

Energy White Paper 2022 (Summary)

June 2022

Agency for Natural Resources and Energy

Energy White Paper 2022

- The Energy White Paper is an annual report based on the Basic Act on Energy Policy (statutory white paper). The 2022 version is the 19th publication since its first release.
- The White Paper has been historically comprised of 3 parts, namely Part 1: Analysis based on the current energy situation, Part 2: Data on energy trends at home and abroad, and Part 3: Measures taken. The composition of the 2022 version is as follows:

Part 1 Current Energy Situation and Key Measures

Chapter 1 Progress in the reconstruction of Fukushima

1. Efforts made to cope with the accident at TEPCO's Fukushima Daiichi Nuclear Power Station
2. Support for victims of the accident
3. Fukushima plan for a new energy society
4. Nuclear damage compensation

Chapter 2 Challenges and responses toward achieving carbon neutrality

1. Global trends surrounding decarbonization
2. Japan's responses toward achieving decarbonization

Chapter 3 Responses to Uncertainty Surrounding Energy

1. Impact of the Covid-19 pandemic on energy supply and demand
2. Surging global energy prices and Russia's aggression against Ukraine
3. Impact of surging global energy prices on Japan

Part 2 Energy Trends

Chapter 1 Domestic energy trends

1. Energy supply and demand
2. Energy consumption by sector
3. Primary energy
4. Secondary energy

Chapter 2 International energy trends

1. Energy supply and demand
2. Primary energy
3. Secondary energy
4. Comparison of energy costs by country

Part 3 Measures Taken in FY2021 concerning Energy Supply and Demand

Chap.1 Comprehensive measures to secure a stable supply of energy

Chap.2 Smarter and more flexible consumption activities toward realizing a society of enhanced energy efficiency

Chap.3 Renewable energy to be a main source of electricity

Chap.4 Nuclear policy deployment

Chap.5 Environment in which fossil fuels can be utilized efficiently and stably

Chap.6 Supply structure reform with cross-market transactions

Chap.7 Resilience of domestic energy supply networks

Chap.8 Expanded use of hydrogen and ammonia toward decarbonization

Chap.9 Comprehensive international cooperation on energy

Chap.10 Strategic technological development

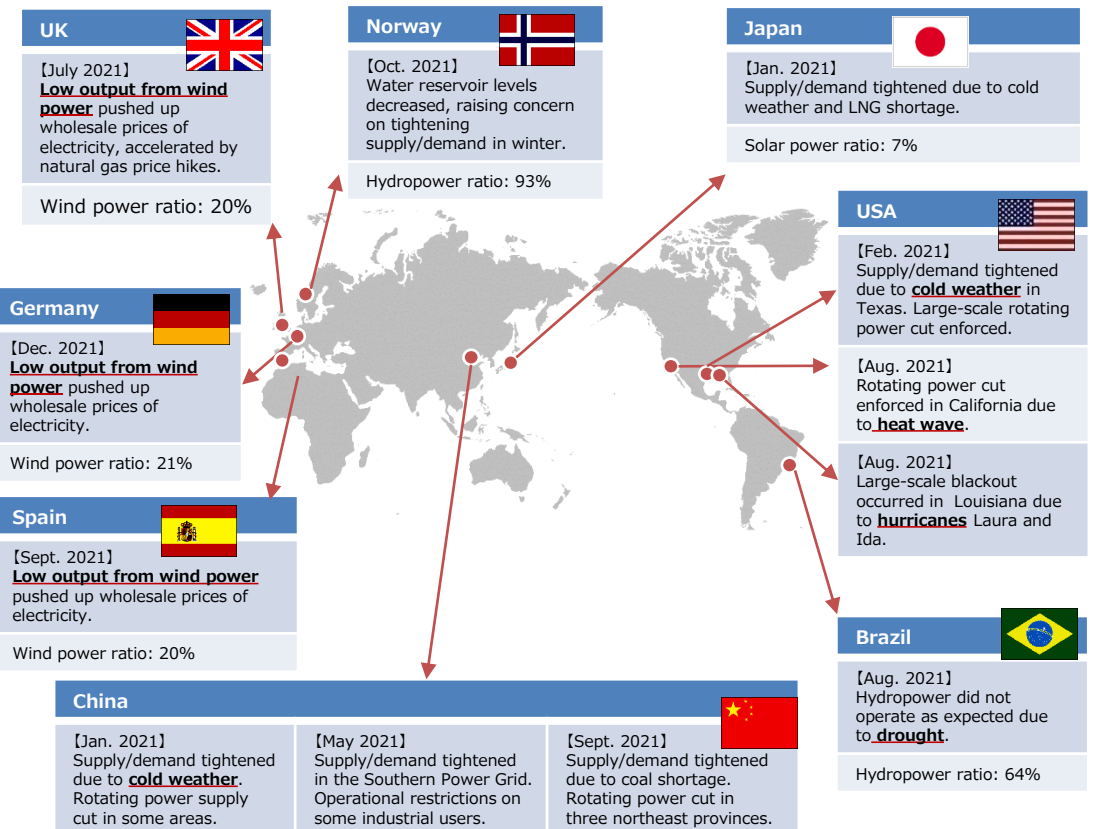
Chap.11 Enhancing public awareness on energy by close communication

Responses to uncertainty surrounding energy

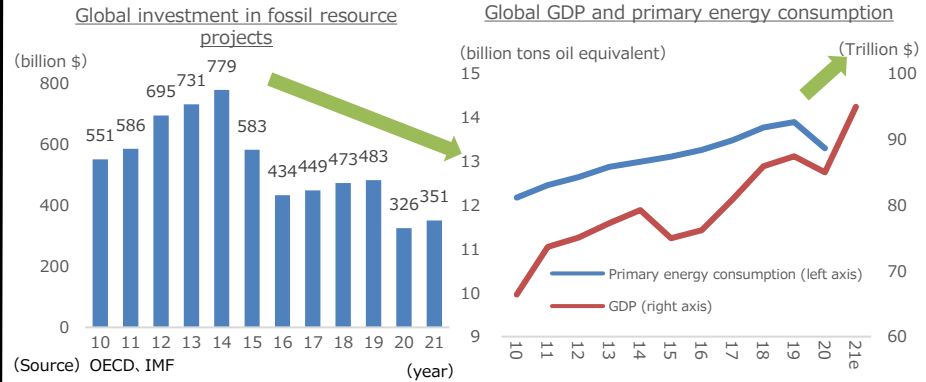
Surging global energy prices

- ① In 2021, supply and demand of electricity tightened in various regions of the world. One of the reasons was that supply capability decreased drastically due to stagnant investment in fossil fuel projects caused by falling crude oil prices since 2015 amid the recent trends toward decarbonization. Another reason was that renewable energy facilities such as wind power could not operate as expected due to bad weather and natural disasters while global energy demand started to increase along with the economic recovery from the Covid-19 pandemic.
- ② Dependency on gas-fired thermal power has increased worldwide during the economic recovery from the Covid-19 pandemic. In Europe, heating demand increased due to the cold weather early 2021, leading to a substantial decline in gas stocks by 20% from that in a normal year. Then, Europe rushed to buy natural gas, crude oil and coal across the world pushing energy prices higher. Price hikes were further accelerated by Russia's aggression against Ukraine.

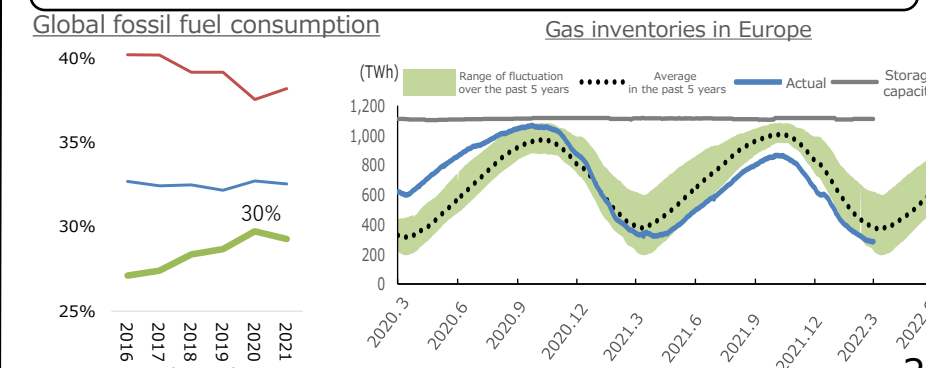
In 2021, supply and demand of electricity tightened across the world.



① Energy supply/demand tightened due to low investment in fossil resource projects and economic recovery



② Amid increasing global dependency on gas, Europe, consuming their inventories, rushed to buy natural gas, pushing prices higher.



Source: The Institute of Energy Economics, Japan

(Source) IEA/World Energy Review 2021]

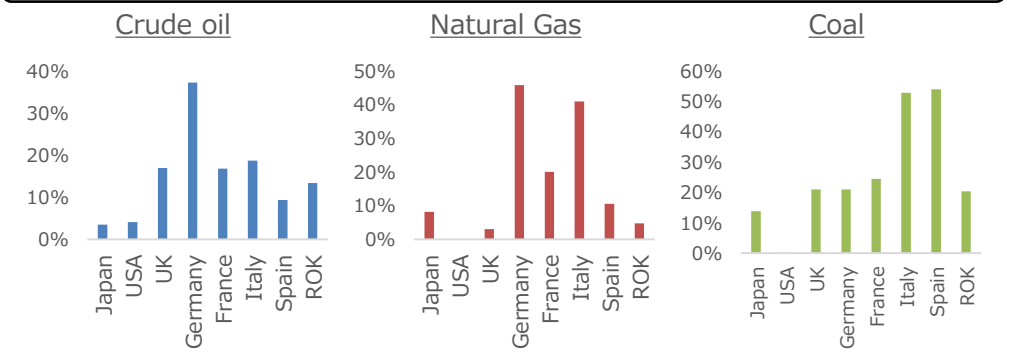
(Source) Created by JOGMEC from Aggregated Gas Storage Inventory

Responses to uncertainty surrounding energy

How Russia's aggression against Ukraine impacted energy

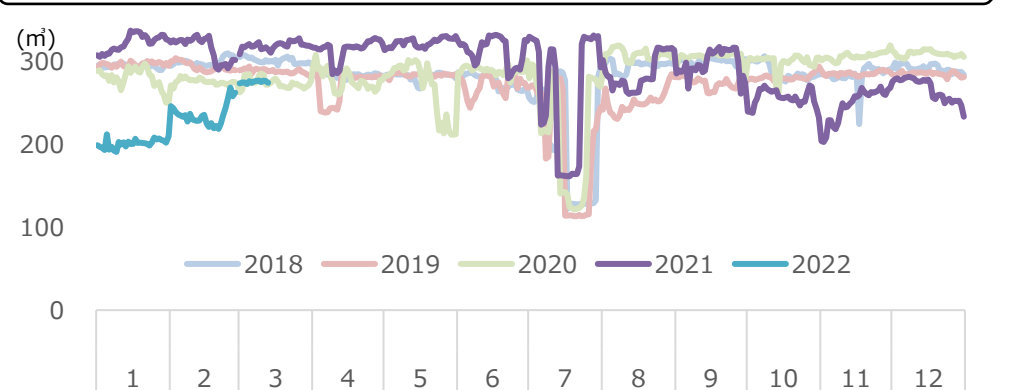
- ① Europe is heavily dependent on Russia for fossil fuels. (Ratio: Germany 50% for natural gas, the Netherlands 100% for oil) Russia's aggression against Ukraine had a strong impact on the Europe's energy situation.
- ② Regarding quantity: From mid-2021 to the year end, Russian state-owned Gazprom decreased its supply to Europe.
- ③ Regarding price: Gazprom's Long-term contract prices are mostly linked with spot prices of gas. Accordingly, soaring spot prices directly affected European long-term contract prices. (Note: Japan's long-term LNG contract prices are mainly linked with crude oil prices.)

① Europe highly dependent on Russian fossil fuels (2020)



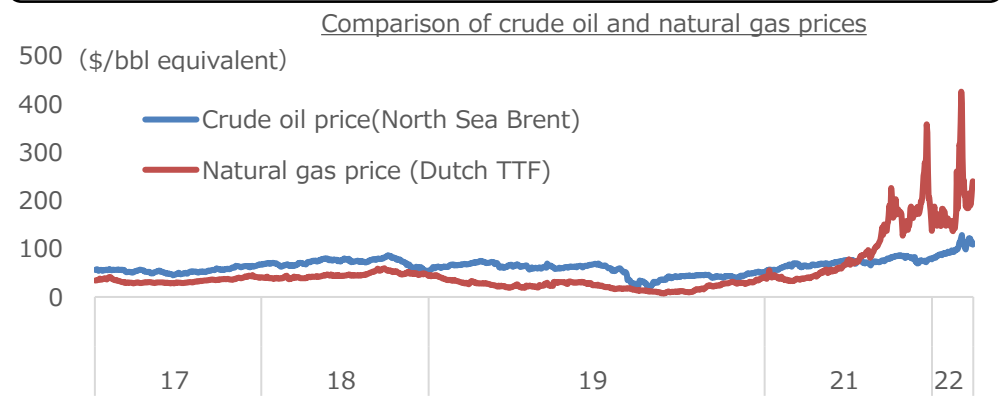
Source : IEA「Reliance on Russian Fossil Fuels in OECD and EU Countries」

② Exports of natural gas by Gazprom to EU decreased toward the end 2021

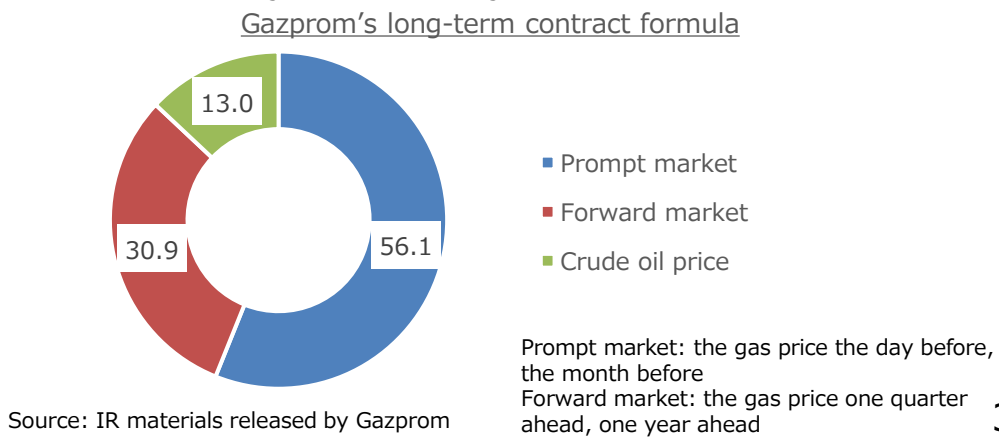


Source: Created by the Institute of Energy Economics, Japan based on Gazprom materials (month)

③ Gazprom's long-term contract prices mostly linked with spot prices of gas



Source: ICE, CME, Chicago Mercantile Exchange

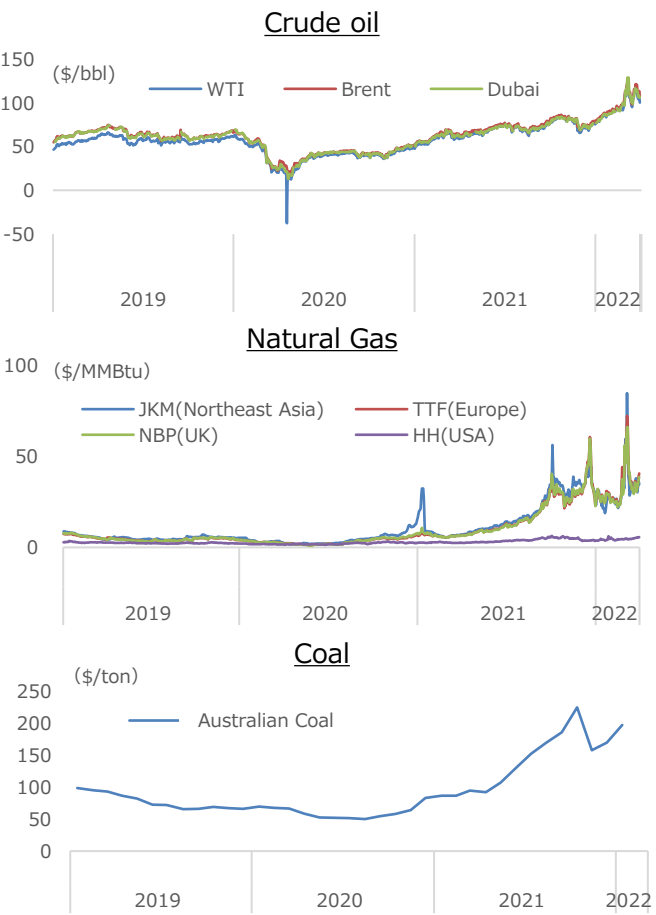


Responses to uncertainty surrounding energy

Surging resource prices and their impact on economies across the world

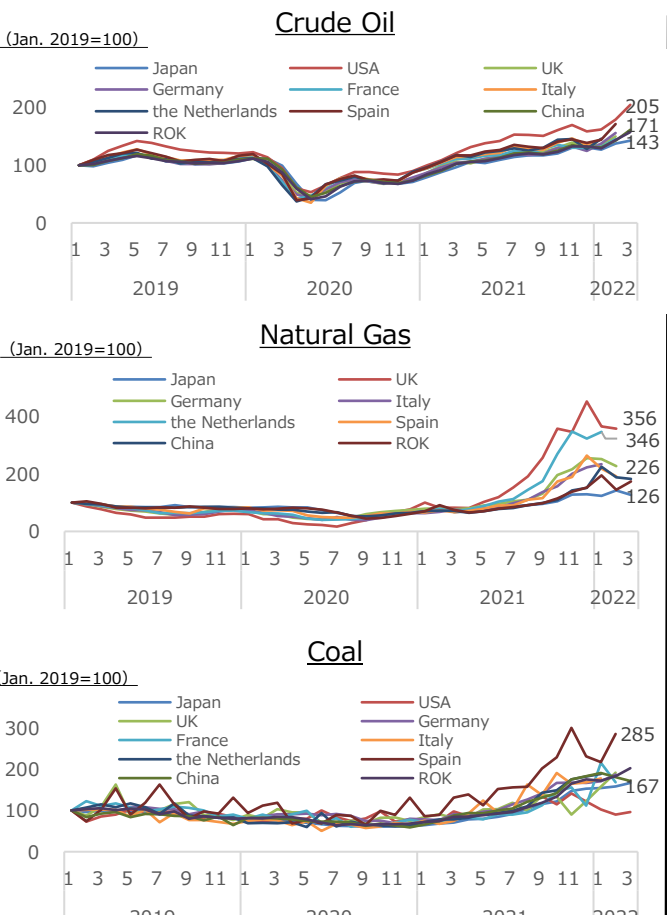
- ① **Prices of fossil fuels** including natural gas **surged due to multiple reasons, such as economic recovery from the COVID-19 pandemic, irregular weather and disasters** across the world and structural **decline in upstream investment** in fossil resources. The price surge was accelerated by the Russia's aggression against Ukraine.
- ② **Import prices** of fossil fuels **also surged**. (**More than doubled in the UK, the Netherlands and Germany. Less than doubled in Japan** for every resource.)
- ③ **Consumer prices** of energy **increased globally**. However, **Japan experienced relatively mild price increase**.

① **Market prices of crude oil, natural gas, coal**



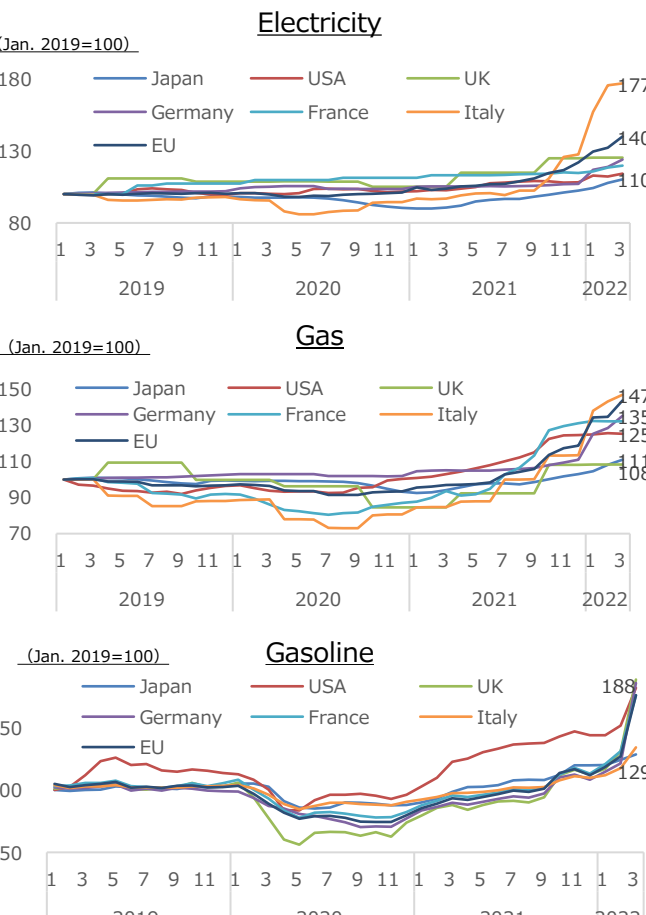
(Source) S&P Global Platts, ICE, CME, Chicago Mercantile Exchange, The World Bank

② **Import prices of crude oil, natural gas, coal**



(Source) Global Trade Atlas

③ **Consumer prices of electricity, gas, gasoline**



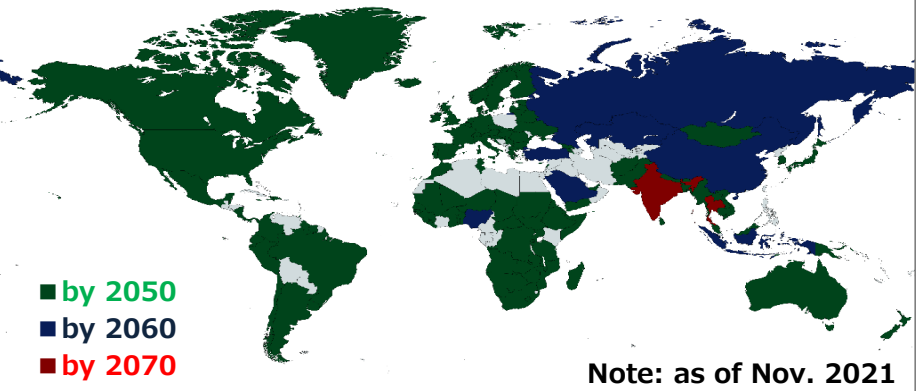
(Source) Statistical data published by respective governments

Challenges and responses toward achieving carbon neutrality

Global trends surrounding decarbonization

- ① The number of countries which declared their intention to achieve carbon neutrality (CN) by a specific year reached **154 countries and 1 area** at the time of the closing of COP26 in November 2021, which accounted for **79% of CO2 emissions and 90% of GDP** globally. Climate change response has now entered **the implementation stage for achieving the goal, instead of just competing by holding up lofty goals.**
- ② **Financial-wise**, climate-related **information disclosure has been progressively made “mandatory” for listed companies** (in UK, USA, Japan, based on TCFD). **Policy-wise, specific support measures have been formulated by several countries** for building an energy structure in decarbonized society (**① Electrification+decarbonization of power ② Hydrogenation ③ CCUS.**)
- ③ **Energy situation is different for each country** (**Japan and China strengthen policies focusing on industry, Europe on household, the USA on transport.**) Realistic efforts must be made based on the situation in each country, which will lead to effective climate change response worldwide.

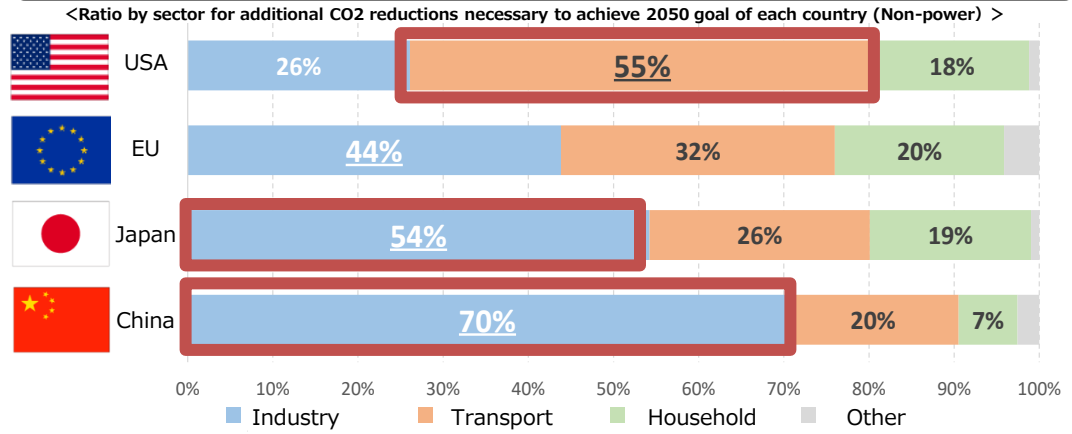
① The number of countries which declared their intention to achieve CN by a specific year like 2050 has been increasing year by year (154 countries and 1 area accounting for 79% of CO2 emissions and 88% of GDP globally)



② Listed companies have been progressively required to disclose climate-related information.

	UK	From April 2022, 1300 listed companies are legally required to disclose information based on TCFD.
	Japan	From FY2022, companies listed on the Prime Market of the Tokyo Stock Exchange are mandated to disclose information based on TCFD.
	USA	In March 2022, the Securities and Exchange Commission (SEC) proposed draft regulations on information disclosure based on TCFD (to be made mandatory in 2024)
	IFRS Foundation	The International Sustainability Standards Board (ISSB) has been established, aiming to finalize unified international standards for ESG information disclosure by the end of 2022.

③ The road to achieving carbon neutrality is rough, and there is no standardized way to suit every nation. It is necessary to enhance measures based on each country's industrial structure and energy situation.



<Major measures taken by each country toward achieving 2050 goal>

	Transport : EV infrastructure, electric buses, 100% SAF Industry: electrification, hydrogenation Household: energy efficiency standards reviewed for buildings and appliances
	Industry: stricter energy efficiency regulations, carbon border adjustment mechanism Transport: building EV Infrastructure, prohibiting sales of gasoline-fueled new cars Household: XEBs mandatory by 2030, large-scale support for renovation to achieve higher energy efficiency
	Industry: investment in higher energy efficiency, electrification, industrial structure reform Transport: subsidies for EV purchase Household: enhancing energy efficiency for houses

Progress in the reconstruction of Fukushima

Starting point of formulating Japan's energy policy: Reconstruction of Fukushima after the nuclear accident

- **Completion of the decommissioning of TEPCO's Fukushima Daiichi NPS and reconstruction of Fukushima are the most important tasks of METI.**
- **As 11 years have passed since the accident, step-by step progress is being seen. However, there are still a number of challenges that need to be addressed from a medium to long-term perspective. The government must stand at the forefront making steady efforts to overcome those challenges.**

Decommissioning of Fukushima Daiichi NPS (on-site)

- Damaged reactors are maintained at a low temperature with on-site radiation levels reduced substantially
 - ※ In 96% of the NPS site, wearing protective clothing is not necessary.
- Work toward decommissioning progressing steadily
 1. Contaminated water/treated water management:
 - Contaminated water generation reduced substantially thanks to frozen soil walls and other measures.
 - ※ 540m³/day (May 2014) ⇒ 130m³/day (FY2021)
 - Action plan formulated based on the basic policy on ALPS-treated water disposal (December 2021)
 - IAEA review mission visited Japan and published a report on its review of safety aspects of ALPS treated water (April 2022)
 2. Spent fuel removal from Units 3 and 4 completed
 3. Fuel debris retrieval:
 - Investigation of the inside of the reactor by an underwater robot commenced (Feb. 2022)
 - Test of the robot arm to be used for experimental retrieval commenced in Naraha Town (Feb. 2022) with the aim of starting operation by the end of the year.

※ALPS: Advanced Liquid Processing System

Reconstruction of Fukushima (off-site)

- Evacuation orders lifted for all areas except for "Restricted Areas"
 - ※ Number of evacuees under evacuation orders 81,000 (Aug. 2013) ⇒ 22,000 (Mar. 2021)
- We aim to lift evacuation orders for the specified reconstruction and revitalization base areas in the spring of 2022 onward.
 - ※ From Nov. 2021, preparatory overnight stay will be allowed gradually.
- Creating an environment for re-inhabitation
 - ※ The JR Joban Line resumed full operation (Mar. 2022). Roadside service areas developed.
- Revitalization of people's livelihoods and development of corporate locations increasing gradually
 - ※ 397 corporate locations in 15 municipalities creating 4,490 jobs (Mar. 2022)
- Industrial bases opened to create clusters of new industries
 - ※ Fukushima Robot Test Field (fully operational in March 2020)
 - ※ Fukushima Hydrogen Energy Research Field (opened in March 2020)

Responses to the remaining challenges

- Disposal of ALPS treated water with thorough measures implemented to mitigate reputational damage
 - ※ To be released into the ocean in approximately 2 years after the basic policy was determined in April 2021
 - ※ Efforts will be advanced to address the following challenges: Examination by the Nuclear Regulation Authority and confirmation by IAEA, explanation to fisheries regarding safety, support for business continuation and expansion with a peace of mind, creating funds to cope with decreasing demand for aquatic products
- Spent fuel removal from the pool
- Fuel debris retrieval

- Handling of "Restricted Areas"
 - ※ Lifting of evacuation orders will start from June 2022 for the specified reconstruction and revitalization base areas in respective municipalities.
 - ※ Toward lifting evacuation orders in areas other than the above, efforts will be made to allow the original residents to return home over the 2020s if they have intention to do so.
- In addition to re-inhabitation, moving and settling in those areas to be promoted. Local consumption to be increased by interaction of people.
- Further implementation of the Fukushima Innovation Coast Framework
 - ※ In collaboration with other ministries and agencies mainly with Reconstruction Agency, Fukushima International Research and Education Organization will be launched in Apr. 2023.

(Reference) Changes of Topics in Part 1 of Energy White Paper

- Part 1, analyzing the latest trends, characterizes each year's White Paper.

Part 1	Chapter 1	Chapter 2	Chapter 3
2022	Progress in the reconstruction of Fukushima	Challenges and responses toward achieving carbon neutrality by 2050 1. Global trends surrounding decarbonization 2. Japan's responses toward achieving decarbonization	Response to uncertainty surrounding energy 1. Impact of the COVID-19 pandemic on energy supply and demand 2. Surging global energy prices and Russia's aggression against Ukraine 3. Impact of surging global energy prices on Japan
2021	Progress in the reconstruction of Fukushima	Challenges and responses toward achieving carbon neutrality by 2050	Changing energy security
2020	Progress in the reconstruction of Fukushima	Resilience of energy systems based on risks associated with disasters and geopolitics	Measures to cope with the effectuation of the Paris Agreement
2019	Reconstruction of Fukushima	Global warming countermeasures and energy policy based on the Paris Agreement	Recent disaster responses and efforts toward enhancing the resilience of energy systems
2018	Historical evolution of the energy situation in Japan since the Meiji Restoration	Progress in the reconstruction of Fukushima	Energy situation at home and abroad and varying challenges
2017	Progress in the Reconstruction of Fukushima	New development of energy policies	Energy system reform and enhancement of competitiveness of the energy industry