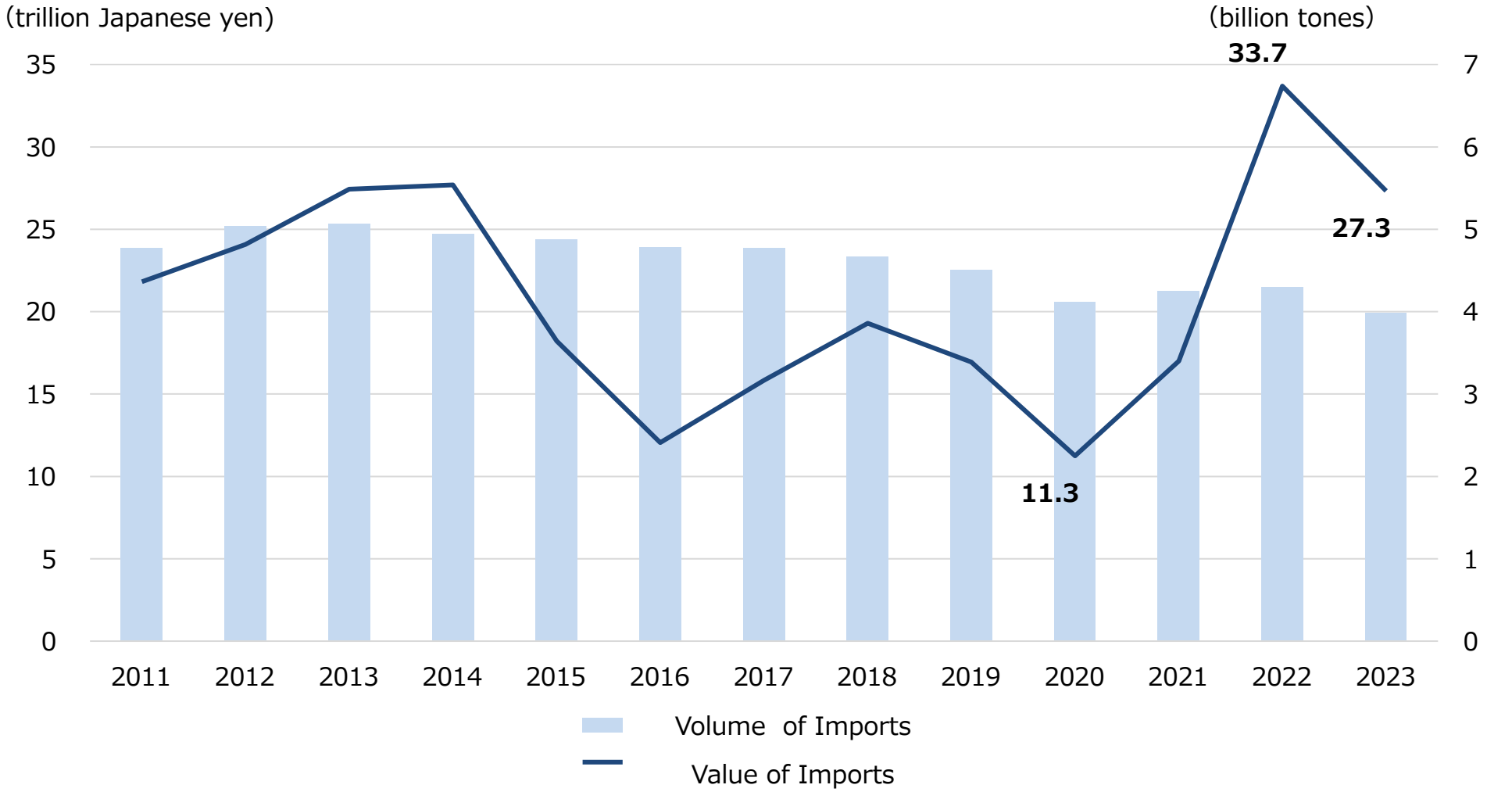


Russia Percentage (2022)	1.5%	9.5%	6.3%
Russia (2023年)	0.08%	9.3%	2.1%

Source : MOF trade Statistics

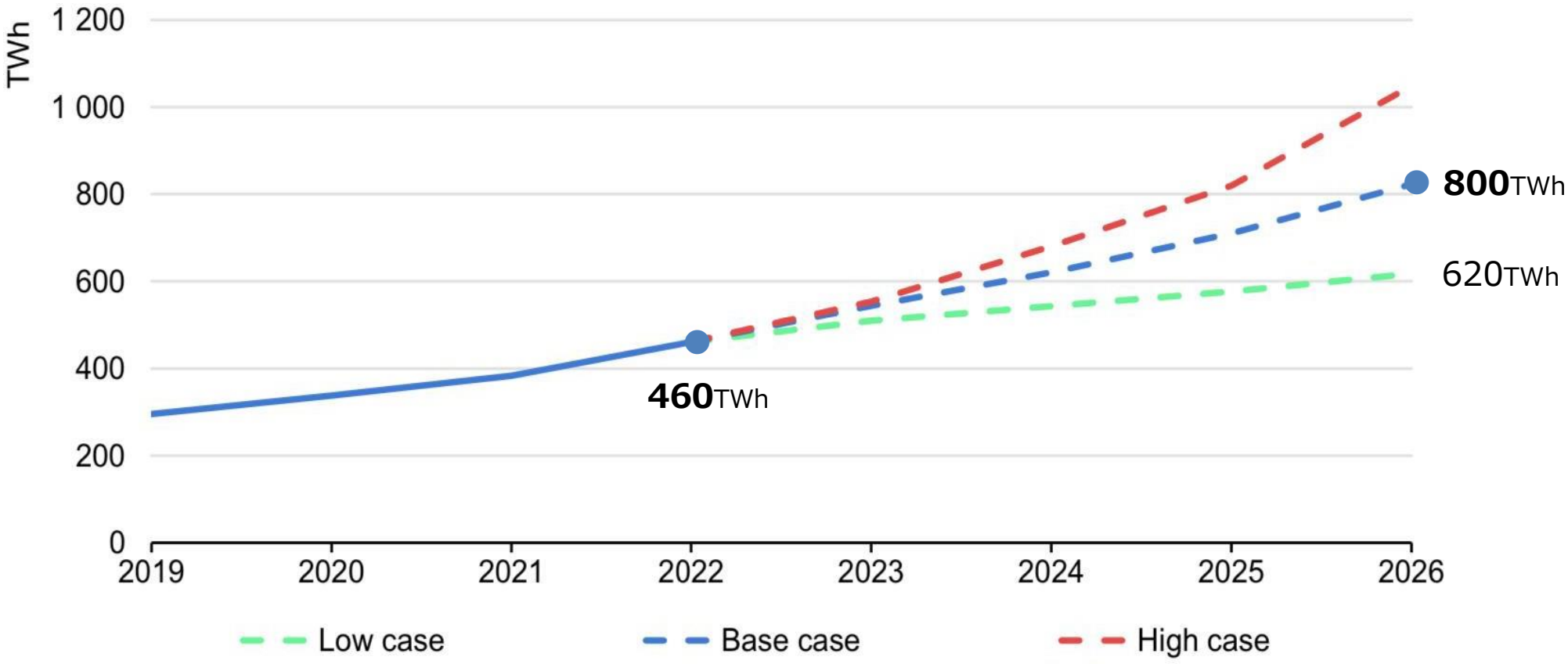
Changes in the value and volume of fossil fuel imports

- Little change in the volume of fossil fuel imports from 2020 to 2023.
- Rapid increase in the value of fossil fuel imports from 2020 to 2023



Source : Trade Statistics

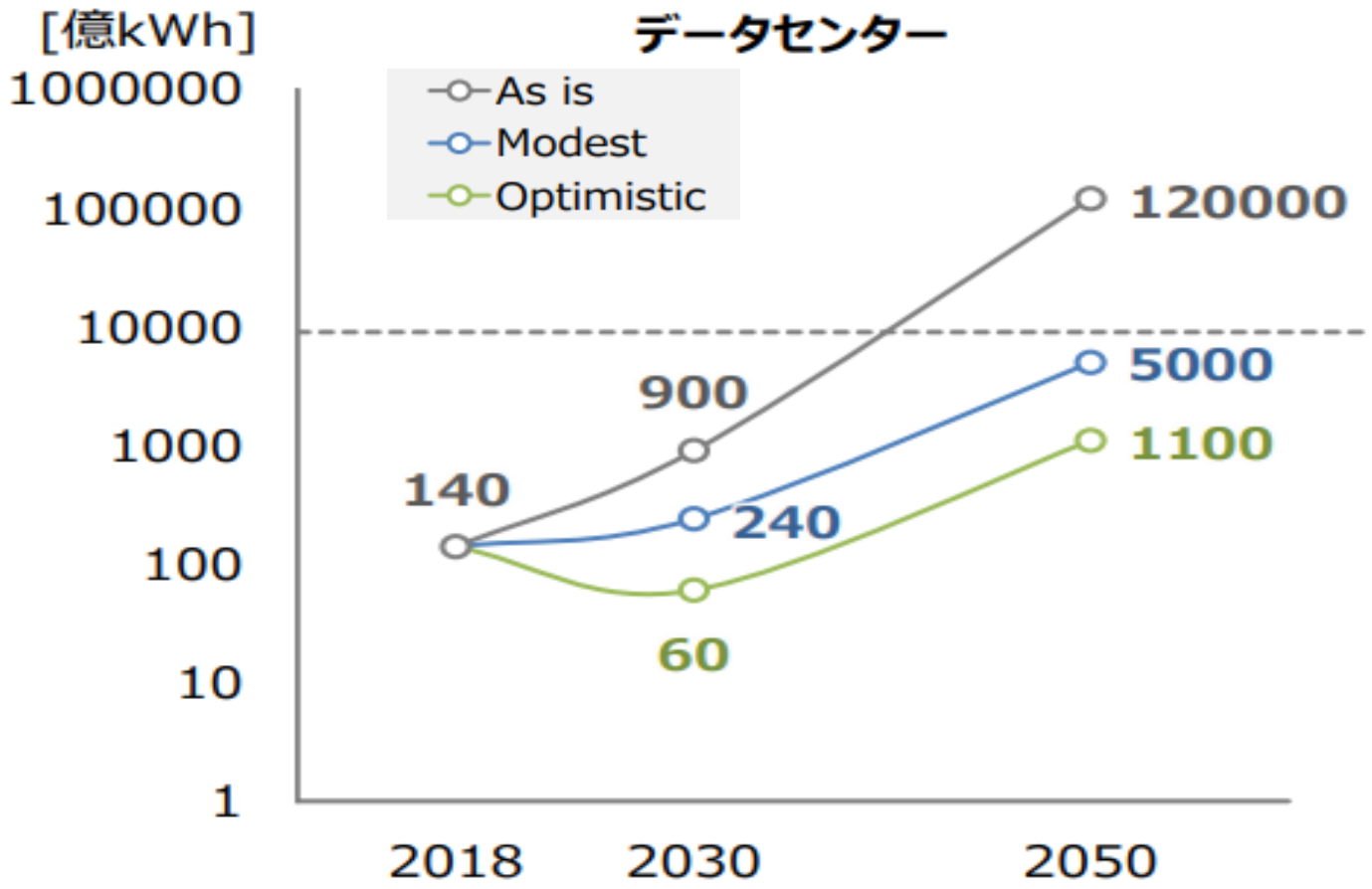
IEA‘s Forecast of Global Power Demand for Data Center, AI, etc



Source： IEA “Electricity 2024”（2024/1/24）

Power Demand Forecast for Data Centers in Japan

unit : hundred million kwh



906.7 billion kWh (2022FY)
Power Demand in Japan

- As is : 0 improved energy efficiency
- Modest : modest improved energy efficiency
- Optimistic : large improved energy efficiency

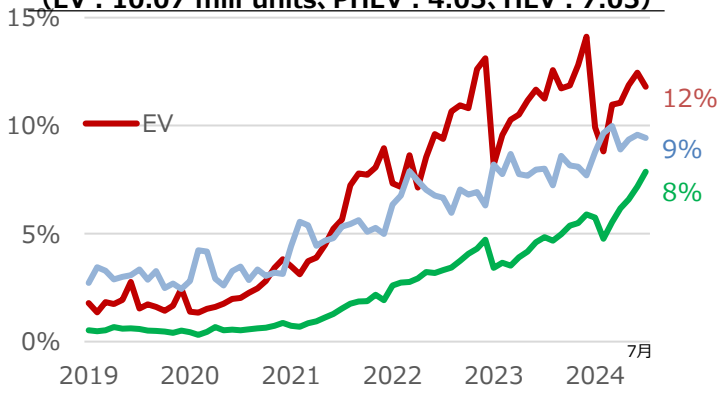
Source : ANRI Council Material

Automobile Electrification trends in regional markets

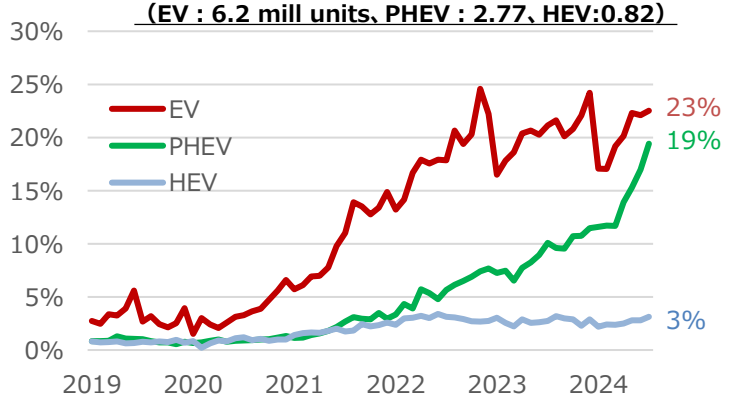
●The proportion of EV sales globally is generally on the rise, but the growth is currently slowing. In western area the sales ratio of HEVs is on the rise. Demand for PHEV is also growing rapidly.

(figures in brackets are annual sales (2023)

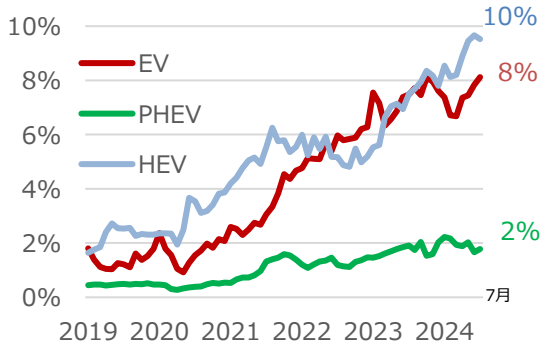
World
(EV : 10.07 mill units、PHEV : 4.05、HEV : 7.05)



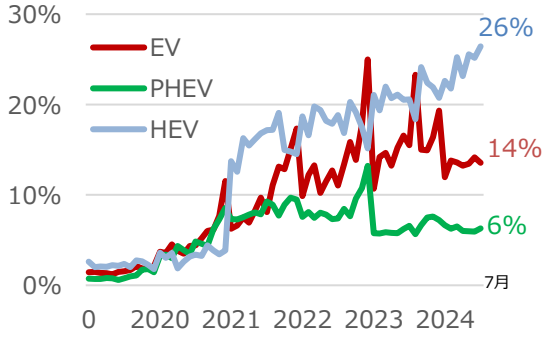
China
(EV : 6.2 mill units、PHEV : 2.77、HEV:0.82)



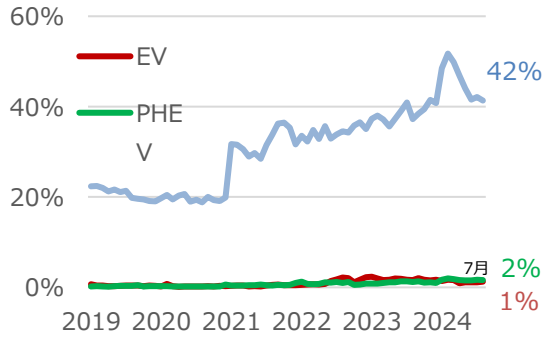
U.S
(EV : 1.18 mill units, PHEV : 0.28,HEV1.17)



Europe
(EV : 1.18 mill units、PHEV : 0.48、HEV : 1.59)

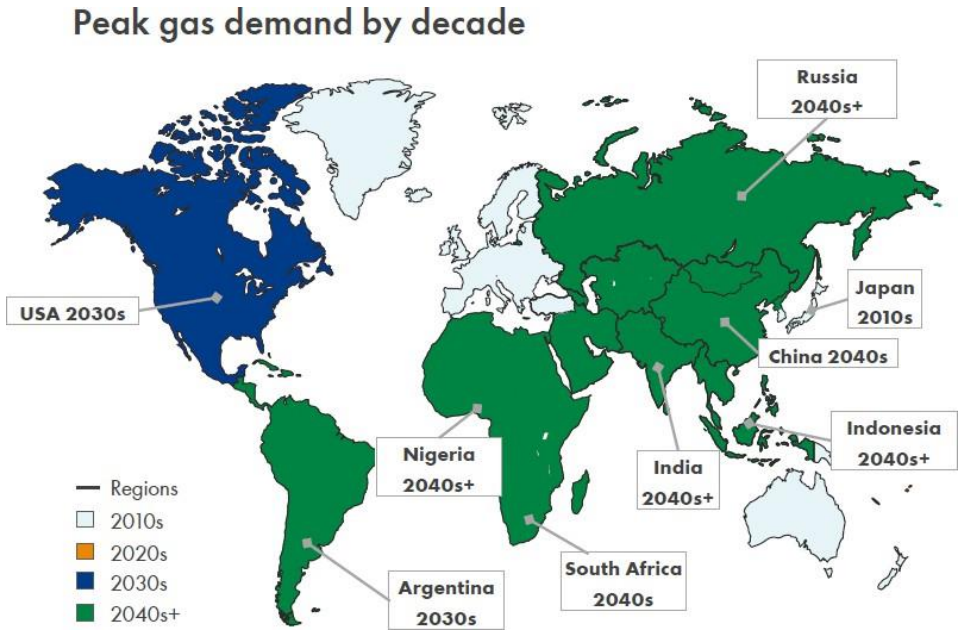


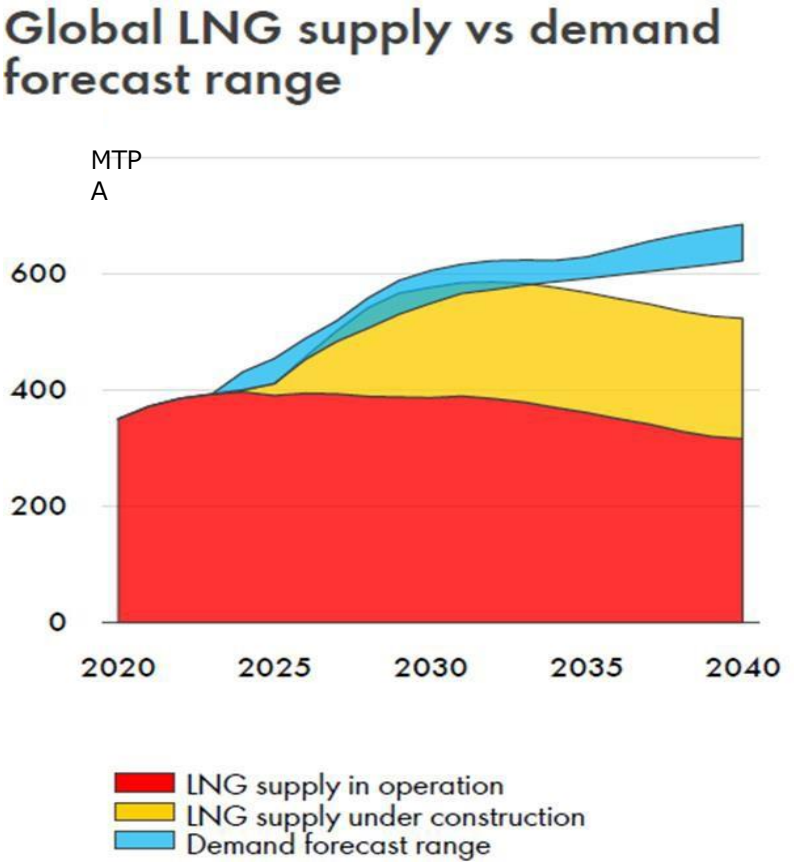
Japan
(EV : 0.09.5mill units、PHEV : 0.05、HEV:1.83)



Source : Marklines, Europe : UK,France,Germany

Shell LNG Outlook 2024~
LNG demand will grow through the2040's





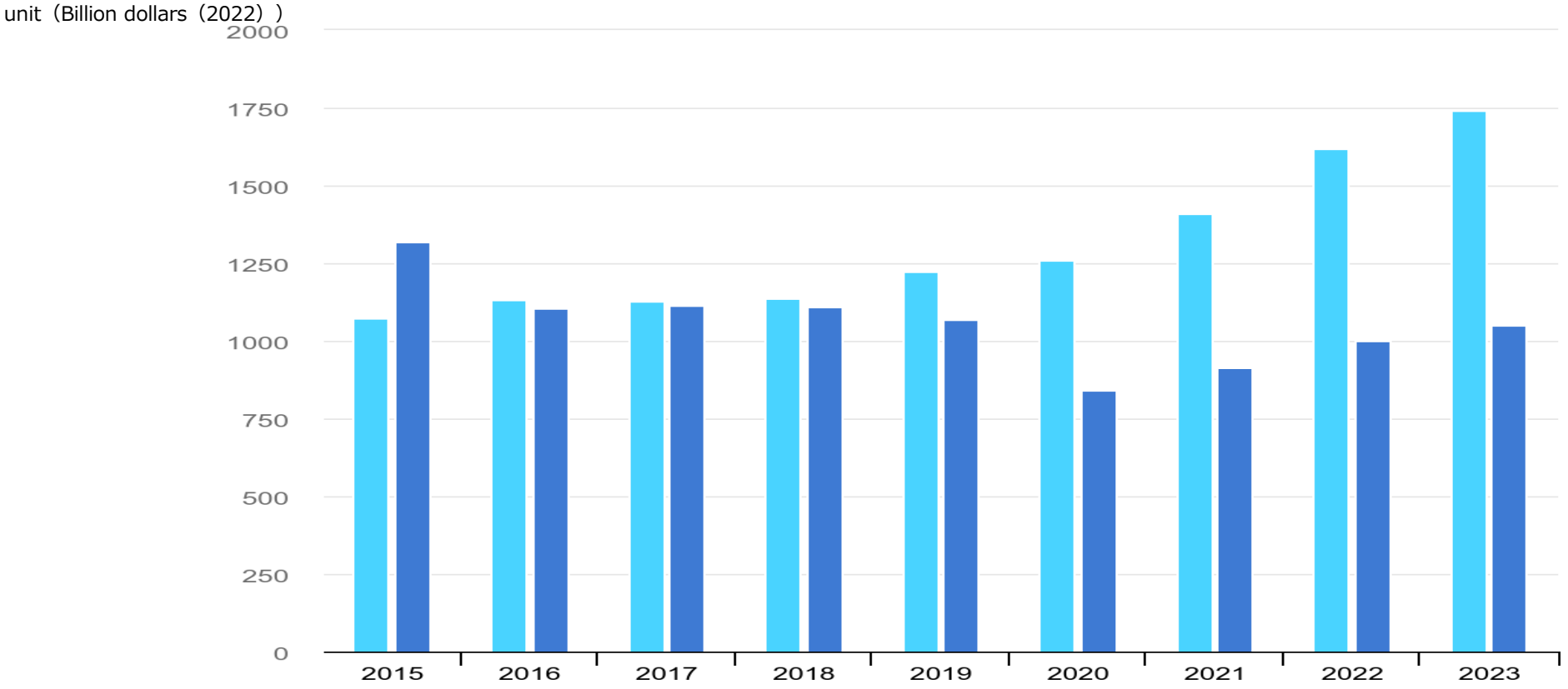
Source : Jogmec Reports

Concerns for lack of investment in fossil fuels

●Investment in upstream fossil fuel development will trend to decline in the long term due to Decarbonization.

●On the other hand, Demand is not declining.

Breakdown of Global Energy Investment
(Light blue : Clean energy、Blue : Fossil fuel)



(出所)IEA「Global energy investment in clean energy and in fossil fuels, 2015-2023」

Cooperation for realistic and healthy development globally

- Decarbonization is essential to sustain the global environment.

- But without fossil fuel, energy for the planet's 8 billion people cannot be met.

- **Innovation and diversification are the keys** in all technologies for Decarbonization.

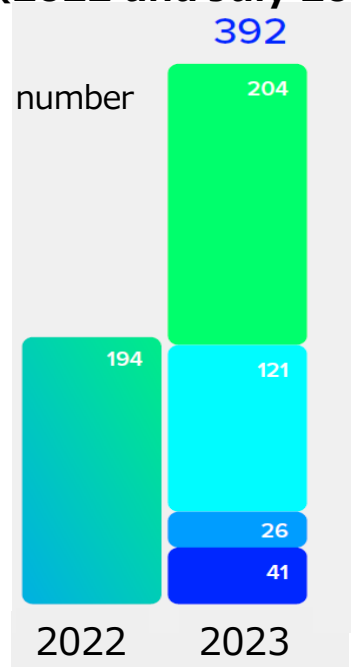
- Fossil supply suppliers can supply renewable energy.

- It is important for energy supplier and consumer countries to cooperate again in innovation and other areas for **realistic solution.**

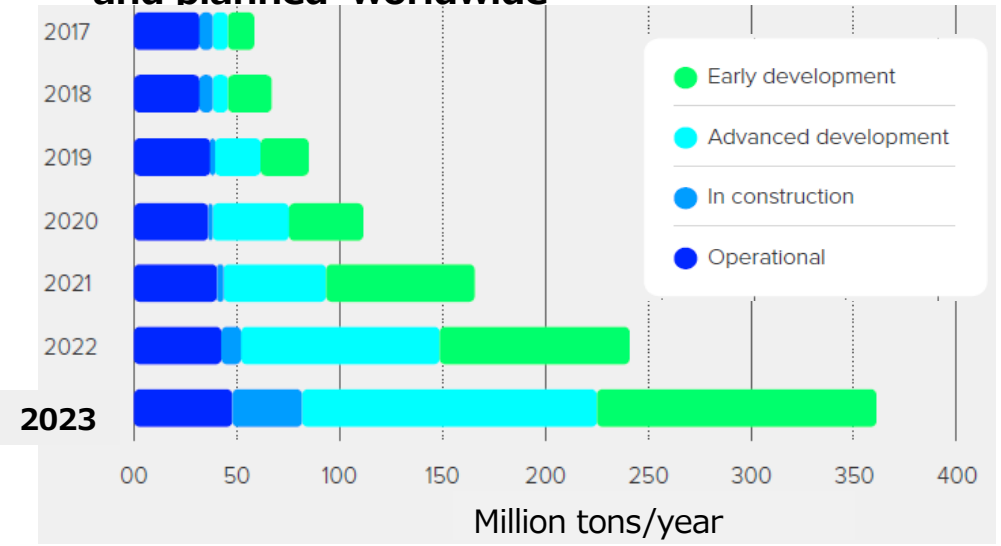
Key Innovation : CCS

- As of July 2023, there will be 392 CCS projects in operation or under Consideration around the world , doubling from 194 in 2022.
- The amount of CO2 capture capacity in operation or planned around the world will increase to approximately seven times the amount in 2017.

Trends in commercial CCS facilities (2022 and July 2023)



Amounts of CO2 capture currently in operation and planned worldwide

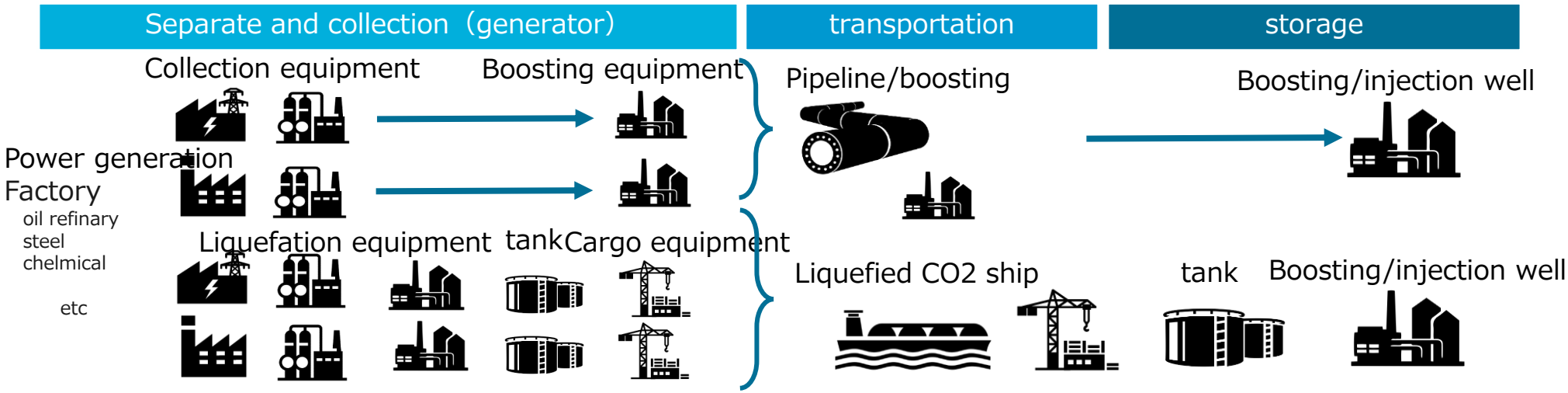


Source : Global CCS Institution Global Status of CCS 2023

Japan's CCS Value Chain Model

●CCS value chain consists of separation and capture, transportation, and storage.

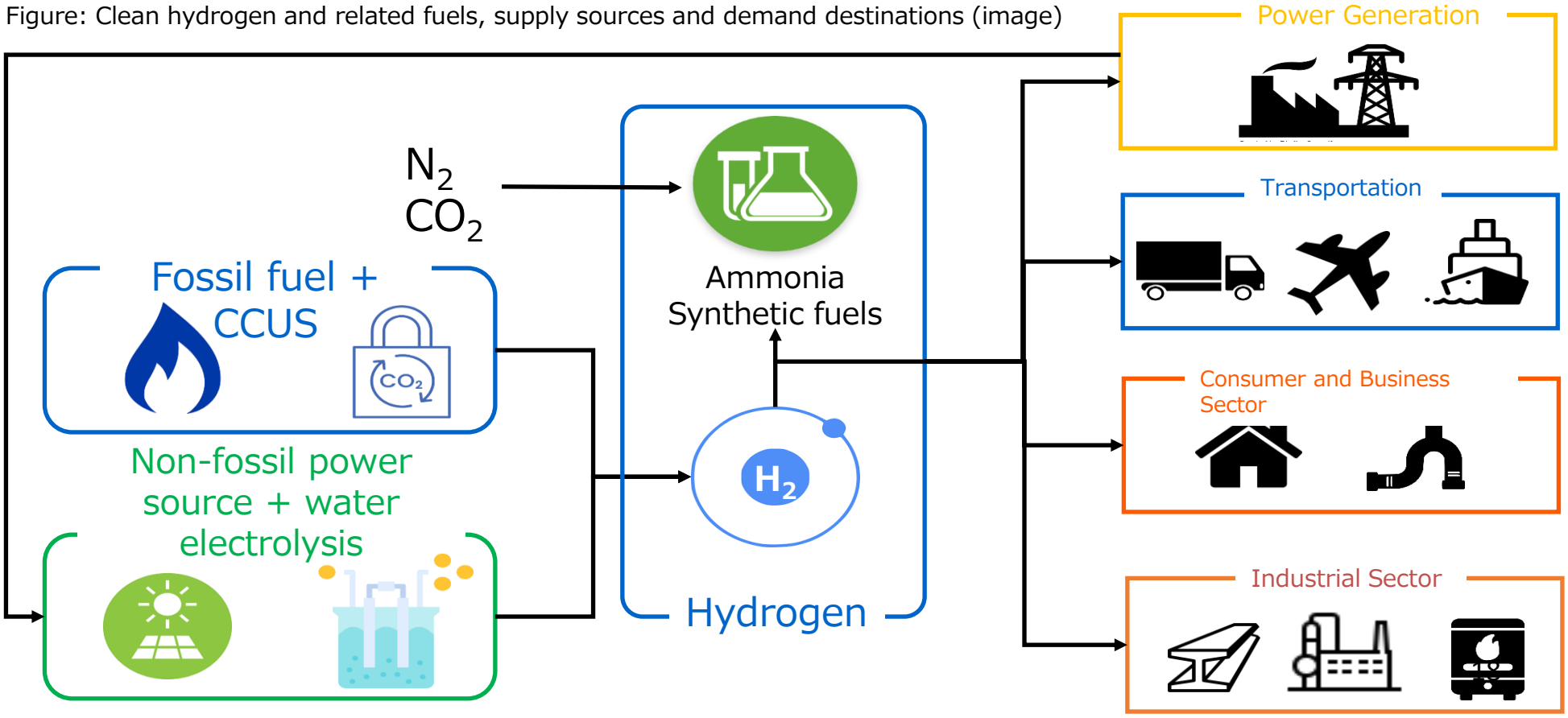
●In 2030 it is expected that Co2 emitters will separate and capture CO2 themselves and pay the transportation and storage company for the service along with CO2.



Key Innovation : Hydrogen

- Hydrogen is a secondary energy that not only directly contributes to the decarbonization of the electric power sector.
- But also enables so-called sector integration, whereby surplus electricity is converted to hydrogen, stored, and used to maximize the potential of renewable energy and other zero-emission power sources in a wide range of sectors.

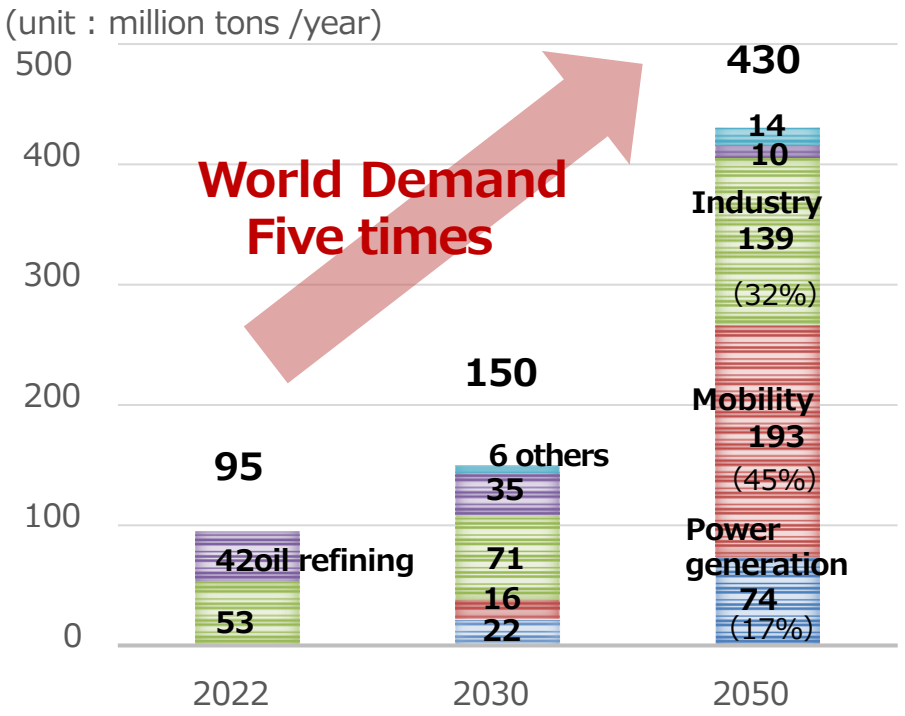
Figure: Clean hydrogen and related fuels, supply sources and demand destinations (image)



Hydrogen is Essential for Carbon Neutrality

- Global demand for hydrogen is expected to be around 430 million tons in 2050. **(five times the current level)**
- Japan aims to expand supply to 3 million tons in 2030 and 20 million tons in 2050.

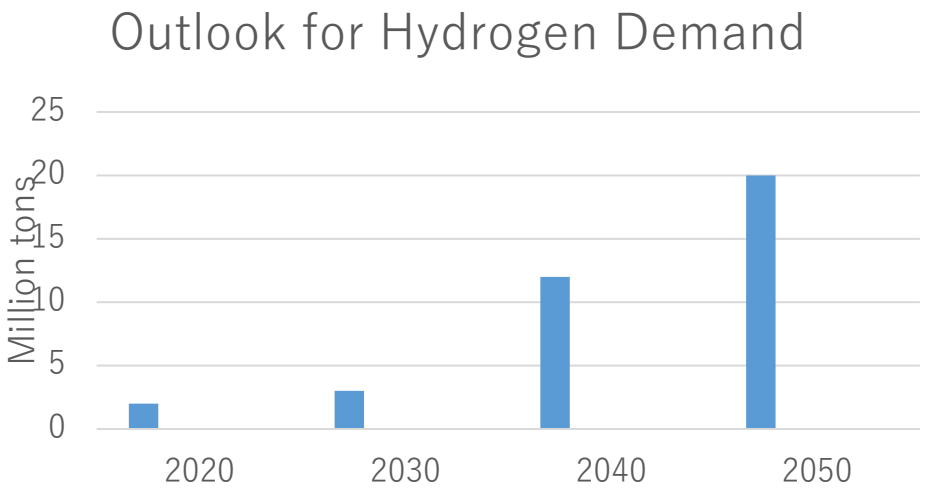
1.Outlook for global demand for Hydrogen



Source : IEA「Net-Zero Roadmap」(2023/Sep)

2.Outlook for Hydrogen Demand in Japan

●2050年 20 million tons
(Hypothetical example)
mobility 6 million tons (30%)
Steel 7 million tons (35%)
Power generation 7 million (35%)



Source : Hydrogen Road Map (2022/Aug)