5. Scenario Analysis Parameters and Tools for reference

Chapter 5. Scenario Analysis Parameters and Tools for reference

Provide useful materials for scenario analysis based on past supporting case studies.

5. Scenario Analysis Parameters and Tools for reference

5-1. Parameter List

5-2. Physical risk assessment tools

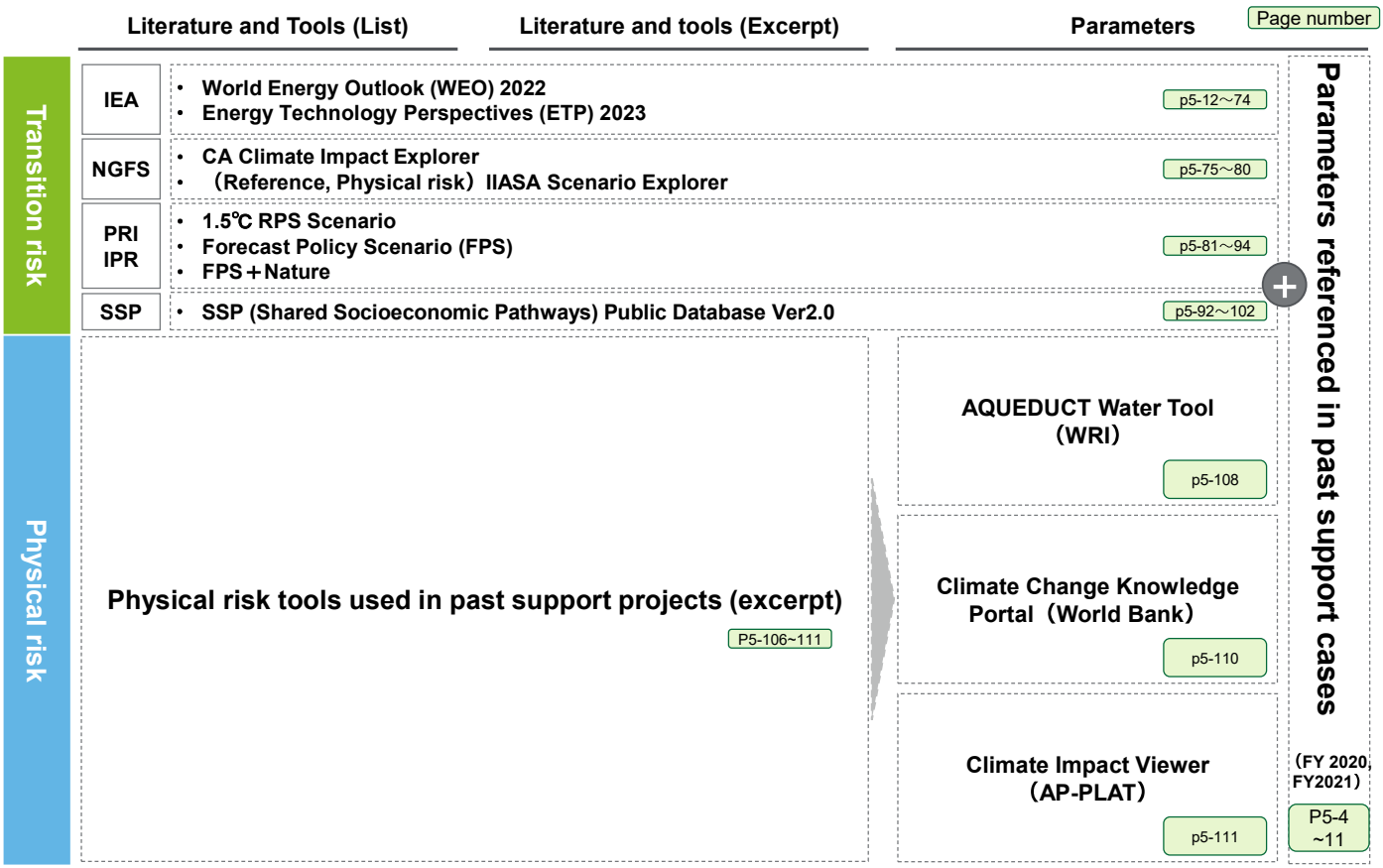
5-3. List of TCFD-related reports

Chapter 5. Scenario Analysis Parameters and Tools for reference

Provide useful materials for scenario analysis based on past supporting case studies.

【Summary of Parameter list】

Partial excerpts on transition risk and physical risk parameters



※Parameters and data are from February 2023

【Methods to acquire transition risk data】
Ways to obtain tools and literatures from IEA, NGFS, PRI, SSP

Issuing Organization	Tool Name	Data acquisition method	URL
IEA	World Energy Outlook (WEO) 2022	• **Download the PDF** report from the IEA homepage • From the IEA homepage, **download the excel for related data.** There are 2 data, **the free dataset and the extended data set**	• PDF：https://www.iea.org/reports/world-energy-outlook-2022 • Free Dataset：https://www.iea.org/data-and-statistics/data-product/world-energy-outlook-2022-free-dataset • Extended Dataset：https://www.iea.org/data-and-statistics/data-product/world-energy-outlook-2022-extended-dataset
	Energy Technology Perspectives (ETP) 2023	• From the IEA homepage, **download the report**（The excel data is not released as of February 2023）	• https://www.iea.org/reports/energy-technology-perspectives-2023
NGFS	CA Climate Impact Explorer	• Can be **viewed through the NGFS homepage**. The datasets are **available for download as an excel** ※Must make an account	• Web tool：https://www.ngfs.net/ngfs-scenarios-portal/data-resources • Excel dataset：https://data.ene.iiasa.ac.at/ngfs/#/downloads
	（Reference、Physical risk）IIASA Scenario Explorer	• Can be **viewed through the NGFS homepage** ※Must make an account	• Web tool：https://climate-impact-explorer.climateanalytics.org/
PRI	1.5℃ RPS Scenario	• **Download excel** from the PRI homepage	• https://www.unpri.org/download?ac=15399 ※Download will start after clicking the link
	Forecast Policy Scenario (FPS)	• **Download excel** from the PRI homepage	• https://www.unpri.org/download?ac=15398 ※Download will start after clicking the link
	FPS＋Nature	• **Download excel** from the PRI homepage	• https://www.unpri.org/ipr-fps-nature-value-drivers ※Download will start after clicking the link
SSP	SSP Public Database Ver2.0	• **Can be viewed through the web tool** on the IIASA homepage	• https://tntcat.iiasa.ac.at/SspDb/dsd?Action=htmlpage&page=10

【Parameters referenced in past support cases】
Transition risk（1/5）

	Item	Parameter	Source	Reference: FY 2020~2021 supported companies
Transition risk	Carbon price	Carbon tax	• IEA WEO2019, WEO2020, NZE2050, WEO2021 • PRI IPR FPS • Information of countries • Ministry of the Environment "Introduction of Taxes to Combat Global Warming" • IPCC "Mitigation Pathways Compatible with 1.5℃ in the Context of Sustainable Development" Below 1.5℃ pathway	ASKUL Corporation, ORIX Asset Management Corporation, Kyushu Railway Company, Shin-Etsu Chemical, Mitsui Mining & Smelting, YASKAWA Electric Corporation, SCSK Corporation, GUNZE, Nishi-Nippon Railroad, Nippon Paper Industries, Fuji Oil Company, Maruha Nichiro Corporation, UACJ Corporation
		Border carbon	• IEA WEO2021 • Ministry of the Environment "Recent Developments in Carbon Tax and Border Adjustment Measures" • ICAP (Average of EU-ETS in 2020)	Fuji Oil Company, UACJ Corporation
		Electricity price	• IEA WEO2018, WEO2020	ASKUL Corporation, ORIX Asset Management Corporation, Kyushu Railway Company, Mitsui Mining & Smelting, SCSK Corporation, GUNZE, Nishi-Nippon Railroad, Nippon Paper Industries, UACJ Corporation
	Carbon emissions targets/policies in each country	Target values for emissions	• Ministry of the Environment's "Draft Japanese Commitments," "Toward Significant Reductions in Greenhouse Gases by 2050" • IEA ETP2020 • Target set by countries • Ministry of Foreign Affairs of Japan "Climate Change: Japan's Emission Reduction Targets" • Ministry of Foreign Affairs of Japan "Domestic and International Developments Concerning Carbon Neutrality in 2050" • Agency for Natural Resources and Energy "Basic Energy Plan" • UNFCCC "Thailand's Updated Nationally Determined Contribution" (October 2020)	Kyushu Railway Company, Shin-Etsu Chemical, YASKAWA Electric Corporation, SCSK Corporation, Nippon Paper Industries, Fuji Oil Company, UACJ Corporation
		Target unmet penalty amount	• IEA WEO2021	Fuji Oil Company
		Annual target of forest area decrease	• Indonesia NDC "First Nationally Determined Contribution REPUBLIC of INDONESIA"	ASKUL Corporation
		Spread of environmentally friendly vehicles (EVs and FC buses)	• IEA WEO2020, NZE2050	Nishi-Nippon Railroad
	Carbon emissions targets/policies in each country (Logging tax)	Logging tax	• Forestry Agency "Forest Environment Tax and Forest Environment Transfer Tax • Customs and Tariff Bureau, Ministry of Finance "Overview of the TPP11 Agreement (CPTPP) (tax rate differences, etc.) • Forestry Agency "Provision of Information on Legally Logged Timber, etc.	Nippon Paper Industries

 ※ The parameters surveyed during support program by the Ministry of the Environment are shown regardless of whether they are used by each company.

【Parameters referenced in past support cases】
Transition risk（2/5）

	Item	Parameter	Source	Reference: FY 2020~2021 supported companies
Transition risk	**Carbon emissions targets/policies in each country （Plastic Regulation）**	Recycled plastic usage rate	• EU Government • Plastic Recycling and Reuse Association, European Plastics Strategy • JPCA • EU Technical Expert Group (TEG), “Taxonomy Report Technical Annex"	ASKUL Corporation, Shin-Etsu Chemical, GUNZE, Fuji Oil Company
	Changes in the energy mix	Power Generation Mix (Japan)	• IEA WEO2019,2020, 2021 • PRI IPR FPS2019 • Japanese Government • Agency for Natural Resources and Energy "Outline of the Basic Energy Plan (Draft 2)”	Kyushu Railway Company, Mitsui Mining & Smelting, YASKAWA Electric Corporation, SCSK Corporation, Nippon Paper Industries
		Fuel price increase/decrease rate	• IEA WEO2020, NZE2050	Nishi-Nippon Railroad
		Oil supply	• IEA WEO2021	Fuji Oil Company
	Dissemination of renewable energy and energy-saving technologies	ZEV ratio	• IEA ETP2017 • Shinichiro Fujimori et al. “The marker quantification of the Shared Socioeconomic Pathway 2: A middle-of-the-road scenario for the 21st century”	ASKUL Corporation, Kyushu Railway Company, Shin-Etsu Chemical
		EV rate of new vehicles	• IEA Global EV Outlook2021	SCSK Corporation, Nippon Paper Industries
		EU Inventory	• IEA WEO2021	UACJ Corporation
		Global Telecommunications Volume Trends	• Cisco ″Global IP Traffic Forecast by Cisco VNI, 2018-2023“ • Nomura Research Institute, "Nomura Research Institute, Outlook for ICT and Media Market Size and Trends through FY2025" • SMART CITY PROJECT	SCSK Corporation
	Development of next-generation technologies	Spread of environmentally friendly trains	• East Japan Railway Company “Production of hybrid vehicle (fuel cell) test vehicle using hydrogen as energy source and implementation of demonstration test” June 2019	Kyushu Railway Company
		Change in the number of passengers between private cars and buses due to decarbonization	• IEA NZE2050	Nishi-Nippon Railroad

 ※ The parameters surveyed during support program by the Ministry of the Environment are shown regardless of whether they are used by each company.

【Parameters referenced in past support cases】
Transition risk（3/5）

	Item	Parameter	Source	Reference: FY 2020~2021 supported companies
Transition risk	**Changes in important products/ prices**	Recycled Aluminum Utilization Rate	• IAI “1.5 DEGREES SCENARIO A MODEL TO DRIVEEMISSIONS REDUCTION” • National Institute for Environmental Studies, “Estimating the Impacts of Carbon Constraints on Metal Production and Use on a Global Scale” (2021)	UACJ Corporation
		Aluminum price	• World Bank “World Bank Commodities Forecast”	UACJ Corporation
		Copper demand forecast	• Sebastiaan Deetman et al “Scenarios for demand growth of metals in electricity generation technologies, cars and electronic appliances”	Mitsui Mining & Smelting
		Zinc demand forecast	• World Bank “The Growing Role of Minerals and Metals for a Low Carbon Future“	Mitsui Mining & Smelting
		Lead demand forecast	• World Bank “The Growing Role of Minerals and Metals for a Low Carbon Future“	Mitsui Mining & Smelting
		cobalt, nickel, and platinum demand forecast	• World Bank “The Growing Role of Minerals and Metals for a Low Carbon Future“	Mitsui Mining & Smelting
		Aluminum demand forecast	• CM group, IAI “AN ASSESSMENT OF GLOBAL MEGATRENDS AND REGIONAL AND MARKET SECTOR GROWTH OUTLOOK FOR ALUMINIUM DEMAND” (2020)	UACJ Corporation
		Fuel price (Oil price, coal price, natural gas price)	• IEA WEO2020, NZE2050, WEO2021 • Agency for Natural Resources and Energy ″Basic Energy Plan″	ASKUL Corporation, Kyushu Railway Company, Shin-Etsu Chemical, Mitsui Mining & Smelting, GUNZE, Nishi-Nippon Railroad, Fuji Oil Company, UACJ Corporation
		Iron price	• 2ii “The Transition Risk-o-Meter Reference Scenarios for Financial Analysis”	Kyushu Railway Company
		Energy intensity	• Japanese government	Shin-Etsu Chemical
		Smart city market size and M2M traffic	• SMART CITY PROJECT “Smart Cities, the world's most important national strategy″ • Statista “Smart City Market revenue worldwide 2019 – 2025, by segment”	Shin-Etsu Chemical

 ※ The parameters surveyed during support program by the Ministry of the Environment are shown regardless of whether they are used by each company.

【Parameters referenced in past support cases】
Transition risk（4/5）

	Item	Parameter	Source	Reference: FY 2020~2021 supported companies
Transition risk	Changes in important products/ prices	Industrial robot market size in major countries	• Japanese Government and others	Shin-Etsu Chemical
		Sales of sustainable certified product	• Nielsen “Product Insider”	ASKUL Corporation, Nippon Paper Industries
		Purchase intention by ethical consumption	• Dentsu, “Ethical Consumption Awareness Survey 2020” • Deloitte, “Millennial Generation Z Annual Survey 2021”	GUNZE, UACJ Corporation
		Improvement rate of energy consumption intensity （Industrial sector）	• IEA WEO2019	YASKAWA Electric Corporation
		Market size of industrial robots	• IEA WEO2019 • International Federation of Robotics, World Robotics 2019 Industrial Robots	YASKAWA Electric Corporation
		Market size of AC servos for industrial robots	• Fuji Keizai “2020 Featured Mechatronics Parts Market Survey” • IEA WEO2019	YASKAWA Electric Corporation
		Market size of industrial inverters	• Research Station LCC, Global market forecast for inverters • Estimated from IEA WEO2019	YASKAWA Electric Corporation
		Neodymium dysprosium demand forecast	• Sebastiaan Deetman et al “Scenarios for demand growth of metals in electricity generation technologies, cars and electronic appliances”	YASKAWA Electric Corporation
		Server Market Trends	• IEA EV Outlook2021 • IDC Japan “Server Market Trend in Japan in FY2020”	SCSK Corporation
		Migratory Tuna Catch	• Johann D. Bell et al “Pathways to sustaining tuna-dependent Pacific Island economies during climate change”	Maruha Nichiro Corporation
		Bait fish stocks	• Ministry of Agriculture, Forestry and Fisheries "Future Prospects for Adaptation to Climate Change Impacts in FY2008"	Maruha Nichiro Corporation
		Fish size	• Global Change Biology “Sound physiological knowledge and principles in modeling shrinking of fishes under climate change” （August 2017）	Maruha Nichiro Corporation

 ※ The parameters surveyed during support program by the Ministry of the Environment are shown regardless of whether they are used by each company.

【Parameters referenced in past support cases】
Transition risk（5/5）

	Item	Parameter	Source	Reference: FY 2020~2021 supported companies
Transition risk	Changes in customer reputation / behavior	Changes in the volume of air passenger	• 2ii “The Transition Risk-o-Meter Reference Scenarios for Financial Analysis”	Kyushu Railway Company
		Number of engine-powered vehicles on the road	• IEA ETP2017	Fuji Oil Company
		Increase / decrease in rent due to environmental performance	• Xymax “Economic analysis of environmental management” • Smart Wellness Office Research Committee “Improving the sustainability of environmental real estate and its added value” • Japan Real Estate Institute “Investors' perceptions of real estate ESG investment” • JRE ”Economy of ESG Investment” （DBJ FY2019 Seminar “Sustainability and ESG Investment in Real Estate- GRESB evaluation result announcement and real estate ESG Investment outlook-”）	ORIX Asset Management Corporation
	Compliance with GHG emission regulations	Energy intensity of buildings	• IEA ETP2017 • MLIT ”Energy consumption reduction targets in global warming countermeasure plans based on the Paris Agreement”, p.1	ORIX Asset Management Corporation
		Zero emission target of Tokyo	• Tokyo	ORIX Asset Management Corporation
		Emission factor for grid electricity	• IEA WEO2020 • Ministry of Economy, Trade and Industry "Basic Energy Plan” • RITE "Scenario Analysis of Carbon Neutrality in 2050"	ORIX Asset Management Corporation, Fuji Oil Company
		Mandatory introduction of ZEB / ZEH（Government goal）	• IEA ETP2017 • Agency for Natural Resources and Energy General Energy Policy (July 2018） • METI	ORIX Asset Management Corporation

 ※ The parameters surveyed during support program by the Ministry of the Environment are shown regardless of whether they are used by each company.

【Parameters referenced in past support cases】
Physical risk（1/3）

	Item	Parameter	Source	Reference: FY 2020~2021 supported companies
Physical risk	Increases in the average temperature	Loss of labor productivity due to heat stress in the industrial sector	• ILO “Working on a warmer planet” (2019)	Mitsui Mining & Smelting, GUNZE, UACJ Corporation
		Increase of hot summer days	• WRI “The Aqueduct Global Flood analyzer” • World Bank “Climate Change Knowledge Portal”	ASKUL Corporation, Mitsui Mining & Smelting, UACJ Corporation
		Increase of temperature	• World Bank “Climate Change Knowledge Portal”	ASKUL Corporation, Kyushu Railway Company
		Relationship between temperature rise and electricity demand	• IEEJ • General Information Processing Center, Mie University "Visualization of Air Conditioning Efficiency by Power Analysis of Server Room"	Kyushu Railway Company, SCSK Corporation
		Relationship between temperature rise and air conditioner sales	• World Bank “Climate Change Knowledge Portal” (Temperature rise) • Ministry of the Environment, Ministry of Education, Culture, Sports, Science and Technology, Ministry of Agriculture, Forestry and Fisheries, Ministry of Land, Infrastructure, Transport and Tourism, Japan Meteorological Agency, "Climate Change Observation, Prediction and Impact Assessment Integrated Report 2018 - Climate Change in Japan and its Impacts"	UACJ Corporation
		Relationship between temperature rise and demand for beverage products	• National Observatory of Athens ″The Impact of Climate Change on the Pattern of Demand for Bottled Water and Non-Alcoholic Beverages″ (2014)	UACJ Corporation
		Increase in Aluminum Demand by Sector	• CM Group, IAI ″AN ASSESSMENT OF GLOBAL MEGATRENDS AND REGIONAL AND MARKET SECTOR GROWTH OUTLOOK FOR ALUMINIUM DEMAN″ (2020)	UACJ Corporation
		Track buckling rate	• ELSEVIER “Impacts of climate change on operation of the US rail network” (2017)	Kyushu Railway Company
		Air conditioning cost	• IEA “The Future of Cooling”	ASKUL Corporation
		Forest fire outbreak situation	• AP-PLAT	ASKUL Corporation
		Forest fire incidence (Vietnam)	• Forest and Grass Fire Risk Assessment for Central Asia under Future Climate Scenarios	Nippon Paper Industries

 ※ The parameters surveyed in the course of support program by the Ministry of the Environment are shown regardless of whether or not they are actually used by each company.

【Parameters referenced in past support cases】
Physical risk（2/3）

	Item	Parameter	Source	Reference: FY 2020~2021 supported companies
Physical risk	Increases in the average temperature	Forest fire incidence (Brazil)	• Effects of climate and land - use change scenarios on fire probability during the 21st century in the Brazilian Amazon	Nippon Paper Industries
		Forest fire incidence (Japan)	• Forestry Agency, "Recent Mountain Disasters"	Nippon Paper Industries
		Temperature rise: Underwear Sales	• World Bank “Climate Change Knowledge Portal”	GUNZE
		Temperature rise: Cotton Cultivation	• FAO “The future of food and agriculture Alternative pathways to 2050”	GUNZE
		Increase in insect infestation (Japan, Vietnam)	• The Potential Global Distribution of the White Peach Scale Pseudaulacaspis pentagona (Targioni Tozzetti) under Climate Change	Nippon Paper Industries
		Probability of heavy rainfall (Japan)	• Ministry of Education, Culture, Sports, Science and Technology and Japan Meteorological Agency "Climate Change in Japan 2020" (December 2020)	Nippon Paper Industries
		Probability of heavy rainfall (Vietnam)	• Projected changes in summer precipitation over East Asia with a high-resolution atmospheric general circulation model during 21st century	Nippon Paper Industries
		Probability of heavy rainfall (Brazil)	• Assessment of multi-model climate projections of water resources over South America CORDEX domain	Nippon Paper Industries
		Rise in sea water temperature	• IPCC AR6 ”Climate Change 2021 The Physical Science Basis”	Maruha Nichiro Corporation
		Changes in dissolved oxygen in seawater	• IPCC AR6 “Climate Change 2021 The Physical Science Basis”	Maruha Nichiro Corporation
		Ocean acidification	• IPCC AR6 “Climate Change 2021 The Physical Science Basis”	Maruha Nichiro Corporation
	Sea level rise	Sea level rise	• IPCC “Fifth Report”, “1.5°C Special Report”	SCSK, Nippon Paper Industries

※ The parameters surveyed in the course of support program by the Ministry of the Environment are shown regardless of whether or not they are actually used by each company.

【Parameters referenced in past support cases】
Physical risk（3/3）

	Item	Parameter	Source	Reference: FY 2020~2021 supported companies
Physical risk	**Increasing extreme weather conditions (typhoons, heavy rains, sediment, storm surges, etc.)**	Flood damage in urban areas	• WRI “The Aqueduct Global Flood Analyzer”	ASKUL Corporation, ORIX Asset Management Corporation, Kyushu Railway Company, Mitsui Mining & Smelting
		Frequency of floods, Flow rate	• Ministry of Land, Infrastructure, Transport and Tourism, “Proposals for Flood Control Plans Based on Climate Change”	ASKUL Corporation, ORIX Asset Management Corporation, Kyushu Railway Company, Mitsui Mining & Smelting, GUNZE, Nishi-Nippon Railroad, Fuji Oil Company, Maruha Nichiro Corporation
		Flood occurrence probability（Japan）	• Ministry of Land, Infrastructure, Transport and Tourism, "Impacts of Climate Change"	SCSK Corporation, Nippon Paper Industries, UACJ Corporation
		Occurrence of typhoons and cyclones	• MOE・JMA and Others 「Climate Change Observation / Forecast and Impact Assessment Integrated Report 2018 - Japan's Climate Change and Its Impact-」	ORIX Asset Management Corporation, Mitsui Mining & Smelting, Maruha Nichiro Corporation
		Number of days per year of torrential rainfall	• Tokyo District Meteorological Observatory Website • World Bank「Climate Change Knowledge Portal」	Nishi-Nippon Railroad
		Average sea level rise	• IPCC “Mitigation Pathways Compatible with 1.5°C in the Context of Sustainable Development” • MOE・JMA “Outline of IPCC Fifth Assessment Report -Working Group 1 Natural Science Basis-” (2014)（p.41）	ORIX Asset Management Corporation, Mitsui Mining & Smelting
		Water risk by base (flood, drought)	• WRI “The Aqueduct Global Flood analyzer” • Technical Study Group on Flood Plans Based on Climate Change "Study on Flood Control Plans Based on Climate Change"	Shin-Etsu Chemical, YASKAWA Electric Corporation, GUNZE, UACJ Corporation
		Sediment disaster occurrence probability	• A-PLAT, Climate Change Adaptation Information Platform	Kyushu Railway Company
		Domestic Disaster Response Product Market Trends	• Yano Research Institute "Research on Disaster Prevention Food Market” (2020)	Nippon Paper Industries

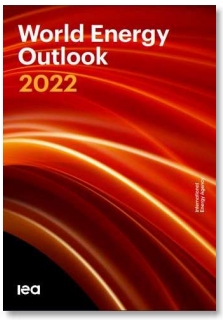
5-11※ The parameters surveyed in the course of support program by the Ministry of the Environment are shown regardless of whether or not they are actually used by each company.

IEA World Energy Outlook 2022

【IEA World Energy Outlook (WEO) Overview】
A report on transition risk published by the IEA

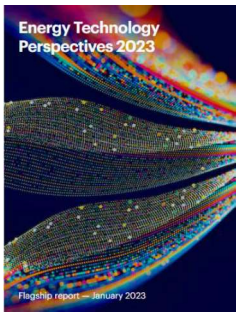
What is the International Energy Agency (IEA)?
- Organization established in 1974 after the first oil crisis to avert oil supply crises (to establish a stable energy supply and demand structure) of the member countries.
- The objective is to promote energy security through collective response by members to the physical disruptions of oil supply.
- Energy-related surveys, statistical compilation, and publication of various reports and books.
- There are 30 members, including Japan.

World Energy Outlook（WEO）



- A report on energy supply and demand published every autumn.
- World Energy Outlook includes medium and long-term energy market forecasts.

Energy Technology Perspectives（ETP）



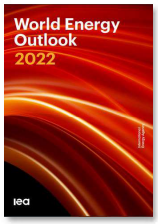
- Describes the process of energy technology innovation.
- Focusing on opportunities and challenges for expanding and accelerating clean energy technologies.
- Parameters on resources and supply chain are introduced.

Source：IEA Homepage

【IEA WEO2022: Overview】

IEA World Energy Outlook 2022

Demands for natural gas are declining due to the energy crisis and the situation in Ukraine, and the report points out the need for investments in clean energy technologies



WEO2022 Report Overview

- ✓ **As the energy crisis caused by the Ukraine crisis continues, prices of natural gas and coal are at record levels, and oil prices have risen up to mid-`22. The energy crisis has shown trends such as a food crisis and rising inflation.** With countries working to invest in clean energy technology, use coal in the short-term, import LNG, the report **highlights the necessity to use nuclear power and increase the share of renewable energy**. Assuming that **the situation in Ukraine will be difficult to bring to a stable and swift end**, the report discusses the impact of the energy crisis using several scenarios
  - Decrease in demand of natural gas
  - The need for more investments in renewable energy
  - Russia`s decline in international trade
- ✓ While policies in major energy markets are promoting a clean energy economy, **the gap between the APS and NZE scenarios has not yet been fully resolved**, and **the need for additional investment in clean energy projects and infrastructure in developing countries** are also noted.
  - Elaborates on the US Inflation Reduction Act in the US, the GX program in Japan, declining energy demand in China, rising share of nuclear and renewable energy in South Korea, rising supply of renewable energy in India, etc.
  - **Pledges by countries such as India and Indonesia have resulted in the APS scenario being projected at 1.7℃, but the gap with the NZE scenario** remains.

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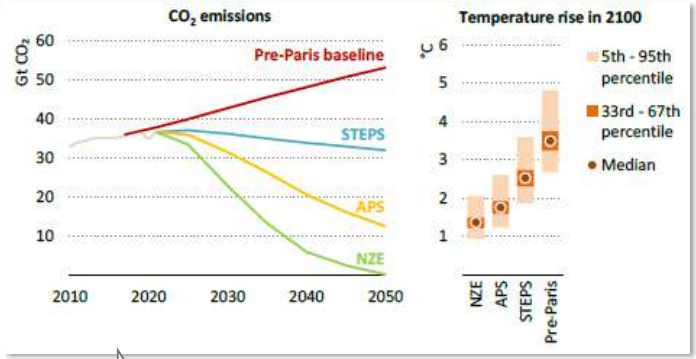
5-13 Source：IEA World Energy Outlook 2022

【IEA WEO2022: Types of Scenarios】

IEA World Energy Outlook 2022

3 major scenarios were evaluated: NZE, which is a prescriptive scenario calculated backward from a specific results, and APS and STEPS, which are exploratory scenarios designed without targeting specific results

Global temperature rise in each WEO2022 scenario



※The maximum temperature is introduced with a 50% probability

Assumption

- ✓ **Temperature rise in 2100 will be 2.5°C in STEPS, and 1.7°C in APS**
- ✓ **Temperature rise in the NZE scenario peaks below 1.6°C around 2040 and then falls to around 1.4°C in2100**
- ✓ Demand, electricity and fuel conversion are modeled for 26 countries and regions, while the supply side is modeled for all major producers
- ✓ **Assumes the war in Ukraine will not end in a quick and stable manner and that the international sanctions against Russia will be prolonged.** On the other hand, the report assumes that the international situation in other countries with major resources subject to sanctions (such as Iran and Venezuela) will gradually normalize

Types of scenarios

Exploratory

The Stated Policies Scenario (STEPS)

- ✓ "Stated Policies Scenario
- ✓ The temperature rise in 2100 will be 2.5°C
- ✓ Realistically examines the current policy situation and indicates the direction of the energy system in the absence of new policies
- ✓ Based on detailed sector-by-sector review of the policies and measures that are in place or under development in variety of areas. Also assesses relevant regulatory, market, infrastructure and financial constraints. goals

Exploratory

The Announced Pledges Scenario (APS)

- ✓ "Announced Pledges Scenario"
- ✓ The temperature rise in 2100 will be 1.7°C
- ✓ All climate change commitments are accounted, including NDC and long-term net zero targets. Assumes all targets are met on-time.
- ✓ Expanded the analysis to consider the impact on countries that have not made ambitious long-term commitments when cost reductions in clean energy technologies are accelerated

Prescriptive

Net Zero Emissions by 2050 Scenario (NZE)

- ✓ "Net zero emission scenario"
- ✓ The temperature rise in 2100 will be 1.4°C
- ✓ With a rapid increase in clean energy policies and investments, leading developed countries will reach net zero faster than others
- ✓ Meet key elements of the UN Sustainable Development Goals for energy: achieving universal access to energy and significantly improving air quality by 2030

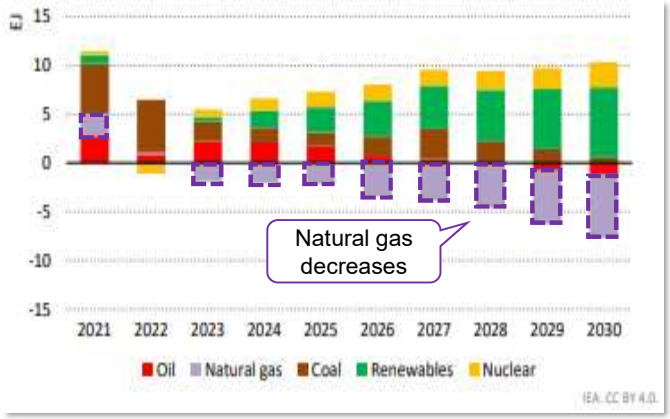
5-14 Source：IEA World Energy Outlook 2022

【IEA WEO2022: Impact of the situation in Ukraine】

IEA World Energy Outlook 2022

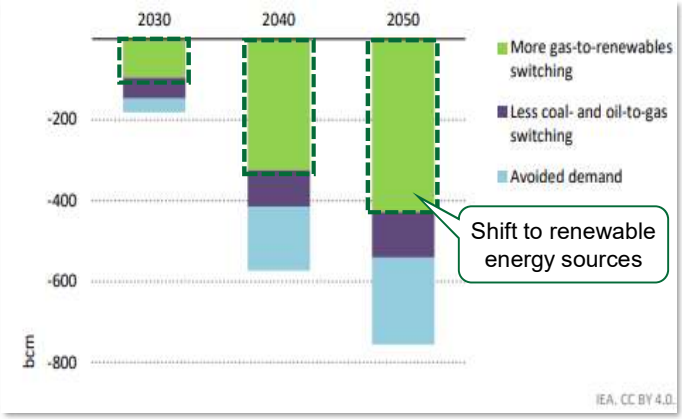
Lower demand for natural gas and an increased ratio of renewable energy and nuclear sources can be seen as a result of the situation in Ukraine and the energy crisis

Changes in overall energy supply amounts compared to the WEO2021 STEPS



- ✓ **Natural gas demand** will continue to **decline**, and the **ratio of renewable energy and nuclear energy will increase**
- ✓ While there will be a **temporary increase in coal to satisfy supply/demand needs, it will soon decline**

Factors behind changes in natural gas demand compared to the WEO2021 STEPS



- ✓ Compared to WEO2021 levels, there will be a 750 bcm reduction in demand for natural gas in 2050 due to **transition to renewable energy sources**, **reduced shifting from coal and oil to natural gas**, **lower demand**

Source：IEA World Energy Outlook 2022

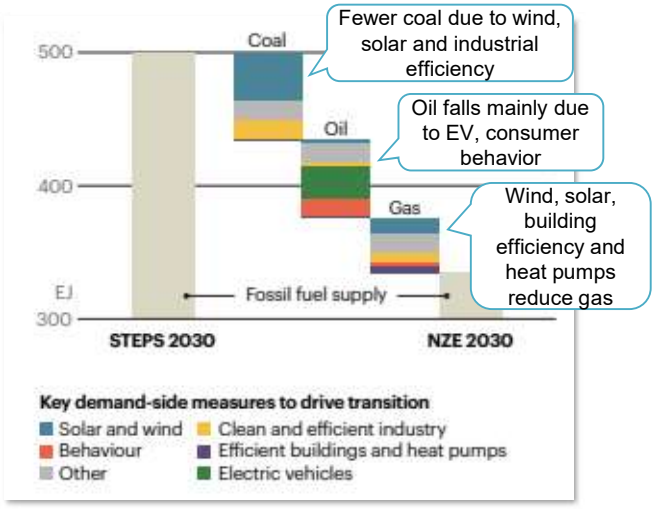
5-15

【IEA WEO2022: Gap with the NZE Scenario】

IEA World Energy Outlook 2022

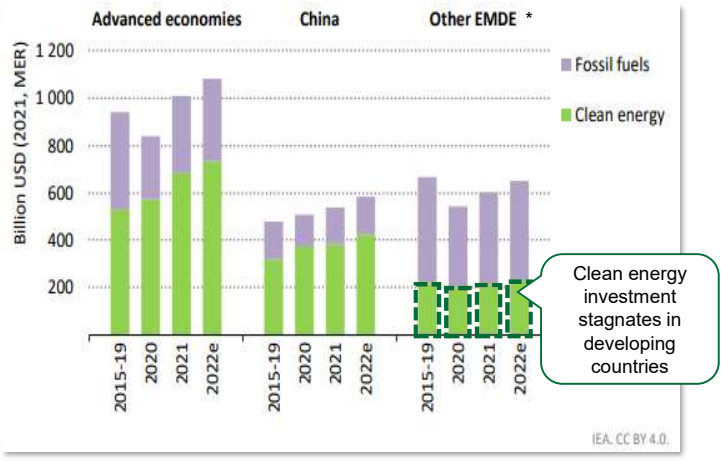
To reduce the demand for fossil fuels and bridge the gap between the STEPS and APS scenarios and the NZE scenario, it is necessary to invest in clean energy in developing countries, etc.

Breakdown of fossil fuel demand changes in STEPS and NZE in 2030



- ✓ It has been pointed out that to close the gap between NZE and STEPS, **investment in cleaner energy, technological innovation and resilience in the supply chain** must be established

Energy investment to date by region



*Other EMDE： Developing countries other than China

- ✓ **Investment in clean energy is slow in developing countries** (other than China), with **most investment coming from developed countries and China**
- ✓ Going forward, **3 times the 2022 investment ($1.4 trillion) will be required by 2030 to align with the NZE scenario**

5-16 Source：IEA World Energy Outlook 2022

【Comparison with WEO2021: Carbon price for each scenario】

IEA World Energy Outlook 2022

There are no significant change in the carbon prices for each country compared to previous years. However, in the NZE scenario, there is a significant increase in carbon prices for other emerging market countries and developing countries

IEA report	WEO2021			WEO2022		
Carbon prices	2030	2040	2050	2030	2040	2050
Stated Policies Scenario (STEPS)						
Canada	55	60	75	54	62	77
Chile, Colombia	15	20	30	13	21	29
China	30	45	55	28	43	53
EU	65	75	90	90	98	113
South Korea	40	65	90	42	67	89
Announced Pledges Scenario (APS)						
Developed countries (countries with Net Zero pledges including OECD countries, except for Mexico)	-	-	-	135	175	200
Developed countries (countries with Net Zero pledges)	120	170	200	-	-	-
Emerging market countries and developing countries (countries with Net Zero pledges)	40	110	160	40	110	160
Other emerging market countries and developing countries	-	-	-	-	17	47
Net Zero Emissions by 2050 Scenario (NZE)						
Developed countries (countries with Net Zero pledges)	130	205	250	140	205	250
Emerging market countries and developing countries (countries with Net Zero pledges, including China, India, Indonesia, Brazil, and South Africa)	-	-	-	90	160	200
Major emerging market countries (including China, Russia, Brazil, and South Africa)	90	160	200	-	-	-
Other emerging market countries and developing countries	15	35	55	25	85	180

Unit: USD/t-CO2

[Scenario types]

- Stated Policies Scenario (STEPS): A scenario for cases where policy takers do not make major changes to the country's course, which is not based on the premise that all targets announced by the governments of each country will be met
- Announced Pledges Scenario (APS): A scenario that assumes that all climate change-related pledges by governments around the world will be met completely and on time
- Net Zero Emissions by 2050 Scenario (NZE): A scenario for global achievement of net zero emissions by 2050

* Sustainable Development Scenario (SDS, a scenario for meeting targets established through the Paris Agreement) was removed in 2022

5-17 Source：IEA World Energy Outlook 2021, 2022

【Comparison with WEO2021: Fuel prices for each scenario (1/2)】

IEA World Energy Outlook 2022

No significant changes in prices for oil, natural gas, or coal from last year calculated by IEA in the scenarios based on the policies for each country

Unit (Oil price) : USD/barrel
Unit (Natural gas price) : USD/MBtu

IEA report	WEO2021		WEO2022	
Oil prices	2030	2050	2030	2050
Stated Policies Scenario (STEPS)	77	88	82	95
Announced Pledges Scenario (APS)	67	64	64	60
Net Zero Emissions by 2050 Scenario (NZE)	36	24	35	24

Natural gas prices				
Stated Policies Scenario (STEPS)				
US	3.6	4.3	4.0	4.7
EU	7.7	8.3	8.5	9.2
China	8.6	8.9	9.8	10.2
Japan	8.5	8.9	10.9	10.6
Announced Pledges Scenario (APS)				
US	3.1	2.0	3.7	2.6
EU	6.5	6.5	7.9	6.3
China	8.5	8.1	8.8	7.4
Japan	7.6	6.8	9.1	7.4
Net Zero Emissions by 2050 Scenario (NZE)				
US	1.9	2.0	1.9	1.8
EU	3.9	3.6	4.6	3.8
China	5.3	4.7	6.1	5.1
Japan	4.4	4.2	6.0	5.1

Source：IEA World Energy Outlook 2021, 2022

IEA World Energy Outlook 2022

【Comparison with WEO2021: Fuel prices for each scenario (2/2)】

No significant changes in prices for oil, natural gas, or coal from last year calculated by IEA in the scenarios based on the policies for each country

Unit: USD/tonne

IEA report	WEO2021		WEO2022	
Coal prices	2030	2050	2030	2050
Stated Policies Scenario (STEPS)				
US	39	38	46	44
EU	67	63	60	64
China	83	74	89	74
Japan	77	70	91	72
Announced Pledges Scenario (APS)				
US	25	25	42	24
EU	66	56	62	53
China	77	65	73	62
Japan	73	63	74	59
Net Zero Emissions by 2050 Scenario (NZE)				
US	24	22	22	17
EU	52	44	52	42
China	61	51	58	48
Japan	58	50	59	46

Source：IEA World Energy Outlook 2021, 2022

IEA World Energy Outlook 2022

【IEA WEO2022 Parameter List】

Chapter 1 (1/3)

Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Ch.1	European Union and United Kingdom winter natural gas supply and options to compensate for a cut in Russian pipeline gas		○	○					○		Charged	Figure 1.1 (p.33)
	Historical energy investment and GDP trends		○	○				○			Charged	Figure 1.2 (p.35)
	Fossil fuel investment in countries with and without net zero emissions pledges, 2015-22		○	○					○		Charged	Figure 1.3 (p.36)
	Year-on-year increase in average power generation costs by selected country and region, 2022	○							○	○	Charged	Figure 1.4 (p.37)
	Value of natural gas trade, 2005-2022		○	○					○		Charged	Figure1.5 (p.38)
	Contributions of energy and food to inflation in selected countries, 2022	○							○		Charged	Figure 1.6 (p.39)
	Number of people without access to electricity and clean cooking by scenario, 2021 and 2030		○		○				○		Charged	Figure 1.7 (p.40)
	Difference in total energy supply in the WEO-2022 STEPS relative to the WEO-2021 STEPS		○	○	○			○			Charged	Figure 1.8 (p.42)
	Fossil fuel demand in the STEPS, 1990-2050		○	○	○	○	○	○			Charged	Figure 1.9 (p.43)
	Global energy supply and demand by sector, scenario and fuel		○		○			○			Charged	Figure 1.10 (p.46)
	Mineral requirements for clean energy technologies by scenario, 2021 and 2030		○		○			○			Charged	Figure 1.11 (p.48)

 Source：IEA World Energy Outlook 2022

【IEA WEO2022 Parameter List】
Chapter 1 (2/3)

Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Ch.1	Drivers of change in natural gas demand in the WEO-2022 STEPS relative to the WEO-2021 STEPS		○		○	○	○	○			Charged	Figure 1.12 (p.50)
	Energy use in transport by scenario, 2000-2050		○	○	○	○	○	○			Charged	Figure 1.13 (p.52)
	Crude oil and natural gas imports to the European Union and emerging market and developing economies in Asia by origin		○	○	○				○		Charged	Figure 1.14 (p.54)
	Changes in Russian oil production and natural gas export in 2035 in the WEO-2022 STEPS relative to the WEO-2021 STEPS	○							○		Charged	Figure 1.15 (p.56)
	Change in net trade position of selected oil and gas exporters in the STEPS, 2021-2030	○			○			○			Charged	Figure1.16 (p.57)
	Fossil and non-fossil energy supply by scenario, 2020-2050			○			○	○			Charged	Figure 1.17 (p.58)
	Energy investment in the NZE Scenario, 2021 and 2030		○	○	○			○			Charged	Figure 1.18 (p.62)
	Energy-related and process CO2 emissions, 2010-2050 and temperature rise in 2100 by scenario		○	○	○	○	○	○			Charged	Figure 1.19 (p.64)
	Change in CO2 emissions in the 2022 APS relative to the WEO-2021 APS, 2025-2050		○	○	○	○	○		○		Charged	Figure 1.20 (p.65)
	Population exposed to heavily polluted air, 2021 and 2050		○	○			○		○		Charged	Figure 1.21 (p.66)
	Energy demand growth by region and scenario, 2021-30		○	○	○				○	○	Charged	Figure 1.22 (p.67)

【IEA WEO2022 Parameter List】
Chapter 1 (3/3), Chapter 2 (1/2)

Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Ch.1	Government funding in the US Inflation Reduction Act and Infrastructure Investment and Jobs Act and technology deployment in the STEPS in the United States, 2021-30		○	○	○			○			Charged	Figure 1.23 (p.68)
	CO2 emissions reductions in selected sectors, 2021-2030		○	○	○			○			Charged	Figure 1.24 (p.73)
	Announced manufacturing capacity for selected energy technologies relative to deployment in the APS, 2021 and 2030		○	○	○			○			Charged	Figure 1.25 (p.76)
	Global employment in fossil fuels and clean energy		○	○	○			○			Charged	Figure 1.26 (p.78)
Ch.2	Evolution in selected energy price indicators since September 2020	○		○				○			Charged	Figure 2.1 (p.87)
	Prices for Brent and Urals crude oil, and diesel in Northwest Europe since January 2021	○		○					○		Charged	Figure 2.2 (p.91)
	Natural gas pipeline flows from Russia to the European Union and Türkiye since January 2022	○		○					○		Charged	Figure 2.3 (p.92)
	Change in base interest rates in selected economies, year-to-August 2022 relative to 2021		○	○					○	○	Charged	Figure 2.4 (p.93)
	Change in household savings rate in selected economies, year-to-August 2022 relative to 2021		○	○					○	○	Charged	Figure 2.5 (p.94)
	Oil and gas use relative to GDP per capita in selected countries/regions since 1971		○	○					○	○	Charged	Figure 2.6 (p.96)
	Global energy investment by region		○	○					○		Charged	Figure 2.7 (p.98)

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【IEA WEO2022 Parameter List】
Chapter 2 (2/2), Chapter 3 (1/4)

Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Ch.2	Global investment in upstream oil, gas and coal supply		○	○				○			Charged	Figure 2.8 (p.99)
	Ratio of global trade to GDP		○	○				○			Charged	Figure 2.9 (p.101)
	Total government outlays on sustainable recovery spending and energy affordability support		○	○					○		Charged	Figure 2.10 (p.105)
	GDP average growth assumptions by region		○	○	○	○	○		○	○	Charged	Table 2.1 (p.108)
	Fossil fuel prices by scenario		○	○	○		○		○	○	Charged	Table 2.2 (p.111)
	Average IEA crude import price by scenario		○	○	○	○	○	○			Charged	Figure 2.11 (p.111)
	Price developments for selected critical minerals and metals		○	○				○			Charged	Figure 2.12 (p.114)
	Changes in levelised costs for a benchmark project in Europe and North America, 2020, 2022 and 2030		○	○	○				○		Charged	Figure 2.13 (p.116)
Ch.3	Energy-related CO2 emissions by sector and gross and net emissions in the NZE Scenario, 2010-2050		○	○	○	○	○	○			Charged	Figure 3.1 (p.126)
	Temperature rise in 2050 and 2100 in the WEO-2022 scenarios		○				○	○			Charged	Figure 3.2 (p.127)
	Total energy supply of unabated fossil fuels and low-emissions sources in the NZE Scenario, 2010-2050		○	○	○	○	○	○			Charged	Figure 3.3 (p.128)

 Source：IEA World Energy Outlook 2022

IEA World Energy Outlook 2022

【IEA WEO2022 Parameter List】
Chapter 3 (2/4)

Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Ch.3	Total final consumption by source in the NZE Scenario, 2010-2050		○	○	○	○	○	○			Charged	Figure 3.4 (p.129)
	Final consumption, useful energy and non-electricity demand by sector and use in the NZE Scenario, 2021 and 2050		○	○			○	○			Charged	Figure 3.5 (p.130)
	Comparison of key indicators for the selected IPCC scenarios and the IEA NZE Scenario in 2050	○						○			Charged	Figure 3.6 (p.132)
	Oil, natural gas and coal supply by region in the NZE Scenario		○	○	○	○	○	○			Charged	Figure 3.7 (p.133)
	Bioenergy supply and hydrogen production by source in the NZE Scenario, 2021-2050		○	○	○	○	○	○			Charged	Figure 3.8 (p.135)
	CO2 emissions by source and key milestones in the electricity sector in the NZE Scenario, 2020 to 2050		○	○	○	○	○	○			Charged	Figure 3.9 (p.137)
	Total installed capacity and electricity generation by source in the NZE Scenario, 2010-2050		○	○	○	○	○	○			Charged	Figure 3.10 (p.138)
	Emissions reductions and key milestones in the industry sector in the NZE Scenario relative to the STEPS, 2020-2050		○	○	○	○	○	○			Charged	Figure 3.11 (p.141)
	Final energy consumption by source in industry sub-sectors in the NZE Scenario, 2021-2050		○	○	○		○	○			Charged	Figure 3.12 (p.143)
	Emissions reductions and key milestones in transport in the NZE Scenario relative to the STEPS, 2020-2050		○	○	○	○	○	○			Charged	Figure 3.13 (p.146)
	Final energy consumption in transport by source and mode in the NZE Scenario, 2021-2050		○	○	○		○	○			Charged	Figure 3.14 (p.147)

 Source：IEA World Energy Outlook 2022

IEA World Energy Outlook 2022

【IEA WEO2022 Parameter List】
Chapter 3 (3/4)

Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Ch.3	Emissions reductions and key milestones in the buildings sector in the NZE Scenario relative to the STEPS, 2020-2050		○	○	○	○	○	○			Charged	Figure 3.15 (p.151)
	Total final consumption in buildings by source and end-use in the NZE Scenario, 2021-2050		○	○	○		○	○			Charged	Figure 3.16 (p.153)
	Annual improvement in access rate to clean cooking and by technology in the NZE Scenario, 2015-2030		○	○	○			○			Charged	Figure 3.17 (p.155)
	Total final consumption in the STEPS and demand avoided by measure in the NZE Scenario		○	○	○		○	○			Charged	Figure 3.18 (p.156)
	CO2 emissions reductions due to behavioural changes in the NZE Scenario		○	○	○		○	○			Charged	Figure 3.19 (p.157)
	Aviation activity growth per capita and emissions reductions due to behavioural changes in the STEPS and NZE Scenario		○	○	○	○	○	○			Charged	Figure 3.20 (p.159)
	Energy consumption per capita in the NZE Scenario and car sales and SUV share in the STEPS and NZE Scenario, 2030		○	○	○			○	○		Charged	Figure 3.21 (p.161)
	Global average annual energy investment by sector and technology in the NZE Scenario		○	○	○	○	○	○			Charged	Figure 3.22 (p.163)
	Energy investment trends by region in the NZE Scenario, 2017-2050		○	○	○	○	○	○			Charged	Figure 3.23 (p.165)
	Clean energy investment and sources of finance in the NZE Scenario to 2030		○	○	○	○	○		○		Charged	Figure 3.24 (p.166)
	Battery demand growth in transport in the NZE Scenario and announced battery manufacturing capacity expansion, 2010-2030		○	○	○			○			Charged	Figure 3.25 (p.167)

 Source：IEA World Energy Outlook 2022

IEA World Energy Outlook 2022

【IEA WEO2022 Parameter List】
Chapter 3 (4/4), Chapter 4 (1/3)

Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Ch.3	Announced manufacturing capacity and installed electrolyser capacity projected on the basis of manufacturing capacity relative to the NZE Scenario, 2021-2030		○	○	○				○		Charged	Figure 3.26 (p.169)
	Solar PV capacity additions and mineral demand in the NZE Scenario, 2021 and 2030		○	○	○			○			Charged	Figure 3.27 (p.171)
	Global CO2 capture by operating and planned source relative to the NZE Scenario, 2030	○			○			○			Charged	Figure 3.28 (p.172)
	Production or throughput capacity in 2021, assuming full implementation of announced project pipelines and NZE Scenario deployment levels in 2030		○	○	○			○			Charged	Figure 3.29 (p.174)
	Energy employment by technology in the NZE Scenario, 2019 and 2030		○	○	○			○			Charged	Figure 3.30 (p.176)
Ch.4	Clean energy investment and reduction in fossil fuel import bills in developing economies in Asia in the NZE Scenario relative to the STEPS		○		○	○	○	○			Charged	Figure 4.1 (p.185)
	Annual average investment in fossil fuel supply, clean power, infrastructure, end-uses and low-emissions fuels by scenario		○	○	○			○			Charged	Figure 4.2 (p.187)
	Investment in clean energy and fossil fuels by scenario, 2025 and 2030		○	○	○			○			Charged	Figure 4.3 (p.188)
	Annual average investment and fossil fuel imports in the APS with projected prices and with high fossil fuel prices, 2021-30		○	○	○			○			Charged	Figure 4.4 (p.190)
	Unit energy consumption for selected equipment in 2021 relative to 2000		○	○				○			Charged	Figure 4.5 (p.192)

 Source：IEA World Energy Outlook 2022

【IEA WEO2022 Parameter List】
Chapter 4 (2/3)

Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Ch.4	Global stock by vintage for selected sectors, 2050		○	○	○	○	○	○			Charged	Figure 4.6 (p.194)
	Residential consumption of modern energy per household by income quintile, 2021	○							○		Charged	Figure 4.7 (p.196)
	Number of people without access to modern energy and losing the ability to afford modern energy in sub-Saharan Africa and developing Asia, 2022	○							○		Charged	Figure 4.8 (p.197)
	Consumer energy spending, subsidies and end-user investment for efficient, low-emissions equipment in the buildings and transport sectors in the STEPS and NZE Scenario by 2030		○	○	○			○			Charged	Figure 4.9 (p.198)
	Indicative weighted average cost of capital of utility-scale solar PV projects, 2021	○							○		Free	Table 4.2 (p.201)
	Composition of levelised cost for a utility-scale solar PV plant with final investment decision secured in 2021	○							○		Charged	Figure 4.10 (p.202)
	Cumulative reduction in clean energy financing costs in emerging market and developing economies by lowering costs of capital in the APS and NZE Scenario, 2023-2050		○				○		○		Charged	Figure 4.11 (p.203)
	Load duration curve for natural gas-fired power generation in the European Union in the APS		○	○	○				○		Charged	Figure 4.12 (p.205)
	Stock and flow of passenger cars by type in the APS		○	○	○	○	○	○			Charged	Figure 4.13 (p.206)
	Export revenue from oil and gas versus hydrogen in the Middle East in the APS and NZE Scenario, 2021-2050		○	○	○		○		○		Charged	Figure 4.14 (p.210)
	Current distribution of energy-intensive industries by grid carbon intensity, solar potential and proximity to CO2 storage	○						○			Charged	Figure 4.15 (p.213)

 Source：IEA World Energy Outlook 2022

【IEA WEO2022 Parameter List】
Chapter 4 (3/3), Chapter 5 (1/4)

Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Ch.4	Flexibility needs and supply by region and scenario		○	○	○		○		○		Charged	Figure 4.16 (p.215)
	Critical mineral demand by weight and value for clean energy technologies by scenario		○	○	○		○	○			Charged	Figure 4.17 (p.218)
	Public reports of governance-related risks by mineral supply chain and region, 2017-2019		○	○					○		Charged	Figure 4.19 (p.220)
	Share of installed power plant capacity exposed to global temperature rise under various IPCC AR6 scenarios	○							○		Charged	Figure 4.20 (p.224)
	Annual average loss of asset value from flooding at four indicative energy supply infrastructure sites based on two IPCC scenarios		○	○	○		○		○		Charged	Figure 4.21 (p.226)
	Fossil fuel consumption subsidies in selected countries		○	○					○		Charged	Figure 4.22 (p.229)
	Sources of finance by sector in the NZE Scenario, 2026-2030		○		○			○			Charged	Figure 4.23 (p.231)
Ch.5	Total energy supply by fuel and CO2 emissions by scenario		○	○	○		○	○			Charged	Figure 5.1 (p.237)
	Key energy indicators by scenario, 2010-2050		○	○	○		○	○			Free	Table 5.1 (p.239)
	Supply and demand of low-emissions hydrogen and fuels		○		○		○	○			Free	Table 5.2 (p.240)
	Total modern energy supply per capita by region in the STEPS and APS, 2021 and 2030		○	○	○				○		Charged	Figure 5.2 (p.242)

 Source：IEA World Energy Outlook 2022

IEA World Energy Outlook 2022

【IEA WEO2022 Parameter List】
Chapter 5 (2/4)

Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Ch.5	Change in total energy supply by region, fuel and scenario, 2010-2019 and 2021-2030		○	○	○				○		Charged	Figure 5.3 (p.243)
	Oil, natural gas and electricity demand reductions from EU citizen actions based on the Playing My Part recommendations	○						○			Charged	Figure 5.4 (p.244)
	Changes in global final energy consumption by lever and sector in the STEPS and APS, 2021-2030		○	○	○			○			Charged	Figure 5.5 (p.247)
	Change in total final consumption by sector, fuel and scenario, 2010-2019 and 2021-2030		○	○	○			○			Charged	Figure 5.6 (p.248)
	Selected updated NDCs under the Paris Agreement	○			○				○		Free	Table 5.3 (p.250)
	Countries with NDCs, long-term strategies and net zero emissions pledges, and their shares of global CO2 emissions	○							○		Charged	Figure 5.7 (p.251)
	Year when the cumulative CO2 emissions until 2050 in the NZE Scenario would be exhausted if the global population had the same per capita emissions as…		○	○	○	○	○	○	○		Charged	Figure 5.8 (p.252)
	CO2 emissions by scenario and by region, 2021 and 2030		○	○	○			○	○		Charged	Figure 5.9 (p.253)
	CO2 emissions reductions by sector and scenario, 2021-2030		○	○	○			○			Charged	Figure 5.10 (p.254)
	Coverage of initiatives and additional corporate net zero emissions pledges in selected sub-sectors	○						○			Charged	Figure 5.11 (p.255)
	Population exposed to heavily polluted air and change in premature deaths from air pollution by region and scenario, 2021 and 2050		○	○			○		○		Charged	Figure 5.12 (p.256)

 Source：IEA World Energy Outlook 2022

IEA World Energy Outlook 2022

【IEA WEO2022 Parameter List】
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Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Ch.5	Annual clean energy investment by sector and scenario, 2021 and 2030		○	○	○			○			Charged	Figure 5.13 (p.256)
	Number of people without access to electricity in sub-Saharan Africa and the world, 2012-2022		○	○				○	○		Charged	Figure 5.14 (p.260)
	Number of people without access to electricity in 2021 and 2030 by scenario		○	○	○				○		Charged	Figure 5.15 (p.262)
	Number of people without access to electricity coverage with targets in the APS	○						○			Free	Figure 5.15 (p.262)
	Number of people without access to clean cooking in 2021 and 2030 by scenario		○	○	○				○		Charged	Figure 5.16 (p.265)
	Number of people without access to clean cooking coverage with targets in the APS	○						○			Free	Figure 5.16 (p.265)
	Annual investments for access to electricity and clean cooking by scenario relative to tracked 2019 investments		○	○	○				○		Charged	Figure 5.17 (p.266)
	Space cooling needs and household air conditioner stock in the STEPS, 2021-2050		○	○	○		○		○		Charged	Figure 5.18 (p.268)
	Household air conditioner ownership in selected regions in the STEPS, 2021-2050		○	○	○	○	○		○	○	Charged	Figure 5.19 (p.269)
	Space cooling demand by region in the STEPS and APS, 2021-2050		○	○	○		○		○	○	Charged	Figure 5.20 (p.270)
	Global road transport oil demand by scenario, 2010-2030, and EV sales by scenario, 2021-2030		○	○	○			○			Charged	Figure 5.21 (p.272)
	Market share of electric cars in key markets by scenario to 2030		○	○	○				○		Charged	Table 5.22 (p.274)

 Source：IEA World Energy Outlook 2022

【IEA WEO2022 Parameter List】
Chapter 5 (4/4), Chapter 6 (1/3)

Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Ch.5	Change in road transport oil consumption by region and effect in the STEPS and APS, 2021-2030		○	○	○				○		Charged	Figure 5.23 (p.275)
	Cumulative emissions from cars and trucks by age band and scenario, 2021-2050		○	○	○	○	○	○			Charged	Figure 5.24 (p.276)
Ch.6	Global electricity demand and supply by scenario (TWh)		○	○	○		○	○			Free	Table 6.1 (p.281)
	Global growth in renewable electricity relative to total electricity generation growth by scenario, 2021-2050		○	○	○		○	○			Charged	Figure 6.1 (p.282)
	Electricity demand by region and scenario, 2010-2050 (TWh)		○	○	○		○		○	○	Free	Table 6.2 (p.283)
	Electricity demand in key regions by scenario, 2010-2030		○	○	○				○	○	Charged	Figure 6.2 (p.285)
	Electricity demand growth by region and scenario, 2012-2030		○	○	○				○		Charged	Figure 6.3 (p.286)
	Global electricity demand and share of electricity in energy consumption in selected applications by scenario, 2021 and 2030		○	○	○			○			Charged	Figure 6.4 (p.287)
	Electricity demand growth by application in the APS, 2021-2050		○		○		○		○		Charged	Figure 6.5 (p.288)
	Global total electricity consumption with and without energy efficiency gains in the STEPS, 2015-2050		○	○	○	○	○	○			Charged	Figure 6.6 (p.289)
	Global electricity generation by source and scenario, 2010-2050		○	○	○		○	○			Charged	Figure 6.7 (p.293)

 Source：IEA World Energy Outlook 2022

【IEA WEO2022 Parameter List】
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Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Ch.6	Share of renewables in total power capacity additions by region in the STEPS, 2022-2050		○				○		○	○	Charged	Figure 6.8 (p.294)
	Global installed electricity capacity by source and scenario, 2010-2050		○	○	○	○	○	○			Charged	Figure 6.9 (p.295)
	Electricity generation by source, key region and scenario, 2021 and 2050		○	○			○		○	○	Charged	Figure 6.10 (p.298)
	Hourly wholesale electricity price duration curve and price setting technology in the European Union, first-half of 2022	○							○		Charged	Figure 6.11 (p.300)
	EU hourly wholesale electricity prices by shares of renewables and natural gas in electricity generation, first-half of 2022	○							○		Charged	Figure 6.12 (p.301)
	CO_2 emissions from electricity generation by source and scenario, 2010-2050 (Mt)		○	○	○		○	○			Free	Table 6.4 (p.303)
	Annual CO_2 emissions from electricity generation for regional groupings by scenario, 2010-2050		○	○	○	○	○		○		Charged	Figure 6.13 (p.304)
	Average CO_2 intensity of electricity generation for selected regions by scenario, 2020-2050		○	○	○	○	○		○	○	Charged	Figure 6.14 (p.305)
	Average annual investment in the power sector by type and scenario, 2017-2050		○	○	○		○	○			Charged	Figure 6.15 (p.306)
	Hour-to-hour flexibility needs in the United States, European Union, China and India in the APS, 2021 and 2030		○	○	○				○		Charged	Figure 6.16 (p.308)
	Flexibility supply by source, region and scenario, 2021 and 2050		○	○			○		○		Charged	Figure 6.17 (p.309)

 Source：IEA World Energy Outlook 2022

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Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Ch.6	Share of batteries in total dispatchable capacity and share of variable renewables in electricity generation for selected regions by scenario, 2021-2050		○	○	○		○		○		Charged	Figure 6.18 (p.311)
	Grid development by type, region and scenario, 2022-2050		○		○		○		○	○	Charged	Figure 6.19 (p.313)
	Typical deployment time for electricity grids, solar PV, wind and EV charging stations	○							○		Charged	Figure 6.20 (p.316)
	Average annual electricity grid investment by type and scenario, 2012-2050		○	○	○	○	○		○		Charged	Figure 6.21 (p.317)
	Annual demand for critical minerals for low-emissions electricity supply, storage and networks by scenario, 2021-2050		○	○	○		○	○			Charged	Figure 6.22 (p.319)
	Annual demand for selected critical minerals used in low-emissions electricity supply, storage and networks by scenario, 2021-2050		○	○	○		○	○			Charged	Figure 6.23 (p.320)
	Demand for selected minerals used in electricity networks, solar PV and wind relative to 2021 in alternative technology cases in the NZE Scenario, 2050	○					○	○			Charged	Figure 6.24 (p.322)
Ch.7	Global liquids demand and supply by scenario (mb/d)		○	○	○		○	○			Free	Table 7.1 (p.329)
	Global oil demand and crude oil price by scenario		○	○	○	○	○	○			Charged	Figure 7.1 (p.330)
	Liquids demand by region and scenario (mb/d)		○	○	○	○	○		○	○	Free	Table 7.2 (p.331)
	Oil demand by sector and scenario to 2030		○	○	○			○			Charged	Figure 7.2 (p.333)

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Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Ch.7	Growth in alternatives to oil in transport by scenario to 2030		○	○	○			○			Charged	Figure 7.3 (p.334)
	Change in oil demand by scenario, 2030-2050		○		○		○		○		Charged	Figure 7.4 (p.335)
	Oil production by scenario (mb/d)		○	○	○	○	○		○		Free	Table 7.3 (p.336)
	Oil production in the STEPS and change by scenario, 2021-2030		○	○	○				○		Charged	Figure 7.5 (p.337)
	Changes in oil production by region and scenario, 2021-2050		○	○	○		○		○		Charged	Figure 7.6 (p.340)
	Oil trade by region and scenario		○	○	○		○		○	○	Free	Table 7.4 (p.341)
	Average annual investment in oil by scenario		○	○	○		○	○			Charged	Figure 7.7 (p.342)
	Liquid biofuel demand and supply by scenario		○	○	○		○	○			Charged	Figure 7.8 (p.344)
	Low-emissions hydrogen-based liquid fuel demand by scenario and the declining cost gap with oil products in the NZE Scenario		○		○		○	○			Charged	Figure 7.9 (p.346)
	Plastic demand per capita and recycling collection rates, 2019	○						○	○		Charged	Figure 7.10 (p.348)
	Oil use in the chemical sector by scenario		○	○	○		○	○			Charged	Figure 7.11 (p.350)

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Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Ch.7	Energy content of various packaging types in the European Union	○							○		Charged	Figure 7.12 (p.351)
	Years needed to discover, approve and develop new conventional upstream oil projects since 2010		○	○				○			Charged	Figure 7.13 (p.353)
	Annual average resources discovered, approved for development and consumed since 1970		○	○				○			Charged	Figure 7.14 (p.354)
	US tight oil production at different levels of investment		○	○	○				○		Charged	Figure 7.15 (p.355)
	Contribution of increased production of tight oil and NGLs, and new and approved projects in the STEPS and APS		○	○	○			○			Charged	Figure 7.16 (p.356)
	Average annual upstream oil investment by scenario		○	○	○		○	○			Free	Table 7.6 (p.357)
	Regional refining margins and crack spreads by product		○	○					○		Charged	Figure 7.17 (p.358)
	Expected refining throughput growth and required throughput increase to meet middle distillate demand, 2022-2025		○					○			Charged	Figure 7.18 (p.359)
	World liquids demand by scenario (mb/d)		○	○	○	○	○	○			Free	Table 7.7 (p.361)
	Refining capacity and runs by region and scenario (mb/d)		○	○	○		○		○	○	Free	Table 7.8 (p.362)
	Operating and planned production capacity for renewable biodiesel and biojet fuels by company type	○						○			Charged	Figure 7.19 (p.363)

【IEA WEO2022 Parameter List】
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Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Ch.8	Global gases by scenario (bcme)		○	○	○		○	○			Free	Table 8.1 (p.369)
	Natural gas prices by region and scenario		○	○	○	○	○		○	○	Charged	Figure 8.1 (p.371)
	Gas demand by region in the STEPS and APS (bcme)		○	○	○		○	○	○	○	Free	Table 8.2 (p.372)
	Change in natural gas demand by sector, region and scenario, 2021-2030		○	○	○				○		Charged	Figure 8.2 (p.373)
	Natural gas demand in the vehicle fleet related to policy support in 2019 and the outlook by scenario		○	○	○				○		Charged	Figure 8.3 (p.374)
	Gas flows to meet demand for low-emissions fuels by sector in the APS and the NZE Scenario, 2050	○					○	○			Charged	Figure 8.4 (p.376)
	Natural gas production in the STEPS and APS (bcm)		○	○	○		○	○	○		Free	Table 8.3 (p.377)
	Change in natural gas production by scenario, 2021-2030		○	○	○				○		Charged	Figure 8.5 (p.378)
	Total gaseous fuel supply by scenario		○	○	○	○	○	○			Charged	Figure 8.6 (p.380)
	Change in natural gas net trade in selected regions in the STEPS and APS		○	○	○		○		○	○	Free	Figure 8.7 (p.381)
	Existing and under construction LNG capacity and total inter-regional LNG trade by scenario, 2015-2050		○	○	○	○	○	○			Charged	Figure 8.8 (p.383)

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Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Ch.8	Average annual natural gas and hydrogen investment by scenario		○	○	○		○	○			Charged	Figure 8.9 (p.384)
	European Union gas taxonomy thresholds compared with global life cycle emissions of natural gas, 2021	○							○		Charged	Figure 8.10 (p.385)
	Share of Russian gas in total natural gas demand and share of gas in sectoral demand by European Union member states and the United Kingdom, 2021	○							○		Free	Table 8.4 (p.387)
	Drivers of reduced natural gas supply from Russia to the European Union in the APS		○	○					○		Charged	Figure 8.11 (p.388)
	European Union monthly natural gas supply balance in the APS		○	○	○				○		Charged	Figure 8.12 (p.389)
	Potential for flaring and methane abatement to satisfy EU gas import demand compared with the capacity of Nord Stream I	○							○		Charged	Figure 8.13 (p.390)
	European Union natural gas contract balance compared with import requirements in the APS, 2022-2035		○		○				○		Charged	Figure 8.14 (p.391)
	Contract prices required to cover break-even costs of LNG supply for recently approved projects	○							○		Charged	Figure 8.15 (p.392)
	Average annual investment in clean energy to transition from natural gas in the European Union and gas import costs, 2016-50		○	○		○	○		○		Charged	Figure 8.16 (p.394)
	Biomethane potential in the European Union by 2030 compared with share of natural gas demand in 2021	○			○				○		Charged	Figure 8.17 (p.395)
	Domestic supply and trade of low-emissions hydrogen for key regions in the APS by 2050	○					○		○	○	Charged	Figure 8.18 (p.396)

 Source：IEA World Energy Outlook 2022

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Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Ch.8	Cost shares of a possible investment package to secure 20 Mt H2 for the European Union from local and imported supplies by 2030	○			○				○		Charged	Figure 8.19 (p.398)
	Capacity of proposed international hydrogen trade projects targeting operation by 2030 by exporter or importer country	○			○				○		Charged	Figure 8.20 (p.399)
	End-user prices for natural gas by sector emerging market and developing economies in Asia		○	○					○		Charged	Figure 8.21 (p.403)
	Natural gas supply balance in emerging market and developing economies in Asia in the APS, 2010-2050		○	○	○	○	○		○		Charged	Figure 8.22 (p.404)
	Natural gas demand in emerging market and developing economies in Asia in the APS		○	○	○	○	○		○		Charged	Figure 8.23 (p.406)
	Drivers of change in natural gas demand in emerging market and developing economies in Asia in the APS		○	○	○	○	○		○		Charged	Figure 8.24 (p.407)
	Natural gas demand in emerging market and developing economies in Asia by WEO-2022 scenario and outlook of the Golden Age of Gas Scenario in 2011		○	○					○		Charged	Figure 8.25 (p.408)
Ch.9	Global coal demand, production and trade, and solid bioenergy use by scenario (Mtce)		○	○	○		○	○			Free	Table 9.1 (p.412)
	Coal and solid bioenergy demand by scenario		○	○	○	○	○	○			Charged	Figure 9.1 (p.413)
	Coal demand by region and scenario (Mtce)		○	○	○	○	○	○	○	○	Free	Table 9.2 (p.414)
	Change in coal demand by scenario, 2021-2030		○	○	○				○		Charged	Figure 9.2 (p.415)

 Source：IEA World Energy Outlook 2022

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Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Ch.9	Global coal demand by region and scenario to 2050		○	○	○	○	○		○		Charged	Figure 9.3 (p.417)
	Coal production by region and scenario (Mtce)		○	○	○	○	○	○	○		Free	Table 9.3 (p.418)
	Coal supply in the STEPS to 2030 and change by scenario		○	○	○				○		Charged	Figure 9.4 (p.419)
	Coal supply by scenario, 2010-2050		○	○	○	○	○	○			Charged	Figure 9.5 (p.420)
	Top coal importers and exporters by scenario, 2021, 2030 and 2050		○	○	○		○		○	○	Charged	Figure 9.6 (p.421)
	Average annual investment in coal supply and coal-fired electricity generation by scenario		○	○	○		○		○		Charged	Figure 9.7 (p.422)
	Solid bioenergy demand by scenario		○	○	○		○	○			Charged	Figure 9.8 (p.423)
	Net GHG emissions savings from clean cooking access in the APS and NZE Scenario by 2030	○			○			○			Charged	Figure 9.9 (p.425)
	Bioenergy supply in the NZE Scenario		○	○	○	○	○	○			Charged	Figure 9.10 (p.427)
Annex	World energy supply data in the STEPS scenario		○	○	○	○	○	○			Free	Table A.1a (p.435)
	World final consumption data in the STEPS scenario		○	○	○	○	○	○			Free	Table A.2a (p.436-7)

 Source：IEA World Energy Outlook 2022

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Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Annex	World electricity sector data in the STEPS scenario		○	○	○	○	○	○			Free	Table A.3a (p.438)
	World CO2 emissions data in the STEPS scenario		○	○	○	○	○	○			Free	Table A.4a (p.439)
	World energy supply data in the APS scenario		○	○	○	○	○	○			Free	Table A.1b (p.440)
	World final consumption data in the APS scenario		○	○	○	○	○	○			Free	Table A.2b (p.441-2)
	World electricity sector data in the APS scenario		○	○	○	○	○	○			Free	Table A.3b (p.443)
	World CO2 emissions data in the APS scenario		○	○	○	○	○	○			Free	Table A.4b (p.444)
	World energy supply data in the NZE scenario		○	○	○	○	○	○			Free	Table A.1c (p.445)
	World final consumption data in the NZE scenario		○	○	○	○	○	○			Free	Table A.2c (p.446-7)
	World electricity sector data in the NZE scenario		○	○	○	○	○	○			Free	Table A.3c (p.448)
	World CO2 emissions data in the NZE scenario		○	○	○	○	○	○			Free	Table A.4c (p.449)
	Total energy supply data (EJ)		○	○	○		○	○	○	○	Free	Table A.5 (p.450)

 Source：IEA World Energy Outlook 2022

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Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Annex	Renewables energy supply data (EJ)		○	○	○		○	○	○	○	Free	Table A.6 (p.450)
	Oil production data (mb/d)		○	○	○		○	○	○		Free	Table A.7 (p.451)
	Oil demand data (mb/d)		○	○	○		○	○	○	○	Free	Table A.8 (p.451)
	World liquids demand data (mb/d)		○	○	○		○	○			Free	Table A.9 (p.452)
	Refining capacity and runs data (mb/d)		○	○	○		○	○	○	○	Free	Table A.10 (p.452)
	Natural gas production data (bcm)		○	○	○		○	○	○		Free	Table A.11 (p.444)
	Natural gas demand data (bcm)		○	○	○		○	○	○	○	Free	Table A.12 (p.453)
	Coal production data (Mtce)		○	○	○		○	○	○		Free	Table A.13 (p.454)
	Coal demand data (Mtce)		○	○	○		○	○	○	○	Free	Table A.14 (p.454)
	Electricity generation data (TWh)		○	○	○		○	○	○	○	Free	Table A.15 (p.455)
	Renewables generation data (TWh)		○	○	○		○	○	○	○	Free	Table A.16 (p.455)

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Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Annex	Solar PV generation data (TWh)		○	○	○		○	○	○	○	Free	Table A.17 (p.456)
	Wind generation data (TWh)		○	○	○		○	○	○	○	Free	Table A.18 (p.456)
	Nuclear generation data (TWh)		○	○	○		○	○	○	○	Free	Table A.19 (p.457)
	Natural gas generation data (TWh)		○	○	○		○	○	○	○	Free	Table A.20 (p.457)
	Coal generation data (TWh)		○	○	○		○	○	○	○	Free	Table A.21 (p.458)
	Total final consumption data (EJ)		○	○	○		○	○	○	○	Free	Table A.22 (p.458)
	Industry consumption data (EJ)		○	○	○		○	○	○	○	Free	Table A.23 (p.459)
	Transport consumption data (EJ)		○	○	○		○	○	○	○	Free	Table A.24 (p.459)
	Buildings consumption data (EJ)		○	○	○		○	○	○	○	Free	Table A.25 (p.460)
	Hydrogen demand data (PJ)		○	○	○		○	○			Free	Table A.26 (p.460)
	Hydrogen balance data (Mt H2 equivalent)		○	○	○		○	○	○	○	Free	Table A.27 (p.461)

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【IEA WEO2022 Parameter List】
Annex (5/5)

Chapter	Specific Data	Time Horizon						Country/Region			Data Type	Page Number
		Single year	Several year	Past	'30	'40	'50	World	Particular country/ region	Japan	Free/ Charged	
Annex	Total CO2 emissions data (Mt CO2)		○	○	○		○	○	○	○	Free	Table A.28 (p.461)
	Electricity and heat sectors CO_2 emissions data (Mt CO_2)		○	○	○		○	○	○	○	Free	Table A.29 (p.462)
	Total final consumption CO_2 emissions data (Mt CO_2)		○	○	○		○	○	○	○	Free	Table A.30 (p.462)

 Source：IEA World Energy Outlook 2022

IEA World Energy Outlook 2022

【Parameters in IEA WEO2022】
CO2 prices

Category	Datasets	Scenario	Time Horizon		Country / Region		Sector
• CO2 prices	• CO2 prices for electricity, industry and energy production in selected regions by scenario	• NZE • APS • STEPS	Past • -	Future • 2030 • 2040 • 2050	Global • Advanced economies with net zero emissions pledges • Emerging market and developing economies with net zero emissions pledges • Other emerging market and developing economies	Region • Canada • Chile • Colombia • China • EU • Korea	• All sector

【Unit】USD/tCO2

Region	Net Zero Emissions by 2050 Scenario (NZE)			Announced Pledges Scenario (APS)			Stated Policies Scenario (STEPS)		
	2030	2040	2050	2030	2040	2050	2030	2040	2050
Canada	-	-	-	-	-	-	54	62	77
Chile, Columbia	-	-	-	-	-	-	13	21	29
China	-	-	-	-	-	-	28	43	53
EU	-	-	-	-	-	-	90	98	113
Korea	-	-	-	-	-	-	42	67	89
Advanced economies with net zero emissions pledges	140	205	250	135	175	200	-	-	-
Emerging market and developing economies with net zero emissions pledges	90	160	200	40	110	160	-	-	-
Other emerging market and developing economies	25	85	180	-	17	47	-	-	-

 Source：IEA World Energy Outlook 2022、Table B.2 "CO2 prices for electricity, industry and energy production in selected regions by scenario"（P.465）

IEA World Energy Outlook 2022

【Parameters in IEA WEO2022】
Price of key commodities/products (Fossil fuel prices)

Category	Datasets	Scenario	Time Horizon		Country / Region		Sector
• Price of key commodities/products	• Fossil fuel prices by scenario	• NZE • APS • STEPS	Past • 2010 • 2021	Future • 2030 • 2050	Global • World	Region • United States • EU • China • Japan	• All sector

【Unit】Crude oil：USD/barrel、Natural gas：USD/Mbtu、Steam coal：USD/tonne

Category	Region	Past		Net Zero Emissions by 2050 Scenario (NZE)		Announced Pledges Scenario (APS)		Stated Policies Scenario (STEPS)	
		2010	2021	2030	2050	2030	2050	2030	2050
Crude oil	World	96	69	35	24	64	60	82	95
Natural gas	United States	5.3	3.9	1.9	1.8	3.7	2.6	4.0	4.7
	EU	9.0	9.5	4.6	3.8	7.9	6.3	8.5	9.2
	China	8.0	10.1	6.1	5.1	8.8	7.4	9.8	10.2
	Japan	13.3	10.2	6.0	5.1	9.1	7.4	10.9	10.6
Steam coal	United States	63	44	22	17	42	24	46	44
	EU	113	120	52	42	62	53	60	64
	Coastal China	142	164	58	48	73	62	89	74
	Japan	132	153	59	46	74	59	91	72

Source：IEA World Energy Outlook 2022、Table 2.2 “Fossil fuel prices by scenario”（P.110）

IEA World Energy Outlook 2022

【Parameters in IEA WEO2022】
CO2 emissions (CO2 emissions from electricity generation)

Category	Datasets	Scenario	Time Horizon		Country / Region		Sector
• CO_2 emissions	• CO_2 emissions from electricity generation by source and scenario	• NZE • APS • STEPS	Past • 2010 • 2021	Future • 2030 • 2050	Global • World	Region • -	• All sector

【Unit】Mt

Category	Past		Net Zero Emissions by 2050 Scenario (NZE)		Announced Pledges Scenario (APS)		Stated Policies Scenario (STEPS)	
	2010	2021	2030	2050	2030	2050	2030	2050
Coal	8,342	9,670	4,179	27	7,423	1,442	8,324	5,242
Natural gas	2,186	2,798	1,969	36	2,380	1,278	2,678	2,407
Oil	751	523	135	2	286	140	333	242
Bioenergy and waste	5	4	-65	-434	-31	-362	4	8
Total (net)	11,285	12,996	6,218	-369	10,057	2,498	11,338	7,899
Total CO2 captured	-	1	304	1,479	81	1,484	7	96

Source：IEA World Energy Outlook 2022、Table 6.4 “CO_2 emissions from electricity generation by source and scenario, 2010-2050 (Mt)”（P.303）

IEA World Energy Outlook 2022

【Parameters in IEA WEO2022】
Energy demand and supply (Supply and demand of low-emissions hydrogen and fuels)

Category	Datasets	Scenario	Time Horizon		Country / Region		Sector
• Energy demand and supply	• Supply and demand of low-emissions hydrogen and fuels	• NZE • APS • STEPS	Past • -	Future • 2030 • 2050	Global • World	Region • -	• All sector

【Unit】Mt hydrogen equivalent (energy basis)

Category (Large)	Category (Small)	Net Zero Emissions by 2050 Scenario (NZE)		Announced Pledges Scenario (APS)		Stated Policies Scenario (STEPS)	
		2030	2050	2030	2050	2030	2050
Low - emissions hydrogen production	**Total**	**90**	**452**	**30**	**225**	**6**	**24**
	Water electrolysis	58	329	21	167	4	17
	Fossil fuels with CCUS	31	122	9	57	2	8
	Bioenergy	0	2	0	1	0	0
Transformation	**Total**	**50**	**186**	**14**	**95**	**3**	**10**
	To power generation	27	60	4	19	0	1
	To hydrogen - based fuels	18	118	6	69	0	3
	To oil refining	2	4	3	6	2	5
	To biofuels	3	3	1	1	1	1
Demand by end - use sector	**Total**	**40**	**266**	**16**	**131**	**3**	**15**
	Total final consumption	31	174	12	80	1	10
	Onsite production	9	92	4	51	2	4
Low - emissions hydrogen - based fuels	**Total**	**15**	**96**	**3**	**55**	**0**	**3**
	Total final consumption	7	68	3	39	0	1
	Power generation	8	28	0	16	0	2
Trade	—	18	73	4	44	1	5

Source：IEA World Energy Outlook 2022、Table 5.2 “Supply and demand of low-emissions hydrogen and fuels”（P.240）

IEA World Energy Outlook 2022

【Parameters in IEA WEO2022】
Energy demand and supply (Global electricity demand and supply)

Category	Datasets	Scenario	Time Horizon		Country / Region		Sector
• Energy demand and supply	• Global electricity demand and supply	• NZE • APS • STEPS	Past • 2010 • 2021	Future • 2030 • 2050	Global • World	Region • -	• All • Buildings • Industry • Transport

【Unit】TWh、%

Category	Past		Net Zero Emissions by 2050 Scenario (NZE)		Announced Pledges Scenario (APS)		Stated Policies Scenario (STEPS)	
	2010	2021	2030	2050	2030	2050	2030	2050
Buildings	9,637	12,594	13,293	15,850	14,889	19,623	15,383	21,940
Industry	7,450	10,166	13,776	21,697	12,471	18,332	12,036	15,073
Transport	295	441	2,236	10,243	1,570	7,845	1,169	3,607
Hydrogen production	-	2	2,464	11,433	879	5,714	159	663
Global electricity demand	**18,548**	**24,700**	**33,733**	**62,159**	**31,752**	**53,810**	**30,621**	**43,672**
Unabated coal	8,670	10,201	4,666	0	8,076	1,580	9,044	5,892
Unabated natural gas	4,855	6,552	4,977	82	6,100	3,577	6,848	6,658
Unabated oil	969	682	180	3	363	175	432	312
Fossil fuels with CCUS	-	1	282	1,317	75	1,338	5	133
Nuclear	2,756	2,776	3,896	5,810	3,547	5,103	3,351	4,260
Hydropower	3,449	4,327	5,725	8,251	5,213	7,543	5,078	6,809
Wind	342	1,870	7,840	23,486	5,816	17,416	4,604	10,691
Solar PV	32	1,003	7,551	27,006	4,838	18,761	4,011	12,118
Other renewables	411	859	1,948	5,762	1,707	5,153	1,380	2,833
Hydrogen and ammonia	-	-	603	1,467	79	567	9	44
Global electricity supply	**21,539**	**28,334**	**37,723**	**73,232**	**35,878**	**61,268**	**34,834**	**49,845**
Renewables share	**20%**	**28%**	**61%**	**88%**	**49%**	**80%**	**43%**	**65%**

Source：IEA World Energy Outlook 2022、Table 6.1 “Global electricity demand and supply by scenario (TWh)”（P.281）

IEA World Energy Outlook 2022

【Parameters in IEA WEO2022】

Energy demand and supply (Electricity demand)

Category	Datasets	Scenario	Time Horizon		Country / Region		Sector
• Energy demand and supply	• Electricity demand by region	• APS • STEPS	Past • 2010 • 2021	Future • 2030 • 2050	Global • World	Region • North America • Central and South America • Europe • Africa • Middle East • Eurasia • Asia Pacific	• All sector

【Unit】TWh

Region	Country	Past		APS		STEPS	
		2010	2021	2030	2050	2030	2050
North America	**–**	**4,632**	**4,852**	**5,544**	**8,786**	**5,266**	**6,830**
	United States	3,880	4,004	4,529	7,187	4,281	5,482
Central and South America	**–**	**932**	**1,097**	**1,447**	**2,940**	**1,308**	**2,168**
	Brazil	451	541	637	1,138	622	985
Europe	**–**	**3,567**	**3,645**	**4,639**	**6,561**	**4,182**	**5,060**
	European Union	2,574	2,608	3,271	4,348	2,922	3,327
Africa	**–**	**570**	**707**	**1,128**	**3,355**	**994**	**2,041**
	South Africa	214	194	248	494	229	365
Middle East	**–**	**709**	**1,064**	**1,343**	**2,878**	**1,372**	**2,430**
Eurasia	**–**	**985**	**1,181**	**1,280**	**1,652**	**1,291**	**1,669**
Asia Pacific	**–**	**7,154**	**12,164**	**16,371**	**27,638**	**16,208**	**23,475**
	China	3,659	7,556	9,940	14,504	9,969	12,868
	India	717	1,273	2,107	5,314	2,117	4,293
	Japan	**1,071**	**934**	**952**	**1,153**	**893**	**922**
	Southeast Asia	607	1,037	1,580	3,214	1,537	2,848
Global electricity demand		**18,548**	**24,700**	**31,752**	**53,810**	**30,621**	**43,672**

 Source：IEA World Energy Outlook 2022、Table 6.2 “Electricity demand by region and scenario, 2010-2050 (TWh)”（P.283）

IEA World Energy Outlook 2022

【Parameters in IEA WEO2022】

Energy demand and supply (Global liquids demand and supply①)

Category	Datasets	Scenario	Time Horizon		Country / Region		Sector
• Energy demand and supply	• Global liquids demand and supply	• NZE • APS • STEPS	Past • 2010 • 2021	Future • 2030 • 2050	Global • World	Region • -	• All • Transport • Buildings etc.

【Unit】mb/d

Category	Past		NZE		APS		STEPS	
	2010	2021	2030	2050	2030	2050	2030	2050
World liquids demand	**88.4**	**96.7**	**81.9**	**34.1**	**98.7**	**69.5**	**105.8**	**107.6**
World oil demand	**87.2**	**94.5**	**75.3**	**22.8**	**93.0**	**57.2**	**102.4**	**102.1**
Road transport	36.5	40.5	27.5	1.3	37.8	17.3	41.9	39.0
Aviation and shipping	9.9	9.9	10.0	2.0	12.8	9.5	14.0	18.1
Industry and petrochemicals	17.2	20.5	20.1	13.4	21.5	18.1	23.7	25.5
Buildings and power	12.4	11.4	6.5	0.6	8.3	3.7	9.3	7.0
Other sectors	11.2	12.2	11.1	5.6	12.6	8.6	13.6	12.5
Liquid biofuels	1.2	2.2	5.7	5.7	5.5	9.2	3.4	5.3
Low - emissions hydrogen - based fuels	-	-	0.9	5.6	0.2	3.2	0.0	0.2
World oil production	**83.4**	**90.3**	**73.5**	**22.2**	**90.7**	**55.3**	**99.9**	**99.3**
Conventional crude oil	66.8	60.1	44.2	12.6	56.8	31.0	62.5	62.6
Tight oil	0.7	7.4	9.2	1.6	9.7	6.7	10.9	9.9
Natural gas liquids	12.7	18.2	16.4	6.1	19.2	13.9	20.9	19.3
Extra-heavy oil and bitumen	2.6	3.7	3.3	2.0	4.1	3.4	4.4	6.2
Other production	0.6	0.9	0.3	0.0	1.0	0.3	1.2	1.4
OPEC share	40%	35%	36%	52%	36%	43%	36%	43%
World processing gains	2.2	2.3	1.8	0.6	2.3	1.9	2.5	2.8
World oil supply	**85.5**	**92.6**	**75.4**	**22.8**	**93.0**	**57.2**	**102.4**	**102.1**
IEA crude oil price	**96**	**69**	**35**	**24**	**64**	**60**	**82**	**95**

 Source：IEA World Energy Outlook 2022、Table 7.1 “Global liquids demand and supply by scenario (mb/d)”（P.329）

IEA World Energy Outlook 2022

【Parameters in IEA WEO2022】
Energy demand and supply (Global liquids demand and supply)

Category	Datasets	Scenario	Time Horizon		Country / Region		Sector
• Energy demand and supply	• Global liquids demand and supply	• APS • STEPS	Past • 2020 • 2021	Future • 2030 • 2050	Global • World	Region • -	• All sector

【Unit】Mb/d

Category	Past		APS			STEPS		
	2020	2021	2030	2040	2050	2030	2040	2050
Total liquids	**90.9**	**96.7**	**98.7**	**82.8**	**69.6**	**105.8**	**107.5**	**107.6**
Biofuels	2.0	2.2	5.5	8.7	9.2	3.4	4.6	5.3
Low-emissions hydrogen-based fuels	0.0	0.0	0.2	1.2	3.2	0.0	0.1	0.2
Total oil	**88.9**	**94.5**	**93.0**	**72.9**	**57.2**	**102.4**	**102.8**	**102.1**
CT*, GTL** and additives	0.8	0.9	1.0	0.7	0.3	1.1	1.3	1.3
Direct use of crude oil	1.0	0.8	0.4	0.3	0.2	0.5	0.4	0.3
Oil products	**87.1**	**92.8**	**91.6**	**71.9**	**56.7**	**100.8**	**101.1**	**100.5**
LPG and ethane	13.3	13.6	14.4	12.4	10.4	15.6	16.2	15.8
Naphtha	6.4	6.9	7.3	7.4	7.4	7.7	8.6	9.5
Gasoline	21.9	23.6	20.6	13.1	8.2	23.2	21.4	19.3
Kerosene	4.7	5.7	8.7	8.0	7.6	9.2	10.3	11.8
Diesel	25.0	26.5	25.0	18.3	12.6	28.2	28.4	28.2
Fuel oil	5.7	5.9	4.8	3.4	2.5	5.5	5.6	6.3
Other products	10.1	10.6	10.8	9.3	8.0	11.4	10.6	9.6
Fractionated products from NGLs***	11.3	11.5	12.7	10.1	8.8	13.4	12.1	11.6
Refinery products	75.8	81.3	78.9	61.8	47.9	87.4	89.0	88.9
Refinery market share	83%	83%	80%	75%	69%	83%	83%	83%

*CT：coal - to - liquids;、**GTL：gas - to - liquids、***NGL：natural gas liquids

5-51 Source：IEA World Energy Outlook 2022、Table 7.7 “World liquids demand by scenario (mb/d)”（P.361）

IEA World Energy Outlook 2022

【Parameters in IEA WEO2022】
Energy demand and supply (Global gas demand, 1/2)

Category	Datasets	Scenario	Time Horizon		Country / Region		Sector
• Energy demand and supply	• Global gas demand	• NZE • APS • STEPS	Past • 2020 • 2021	Future • 2030 • 2050	Global • World	Region • -	• All • Power • Industry etc.

【Unit】bcme

Category	Past		NZE		APS		STEPS	
	2020	2021	2030	2050	2030	2050	2030	2050
Total gas demand	**3,351**	**4,248**	**3,666**	**2,681**	**4,069**	**3,568**	**4,456**	**4,661**
Natural gas demand	**3,329**	**4,213**	**3,268**	**1,159**	**3,874**	**2,661**	**4,372**	**4,357**
Power	1,345	1,633	1,177	119	1,422	880	1,590	1,469
Industry	701	882	802	213	891	644	1,003	1,116
Buildings	757	886	486	-	737	372	890	852
Transport	108	147	99	12	126	58	159	172
Low-emissions H2 production inputs	-	1	145	566	41	266	10	32
Other	417	664	559	248	658	441	720	717
Natural gas abated with CCUS	2	12	223	738	103	420	24	74
Losses from low - emissions H2 production	-	-	45	175	13	82	3	10
Natural gas production	**3,274**	**4,149**	**3,264**	**1,178**	**3,878**	**2,660**	**4,372**	**4,355**
Conventional gas	2,768	2,964	2,292	827	2,731	2,016	2,962	3,025
Unconventional gas	506	1,185	972	351	1,147	644	1,410	1,329
Natural gas trade	**641**	**878**	**667**	**224**	**833**	**497**	**944**	**991**
LNG	275	450	443	153	545	324	559	649
Pipeline	366	428	224	71	288	173	385	342

5-52 Source：IEA World Energy Outlook 2022、Table 8.1 “Global gases by scenario (bcme)”（P.369）

IEA World Energy Outlook 2022

【Parameters in IEA WEO2022】
Energy demand and supply (Global gas demand, 2/2)

Category	Datasets	Scenario	Time Horizon		Country / Region		Sector
• Energy demand and supply	• Global gas demand	• NZE • APS • STEPS	Past • 2020 • 2021	Future • 2030 • 2050	Global • World	Region • -	• All • Power • Industry etc.

【Unit】 bcme

Category	Past		NZE		APS		STEPS	
	2020	2021	2030	2050	2030	2050	2030	2050
Low - emissions H2 demand	-	**1**	**299**	**1,509**	**100**	**752**	**21**	**81**
Power	-	-	91	200	14	63	1	2
Industry	-	-	84	451	36	248	7	20
Buildings	-	-	10	40	6	30	-	3
Transport	-	-	38	396	11	158	2	25
Low - emissions H2 production inputs	-	-	60	395	19	229	1	11
Other	-	1	16	27	15	24	10	20
Low - emissions H2 production	-	**1**	**299**	**1,509**	**100**	**752**	**21**	**81**
Fossil fuel - based (with CCUS)	-	1	103	406	29	192	8	25
Electrolytic	-	-	195	1,097	70	557	13	56
Bioenergy-based	-	-	1	7	1	4	-	-
Biogas demand	**22**	**35**	**199**	**404**	**123**	**339**	**70**	**244**
Biogas	21	27	59	138	58	142	46	102
Biomethane	1	8	140	267	65	197	24	143

Source：IEA World Energy Outlook 2022、Table 8.1 “Global gases by scenario (bcme)”（P.369）

IEA World Energy Outlook 2022

【Parameters in IEA WEO2022】
Energy demand and supply (Gas demand by region)

Category	Datasets	Scenario	Time Horizon		Country / Region		Sector
• Energy demand and supply	• Global gas demand	• APS • STEPS	Past • 2010 • 2021	Future • 2030 • 2050	Global • World	Region • North America • Central and South America • Europe • Africa • Middle East • Eurasia • Asia Pacific	• All sector

【Unit】 bcme

Region	Country	Past		APS		STEPS	
		2010	2021	2030	2050	2030	2050
North America	**–**	**835**	**1 106**	**933**	**396**	**1 118**	**820**
	United States	678	871	716	252	864	575
Central and South America	**–**	**147**	**161**	**141**	**96**	**159**	**179**
	Brazil	29	42	28	17	34	37
Europe	**–**	**698**	**625**	**394**	**122**	**511**	**395**
	European Union	446	421	242	45	340	235
Africa	**–**	**105**	**172**	**189**	**193**	**215**	**292**
	North Africa	85	132	137	120	155	182
Middle East	**–**	**391**	**567**	**638**	**582**	**689**	**833**
Eurasia	**–**	**578**	**662**	**587**	**532**	**626**	**635**
	Russia	472	543	470	424	498	470
Asia Pacific	**–**	**576**	**920**	**983**	**731**	**1,043**	**1,173**
	China	110	368	406	238	443	442
	India	64	66	110	102	115	170
	Japan	**95**	**103**	**57**	**17**	**64**	**43**
	Southeast Asia	150	162	194	177	203	272

 Source：IEA World Energy Outlook 2022、Table 8.2 “Gas demand by region in the STEPS and APS (bcme)”（P.372）

IEA World Energy Outlook 2022

【Parameters in IEA WEO2022】
Energy demand and supply (Global coal demand)

Category	Datasets	Scenario	Time Horizon		Country / Region		Sector
• Energy demand and supply	• Global coal demand	• NZE • APS • STEPS	Past • 2020 • 2021	Future • 2030 • 2050	Global • World	Region • -	• All • Power • Industry

【Unit】Mtce、EJ

Category	Past		NZE		APS		STEPS	
	2020	2021	2030	2050	2030	2050	2030	2050
World coal demand	**5,220**	**5,644**	**3,024**	**539**	**4,539**	**1,613**	**5,149**	**3,828**
Power	3,108	3,642	1,685	306	2,852	938	3,174	2,086
Industry	1,690	1,629	1,159	206	1,426	640	1,684	1,520
Other sectors	423	373	180	28	261	36	291	222
Share of demand with CCUS	0%	0%	3%	89%	1%	31%	0%	1%
Advanced economies	1,585	1,024	267	84	375	127	526	297
Emerging market and developing economies	3,686	4,620	2,762	455	4,164	1,486	4,623	3,532
World coal production	**5,235**	**5,825**	**3,024**	**539**	**4,539**	**1,613**	**5,149**	**3,829**
Steam coal	4,069	4,560	2,271	407	3,538	1,177	4,026	2,954
Coking coal	866	1,030	716	120	855	381	936	736
Peat and lignite	300	235	38	12	146	56	187	139
Advanced economies	1,512	1,124	362	99	522	186	729	590
Emerging market and developing economies	3,723	4,702	2,662	443	4,017	1,427	4,420	3,239
World coal trade	**948**	**1,135**	**539**	**137**	**859**	**470**	**999**	**958**
Trade as share of production	18%	19%	18%	25%	19%	29%	19%	25%
Coastal China steam coal price	142	155	52	44	66	56	81	67
Solid bioenergy (EJ)	**49**	**60**	**58**	**74**	**62**	**87**	**66**	**80**
Traditional use of biomass	25	24	-	-	9	6	20	18
Modern bioenergy and losses	24	36	58	74	53	81	46	62

5-55 Source：IEA World Energy Outlook 2022、Table 9.1 “Global coal demand, production and trade, and solid bioenergy use by scenario (Mtce)”（P.412）

IEA World Energy Outlook 2022

【Parameters in IEA WEO2022】
Energy demand and supply (Global coal demand by region)

Category	Datasets	Scenario	Time Horizon		Country / Region		Sector
• Energy demand and supply	• Global coal demand by region	• APS • STEPS	Past • 2010 • 2021	Future • 2030 • 2040 • 2050	Global • World	Region • North America • Central and South America • Europe • Africa • Middle East • Eurasia • Asia Pacific	• All

【Unit】Mtce

Region	Country	Past		APS			STEPS		
		2010	2021	2030	2040	2050	2030	2040	2050
North America	**–**	**768**	**389**	**80**	**37**	**30**	**107**	**50**	**42**
	United States	716	363	64	24	17	91	32	26
Central and South America	**–**	**37**	**46**	**28**	**25**	**20**	**40**	**52**	**60**
	Brazil	21	25	16	14	12	23	27	29
Europe	**–**	**539**	**369**	**157**	**99**	**72**	**229**	**176**	**167**
	European Union	360	238	79	35	20	125	69	56
Africa	**–**	**156**	**152**	**119**	**59**	**30**	**148**	**132**	**131**
	North Africa	144	129	95	34	6	113	87	78
Middle East	**–**	**5**	**5**	**7**	**8**	**9**	**8**	**11**	**12**
Eurasia	**–**	203	222	162	131	121	172	158	160
	Russia	151	166	113	100	95	114	104	102
Asia Pacific	**–**	**3,513**	**4,460**	**3,986**	**2,449**	**1,332**	**4,444**	**3,816**	**3,258**
	China	2,565	3,157	2,691	1,603	789	2,974	2,342	1,856
	India	399	614	704	420	243	773	738	671
	Indonesia	45	102	124	90	41	136	164	160
	Japan	**165**	**143**	**97**	**58**	**35**	**103**	**87**	**62**
	Southeast Asia	76	166	171	138	110	201	243	263

5-56 Source：IEA World Energy Outlook 2022、Table 9.2 “Coal demand by region and scenario (Mtce)”（P.414）

IEA World Energy Outlook 2022

【Parameters in IEA WEO2022】
Energy demand and supply (Oil production、1/3)

Category	Datasets	Scenario	Time Horizon		Country / Region		Sector
• Energy demand and supply	• Oil production by region	• APS • STEPS	Past • 2010 • 2021	Future • 2030 • 2040 • 2050	Global • World	Region • North America • Central and South America • Europe • Africa • Middle East • Eurasia • Asia Pacific	• All

【Unit】mb/d

Region	Country	Past		APS			STEPS		
		2010	2021	2030	2040	2050	2030	2040	2050
North America	**－**	**14.2**	**24.4**	**25.8**	**19.2**	**14.7**	**28.6**	**27.0**	**24.6**
	Canada	3.5	5.6	5.4	4.1	3.2	6.2	6.4	5.5
	United States	7.8	16.8	18.8	14.0	10.7	20.7	18.6	16.7
Central and South America	**－**	**7.4**	**5.9**	**8.3**	**7.7**	**6.5**	**9.0**	**10.1**	**11.4**
	Brazil	2.2	3.0	4.4	3.8	3.3	4.5	4.3	5.1
	Guyana	0.0	0.1	1.4	1.5	1.0	1.6	2.0	1.1
	Venezuela	2.8	0.6	0.7	1.2	1.3	0.8	1.4	2.7
Europe	**－**	**4.4**	**3.6**	**2.7**	**1.3**	**0.6**	**3.1**	**2.2**	**1.3**
	Norway	2.1	2.0	1.9	1.0	0.5	2.0	1.3	0.6
	United Kingdom	1.4	0.9	0.5	0.2	0.1	0.6	0.4	0.3
Africa	**－**	**10.2**	**7.4**	**5.8**	**4.0**	**2.9**	**7.0**	**6.4**	**6.1**
	Angola	1.8	1.2	0.8	0.6	0.5	0.9	0.8	0.9
	Nigeria	2.5	1.7	1.2	0.9	0.7	1.3	1.3	1.3

 Source：IEA World Energy Outlook 2022、Table 7.3 “Oil production by scenario (mb/d)”（P.336）

IEA World Energy Outlook 2022

【Parameters in IEA WEO2022】
Energy demand and supply (Oil production、2/3)

Category	Datasets	Scenario	Time Horizon		Country / Region		Sector
• Energy demand and supply	• Oil production by region	• APS • STEPS	Past • 2010 • 2021	Future • 2030 • 2040 • 2050	Global • World	Region • North America • Central and South America • Europe • Africa • Middle East • Eurasia • Asia Pacific	• All

【Unit】mb/d

Region	Country	Past		APS			STEPS		
		2010	2021	2030	2040	2050	2030	2040	2050
Middle East	**－**	**25.4**	**27.9**	**31.2**	**27.5**	**22.9**	**33.9**	**38.2**	**40.4**
	Iraq	2.4	4.1	4.6	3.7	2.7	4.6	5.5	6.2
	Iraq	4.2	3.4	3.7	4.0	2.8	3.9	4.6	5.0
	Kuwait	2.5	2.7	3.0	2.6	2.3	3.3	3.4	3.5
	Saudi Arabia	10.0	11.0	12.3	10.9	10.0	13.5	14.8	15.9
	United Arab Emirates	2.8	3.6	4.1	3.2	2.5	4.8	5.4	5.5
Eurasia	**－**	**13.4**	**13.7**	**11.2**	**7.6**	**5.4**	**11.9**	**10.8**	**10.6**
	Russia	10.4	10.9	8.5	5.5	3.9	8.8	7.7	7.7
Asia Pacific	**－**	**8.4**	**7.4**	**5.7**	**3.5**	**2.2**	**6.3**	**5.4**	**4.8**
	China	4.0	4.0	3.3	1.9	1.1	3.6	3.1	2.7

 Source：IEA World Energy Outlook 2022、Table 7.3 “Oil production by scenario (mb/d)”（P.336）

IEA World Energy Outlook 2022

【Parameters in IEA WEO2022】
Energy demand and supply (Oil production、3/3)

Category	Datasets	Scenario	Time Horizon		Country / Region		Sector
• Energy demand and supply	• Oil production by region	• APS • STEPS	Past • 2010 • 2021	Future • 2030 • 2040 • 2050	Global • World	Region • North America • Central and South America • Europe • Africa • Middle East • Eurasia • Asia Pacific	• All

【Unit】mb/d

Region	Country	Past		APS			STEPS		
		2010	2021	2030	2040	2050	2030	2040	2050
Conventional crude oil	–	66.8	60.1	56.8	41.9	31.0	62.5	62.5	31.0
Tight oil	–	0.7	7.4	9.7	8.3	6.7	10.9	11.3	6.7
	United States	0.6	6.9	8.8	7.8	6.2	9.9	9.7	6.2
Natural gas liquids	–	12.7	18.2	19.2	15.9	13.9	20.9	19.9	13.9
Canada oil sands		1.6	3.4	3.5	2.8	2.2	3.9	3.8	2.2
Other production		1.6	1.3	1.6	1.8	1.6	1.7	2.6	1.6
Total	–	**83.4**	**90.3**	**90.7**	**70.7**	**55.3**	**99.9**	**100.1**	**55.3**
OPEC share (%)	–	40%	35%	40%	40%	43%	36%	40%	43%

Source：IEA World Energy Outlook 2022、Table 7.3 “Oil production by scenario (mb/d)”（P.336）

IEA World Energy Outlook 2022

【Parameters in IEA WEO2022】
Energy demand and supply (Natural gas production、1/2)

Category	Datasets	Scenario	Time Horizon		Country / Region		Sector
• Energy demand and supply	• Natural gas production	• APS • STEPS	Past • 2010 • 2021	Future • 2030 • 2050	Global • World	Region • North America • Central and South America • Europe • Africa • Middle East • Eurasia • Asia Pacific	• All

【Unit】bcm

Region	Country	Past		APS		STEPS	
		2010	2021	2030	2050	2030	2050
North America	–	**811**	**1,189**	**1,098**	**485**	**1,283**	**1,017**
	Canada	156	189	154	87	189	200
	Mexico	51	31	31	34	31	34
	United States	604	969	913	364	1 063	784
Central and South America	–	**160**	**151**	**133**	**95**	**149**	**195**
	Argentina	41	41	51	60	53	107
	Brazil	16	25	19	11	25	38
Europe	–	**341**	**239**	**177**	**65**	**247**	**208**
	European Union	148	51	17	2	39	34
	Norway	110	119	80	20	126	78
Africa	–	**203**	**265**	**285**	**239**	**313**	**369**
	Algeria	85	103	97	39	103	65
	Egypt	57	72	74	50	74	58
	Mozambique	3	4	14	43	23	83
	Nigeria	33	44	48	41	51	57

 Source：IEA World Energy Outlook 2022、Table 8.3 “Natural gas production in the STEPS and APS (bcm)”（P.377）

IEA World Energy Outlook 2022

【Parameters in IEA WEO2022】
Energy demand and supply (Natural gas production、2/2)

Category	Datasets	Scenario	Time Horizon		Country / Region		Sector
• Energy demand and supply	• Natural gas production	• APS • STEPS	Past • 2010 • 2021	Future • 2030 • 2050	Global • World	Region • North America • Central and South America • Europe • Africa • Middle East • Eurasia • Asia Pacific	• All

【Unit】bcm

Region	Country	Past		APS		STEPS	
		2010	2021	2030	2050	2030	2050
Middle East	**–**	**463**	**660**	**798**	**690**	**853**	**1,030**
	Iran	144	236	245	154	248	319
	Iraq	5	12	29	28	32	44
	Qatar	121	169	236	225	247	326
	Saudi Arabia	73	100	148	189	150	191
Eurasia	–	**807**	**998**	**751**	**654**	**831**	**857**
	Azerbaijan	17	33	35	29	35	24
	Russia	657	793	584	483	633	**612**
	Turkmenistan	45	90	73	100	91	155
Asia Pacific	–	**488**	**648**	**636**	**432**	**694**	**678**
	Australia	53	151	154	121	165	150
	China	96	200	228	120	250	285
	India	51	32	47	53	48	78
	Indonesia	86	58	50	33	57	38
	Rest of Asia Pacific	203	206	156	106	174	126

5-61 Source：IEA World Energy Outlook 2022、Table 8.3 “Natural gas production in the STEPS and APS (bcm)”（P.377）

IEA World Energy Outlook 2022

【Parameters in IEA WEO2022】
Energy demand and supply (Coal production)

Category	Datasets	Scenario	Time Horizon		Country / Region		Sector
• Energy demand and supply	• Coal production by region	• APS • STEPS	Past • 2010 • 2021	Future • 2030 • 2040 • 2050	Global • World	Region • North America • Central and South America • Europe • Africa • Middle East • Eurasia • Asia Pacific	• All

【Unit】Mtce

Region	Country	Past		APS			STEPS		
		2010	2021	2030	2040	2050	2030	2040	2050
North America	**–**	**818**	**478**	**138**	**57**	**32**	**188**	**105**	**106**
	United States	758	433	115	50	29	156	79	80
Central and South America	**–**	**79**	**62**	**24**	**10**	**3**	**41**	**42**	**41**
	Colombia	73	58	22	10	3	37	38	37
Europe	**–**	**331**	**200**	**79**	**27**	**20**	**126**	**80**	**59**
	European Union	220	138	46	10	8	71	29	10
Africa	**–**	**210**	**212**	**162**	**87**	**47**	**188**	**158**	**171**
	South Africa	206	199	138	58	19	162	114	109
Middle East	**–**	**1**	**1**	**0**	**0**	**0**	**1**	**1**	**1**
Eurasia	**–**	**309**	**444**	**292**	**245**	**216**	**323**	**307**	**274**
	Russia	238	371	239	212	187	265	250	215
Asia Pacific	**–**	**3,487**	**4,428**	**3,843**	**2,382**	**1,295**	**4,282**	**3,701**	**3,177**
	Australia	352	421	304	255	138	408	425	419
	China	2,461	3,004	2,554	1,522	733	2,808	2,228	1,776
	India	304	447	509	251	109	546	508	436
	Indonesia	266	438	364	247	210	393	405	402
	Rest of Southeast Asia	52	60	59	52	53	67	70	72

5-62 Source：IEA World Energy Outlook 2022、Table 9.3 “Coal production by region and scenario (Mtce)”（P.418）

IEA World Energy Outlook 2022

【Parameters in IEA WEO2022】
Predictions on production and sales (Oil trade、Imports)

Category	Datasets	Scenario	Time Horizon		Country / Region		Sector
• Predictions on production and sales	• Oil trade	• APS • STEPS	Past • 2021	Future • 2030 • 2050	Global • -	Region • China • European Union • Other Asia Pacific • Japan・Korea • India • Other Europe	• All

【Unit】Mb/d

Net importer in 2021	APS				STEPS					
	Net imports (mb/d)		Share of demand		Net imports (mb/d)			Share of demand		
	2030	2050	2030	2050	2021	2030	2050	2021	2030	2050
China	12.2	6.9	75%	82%	12.3	13.0	10.6	78%	75%	76%
European Union	7.6	2.0	95%	93%	9.7	8.9	5.7	93%	95%	92%
Other Asia Pacific	9.3	7.9	83%	87%	6.4	10.0	13.5	70%	82%	87%
Japan・Korea	5.0	2.3	98%	97%	5.8	5.5	4.1	96%	98%	98%
India	5.4	3.8	90%	90%	4.1	6.2	8.0	87%	89%	92%
Other Europe	0.7	0.9	21%	60%	0.3	0.9	2.2	7%	25%	67%

Source：IEA World Energy Outlook 2022、Table 7.4 “Oil trade by region and scenario”（P.341）

IEA World Energy Outlook 2022

【Parameters in IEA WEO2022】
Predictions on production and sales (Oil trade、Exports)

Category	Datasets	Scenario	Time Horizon		Country / Region		Sector
• Predictions on production and sales	• Oil trade	• APS • STEPS	Past • 2021	Future • 2030 • 2050	Global • -	Region • China • European Union • Other Asia Pacific • Japan・Korea • India • Other Europe	• All

【Unit】Mb/d

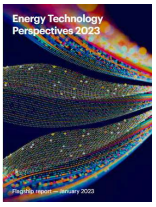
Net exporter in 2021	APS				STEPS					
	Net exports (mb/d)		Share of production		Net exports (mb/d)			Share of production		
	2030	2050	2030	2050	2021	2030	2050	2021	2030	2050
Middle East	22.4	14.4	72%	63%	19.6	24.3	28.5	70%	72%	71%
Russia	5.1	1.0	60%	27%	7.2	5.3	4.4	66%	61%	58%
Africa	0.6	n.a.	11%	n.a.	3.4	1.7	n.a.	46%	25%	n.a.
North America	7.3	7.5	28%	51%	2.5	7.9	7.7	10%	27%	31%
Caspian	1.8	0.4	64%	26%	2.0	2.0	1.4	72%	66%	49%
Central & South America	3.1	3.8	37%	59%	0.4	3.1	5.0	8%	34%	44%

Source：IEA World Energy Outlook 2022、Table 7.4 “Oil trade by region and scenario”（P.341）

IEA Energy Technology Perspective 2023

【IEA ETP2023：Overview】

Supply chains for clean energy technologies are concentrated in certain areas, emphasizing the need for supply chain diversity



ETP2023 Report Overview

- ✓ ETP2023 provides a comprehensive inventory of the current state of the global clean energy supply chain, **using the Announced Pledges Scenario (APS) and the Net Zero Emissions by 2050 scenario (NZE)**. The report refers to the supply of materials such as lithium, copper, nickel, steel, cement, aluminum, and plastic, as well as the production and adoption of key technologies
- ✓ **Emphasized the increase in prices of clean energy technologies in the recent years due to the tightening of the supply chains caused by the situation in Ukraine. Also points out the need for diversification of the supply** chains to reduce physical risks since clean energy production/trade and mineral resources are concentrated in specific regions.
  - 70% of the manufacturing capacity for wind, batteries, electrolysers, solar panels and heat pumps are from three countries, with the majority manufactured in China
  - Higher prices for lithium and nickel contributed to a 10% increase in battery prices worldwide in 2022. With the steel and copper prices doubling in 2020 and the first half of 2022, the cost of wind turbines outside of China is also rising
- ✓ **Various governments are competing for economic opportunity while increasing resilience and diversifying the clean energy supply chains**
  - Examples would be the US “Inflation Reduction Act”, EU “Fit for 55 Package” and “REPowerEU Plan”, Japan`s GX program, India`s “the Production Linked Incentive scheme”

Table of Contexts

 Source：IEA Energy Technology Perspective 2023 ※Excel data of the parameters are not available as of February 21st, 2023

IEA Energy Technology Perspective 2023

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 Source：IEA Energy Technology Perspective 2023

IEA Energy Technology Perspective 2023

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 Source：IEA Energy Technology Perspective 2023

IEA Energy Technology Perspective 2023

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 Source：IEA Energy Technology Perspective 2023

IEA Energy Technology Perspective 2023

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	Figure 4.5	Solar PV manufacturing capacity by country/region according to announced projects and in the NZE Scenario
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 Source：IEA Energy Technology Perspective 2023

IEA Energy Technology Perspective 2023

【List of IEA ETP2023 Parameters】
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Ch.4	Figure 4.7	Financial indicators for non-Chinese wind turbine manufacturers
	Figure 4.8	Battery and component manufacturing capacity by country/region according to announced projects and in the NZE Scenario
	Figure 4.9	Heavy-duty fuel cell truck and mobile fuel cell manufacturing capacity by country/region according to announced projects and in the NZE Scenario
	Figure 4.10	Heat pump manufacturing capacity by country/region according to announced projects and in the NZE Scenario
	Figure 4.11	Global annual sales of heat pump technologies for buildings in the NZE Scenario
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	Figure 4.13	Announced global cumulative investment in large-scale, site-tailored clean energy technologies by region/country and that required to meet demand in 2030 in the NZE Scenario, 2022-2030
	Figure 4.14	Capacity of hydrogen production from natural gas with CCS by country/region according to announced projects and in the NZE Scenario
	Figure 4.15	Direct air capture capacity by country/region for use and storage according to announced projects and in the NZE Scenario
	Figure 4.16	Capacity of bioenergy with CO2 captured for use and storage by country/region according to announced projects and in the NZE Scenario
	Figure 4.17	Low-emission synthetic hydrocarbon fuel production capacity by country/region according to announced projects and in the NZE Scenario
	Table 4.1	Selected announced expansion projects for manufacturing solar PV supply chain components
	Table 4.2	Announced expansion projects of selected battery makers and automakers
Ch.5	Figure 5.1	Global historic deployment and investments in electricity and natural gas infrastructure
	Figure 5.3	Global high-voltage direct current (HVDC) transmission lines by country/region and line type

 Source：IEA Energy Technology Perspective 2023

IEA Energy Technology Perspective 2023

【List of IEA ETP2023 Parameters】
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Ch.5	Figure 5.4	Gross electricity grid additions in advanced and emerging economies in the NZE Scenario
	Figure 5.5	Average annual transformer and stationary-battery capacity additions in the NZE Scenario
	Figure 5.6	Average annual material needs for selected grid technologies in the NZE Scenario
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	Figure 5.23	Indicative levelised cost of delivering hydrogen, by shipping-option step and distance in the NZE Scenario, 2030
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 Source：IEA Energy Technology Perspective 2023

IEA Energy Technology Perspective 2023

【List of IEA ETP2023 Parameters】
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Ch.5	Figure 5.25	Global liquefied gas tanker deliveries by country and type in the NZE Scenario
	Figure 5.26	Lead times of selected natural gas infrastructure projects
	Figure 5.27	Global energy consumption for hydrogen transportation in the NZE Scenario
	Figure 5.28	Energy consumption and overall efficiency of hydrogen transport and distance in the NZE Scenario, 2030
	Figure 5.32	Indicative CO2 shipping and offshore pipeline transportation costs
	Figure 5.33	Existing and planned annual global CO2 storage injection capacity, compared with projected NZE Scenario needs in 2030
	Figure 5.34	Lead times for the CO2 storage component of selected CCUS projects with dedicated storage
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	Table 5.1	Global grain-oriented steel manufacturing capacity by country and manufacturer, 2020
	Table 5.3	Announced designs for liquefied hydrogen tankers expected to be commercial before 2030
	Table 5.4	Characteristics of types of underground geological storage for hydrogen
	Table 5.6	CO2 pipeline deployment for CO2 capture in the NZE Scenario, 2050
Ch.6	Figure 6.2	Annual energy sector investments by regional grouping in the NZE Scenario
	Figure 6.3	Public energy R&D by region and corporate energy R&D by technology
	Figure 6.5	Geographic concentration for key critical minerals, material production and manufacturing operations for clean energy technologies
	Figure 6.6	Announced project throughput and deployment for key clean energy technologies in the APS and the NZE Scenario

 Source：IEA Energy Technology Perspective 2023

IEA Energy Technology Perspective 2023

【List of IEA ETP2023 Parameters】
List of charts with quantitative information（8/9）

Chapter	Chart number	Chart
Ch.5	Figure 5.25	Global liquefied gas tanker deliveries by country and type in the NZE Scenario
	Figure 5.26	Lead times of selected natural gas infrastructure projects
	Figure 5.27	Global energy consumption for hydrogen transportation in the NZE Scenario
	Figure 5.28	Energy consumption and overall efficiency of hydrogen transport and distance in the NZE Scenario, 2030
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 Source：IEA Energy Technology Perspective 2023

IEA Energy Technology Perspective 2023

【List of IEA ETP2023 Parameters】
List of charts with quantitative information（9/9）

Chapter	Chart number	Chart
Ch.6	Figure 6.7	Market size for key clean energy technologies and net fossil fuel trade in the APS
	Figure 6.8	Employment in clean energy technology manufacturing by region
	Figure 6.9	Concentrations of the largest enterprises in global manufacturing capacity and material production, 2021
	Figure 6.11	Industry end-user prices for natural gas and electricity in selected countries
	Figure 6.12	Indicative production costs for hydrogen and hydrogen-based commodities produced via electrolysis
	Figure 6.13	Global cathode production for passenger light-duty BEVs by chemistry in the NZE Scenario
	Figure 6.14	Risk of failing to reduce CO2 emissions in the most intensive steps of selected clean energy and technology supply chains
	Figure 6.15	Number of companies committed to purchasing low-emission steel by end-use sector, and global market size for selected bulk materials in the NZE Scenario

 Source：IEA Energy Technology Perspective 2023

NGFS

[What is the NGFS (Network for Greening the Financial System)]
NGFS was established as an international climate risk management platform for central banks and regulatory authorities; it released its Phase III scenarios in September ’22, which were updated with pledges and renewable energy trends in each country from COP26

Background behind establishment	■ Established in December 2017 through efforts led by central banks and financial supervisors. It was established to be an **international platform for central banks and financial supervisors** to consider financial supervisory measures toward climate change-related risk management. Japanese participants are the Financial Services Agency and Bank of Japan
Description of activities	■ Description of activities: Release of six recommendations for measures against climate change risk (April 2019) and climate change scenarios (June 2020); **the Phase III climate change scenarios were announced in September 2022**
Targets	■ **Central banks, financial supervisors, policy makers**
Scenario overview	■ For the NGFS Phase III scenarios made public in September 2022, the scenarios were released after **updating the database forming the basis of the scenario assumptions with information such as pledges and the latest trends for renewable energy sources from COP26, and macroeconomic impact of loss due to extreme weather and chronic physical risks, which includes the latest GDP and demographic information** (does not take into account the Russian invasion of Ukraine and its aftermath, as these are still unclear and thus difficult to model)
Assumed activity scope for NGFS scenarios	■ Since the assumed readers are central banks, financial supervisors, and policy makers, NGFS scenarios are not expected to be used frequently for scenario analysis by private companies in non-financial sectors ➢ For transition risk parameters that are referenced frequently such as carbon price, energy mix, fuel prices, the information from IEA scenario (NZE, APS, STEPS) are also available ➢ IEA, SSP, PRI`s transition risk parameters can be used as a complement ➢ Although the number of physical risk parameters are limited, it may be used together with water risk tools (AQUEDUCT) and RCP ■ On the other hand, the opportunities to reference NGSF scenarios for climate change-related risk management in financial institutions may increase

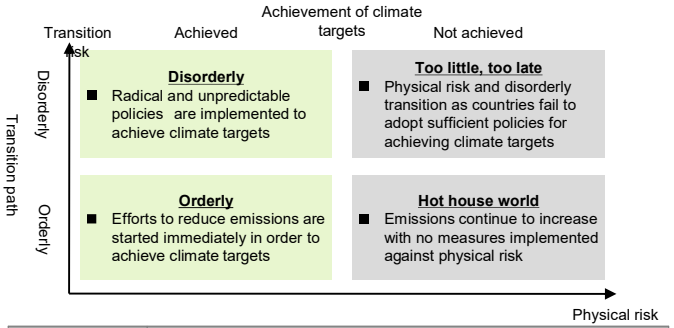
Source：Complied by Ministry of Environment from NGFS “NGFS publishes the third vintage of climate scenarios for forward looking climate risks assessment”

NGFS

NGFS climate scenarios for central banks and supervisors】
In 2021, the NGFS recategorized scenarios into 6 types; the same categories will also be used in 2022

Climate scenario framework

- Scenarios are designed to show the scope of transition and physical risk

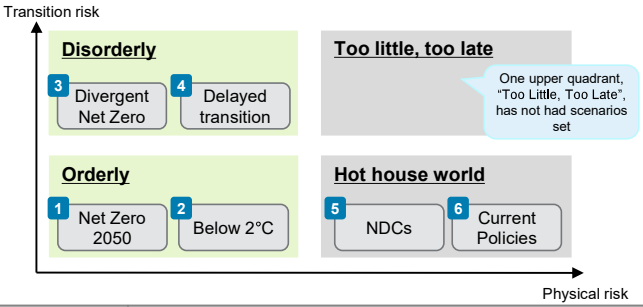


Risk factor	Implications
Transition risk	Low if an orderly transition path is established, high if it is disorderly
Physical risk	Low if climate targets are achieved, high if they are not

Scenario elements	Overview
Orderly	**Emission reduction policies are implemented immediately**, and net zero emissions are achieved by 2070. Transition and physical risks are both low
Disorderly	Emission reduction policies fail to be implemented before 2030; transition risk increases due to the need for **rapid policy responses**
Hot House World	Emissions continue to increase until 2080 with no emission reduction policies implemented; physical risk increases due to the temperature rising 3°C or more
Too Little, Too late	Not set

Scenario types

- 6 scenarios categorized through the climate scenario framework



Scenario name	Overview
1 Net Zero 2050	**Net Zero 2050 is achieved** through policies and innovation, with certain areas such as the US, EU, and Japan reaching targets of net zero emissions for all greenhouse gases
2 Below 2°C	Policies are gradually made stricter, and the **2°C and below target** is reached at **a rate of 67%**
3 Divergent Net Zero	Net Zero 2050 is achieved, but **with higher costs due to divergent policies and a quicker phase-out of fossil fuels**
4 Delayed Transition	Annual emissions fail to be reduced by 2030, with limited reductions in CO2
5 NDCs	Physical risk is limited to a certain extent when each country achieves its established emission reduction targets
6 Current Policies	Only current policies are implemented; physical risk is expected to be high

Source: NGFS climate scenarios for central banks and supervisors

NGFS

【About the NGFS scenarios】
The NGFS scenarios characterize physical risks and transition risks in terms of macro-financial risk overall based on policy ambition, policy response, and changes in and degree of use of technologies

[Legend] : Low risk, : Medium risk, : High risk

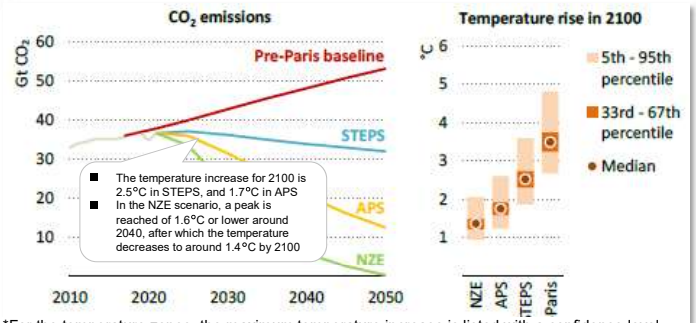
Category	Scenario	Physical risk: Policy ambition	Transition risk: Policy response	Transition risk: Changes in technology	Transition risk: Use of CO2 removal	Transition risk: Variation in regional policies
Orderly Climate policies are introduced at an early stage. Risk is comparatively modest	**Net Zero 2050**	1.4°C	Swift and smooth	Fast	Medium to high	Medium
	Below 2°C	1.6°C	Swift and smooth	About medium	Medium to high	Low
Disorderly Policies are delayed, and transition risk increases due to gaps between countries and sectors. Carbon prices become higher than usual	**Divergent Net Zero**	1.4°C	Swift but with variation among sectors	Fast	Low to medium	Medium
	Delayed Transition	1.6°C	Delayed	Slow / fast	Low to medium	High
Hot house world Global efforts are insufficient and global warming cannot be curbed. Physical risks and irreversible effects such as rising sea levels occur.	**Nationally Determined Contributions (NDCs)**	2.6°C	NDC	Slow	Low to medium	Medium
	Current Policies	3°C+	Without current policies	Slow	Low	Low

Source: "NGFS Scenarios for central banks and supervisors" (NGFS)

NGFS

【Comparison with the IEA: Trends for rising global surface temperatures (median)】
Both the IEA and NGFS use Integrated Assessment Models (IAM) to show transition paths for various scenarios; while the details of the paths differ, consistent results are shown

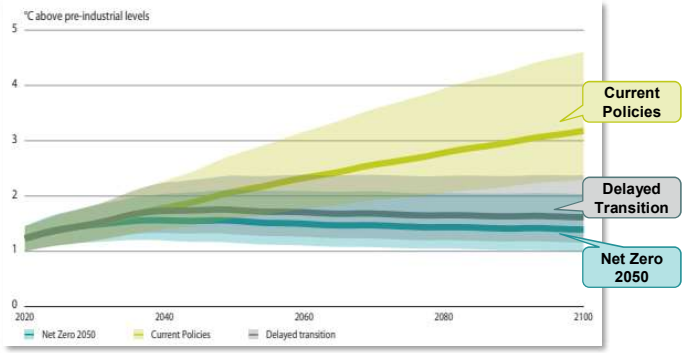
IEA WEO2022



*For the temperature zones, the maximum temperature increase is listed with a confidence level of 50% and 33% to 67%

	Scenario name	Overview
2.5°C	Stated Policies Scenario (STEPS)	• Realistically examines the status of current policies and shows the direction of the energy system in the case where no new policies are introduced
1.7°C	Announced Pledges Scenario (APS)	• Considers all climate change-related pledges announced by national governments, including NDC and long-term net zero goals, and assumes that these will all be achieved completely and on time
1.4°C	Net Zero Emissions by 2050 Scenario (NZE)	• There is a rapid increase in green energy policies and investment, and developed countries reach net zero ahead of other countries • Achievement of universal access to energy and significant improvement in air quality by 2030

NGFS



	Scenario name	Overview
3°C+	Current Policies	Only current policies are implemented; physical risk is expected to be high **The temperature increase exceeds 3°C, bringing on serious and irreversible impact**
1.6°C	Delayed Transition	Annual emissions fail to be reduced by 2030, with limited reductions in CO2
1.4°C	Net Zero 2050	**Net Zero 2050 is achieved** through policies and innovation, with certain areas such as the US, EU, and Japan reaching targets of net zero emissions for all greenhouse gases

- The average temperature rises in all scenarios, exceeding 3°C in the Current Policies Scenario
- Changes in climatic conditions affect the productivity of manual labor, leading to serious and irreversible effects

 Source: NGFS climate scenarios for central banks and supervisors

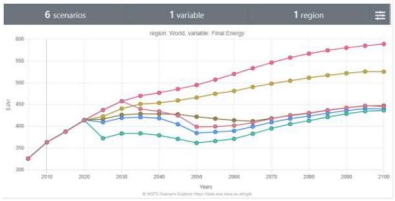
NGFS Phase 3 Scenario Explorer

【NGFS Phase 3 Scenario Explorer Parameter】

The available parameters in the NGFS Phase 3 Scenario Explorer

NGFS Phase 3 Scenario Explorer

Issuing Agency	**NGFS**
Scenario	**Below 2°C / Divergent Net Zero / Delayed Transition / Nationally Determined Contributions (NDCs) / Current Policies**
Time Horizon	**～2100, every 5 years** （historical data varies by scenario）



List of available parameters

Category	Details
Macro-economic	• GDP、Population • Macro-economic climate damage（GDP change）
Climate	• Temperature（global mean）、Surface temperature • Damage factor • Emissions（BC、C2F6、CF4、CH4、CO、CO2、Fガス、HFC、Kyoto gases、N2O、NH3、NOx、OC、PFC、SF6、Sulfur、VOC） • Concentration（CH4、CO2、N2O） • Radiative forcing
Price	• Carbon（Industry, residential and commercial, transportation, SCC, supply） • Primary energy（biomass, coal, gas, oil） • Secondary energy（electricity, gas, hydrogen, liquid fuels, solid fuels） • Final energy（industry, residential and commercial, transportation） • Industry（cement） • Agriculture（corn, Non-energy crops, soybean, wheat）
Capacity	• Electricity（biomass, coal, gas, geothermal, hydro, nuclear, oil, other, solar, biomass, wind） • Gas（biomass, coal, hydrogen, liquids） • Capacity additions（biomass, coal, gas, geothermal, hydro, nuclear, oil, solar, biomass, wind）

Category	Details
Energy	• Carbon sequestration（CCS, land use） • Trade（biomass, gas, coal, oil） • Production（primary energy, secondary energy, final energy） • Production（cement, chemicals, non-ferrous metals, steel） • Energy supply investment（CO2 transport and storage, electricity, extraction, heat, hydrogen, liquids, other）
Capital Cost	• Electricity（biomass, coal, gas, geothermal, hydro, nuclear, solar, wind） • Gas（biomass, coal） • Hydrogen（Biomass, coal, electricity, gas）‘ • Liquids（biomass, coal, gas, oil）
Agricultural crops and forestry	• Agricultural demand/production • Forestry demand/production • Yield（cereal, oil crops, sugar crops） • Fertilizer use（nitrogen, phosphorus） • Food demand（crops、livestock）
Other	• Government tax revenue • Water consumption • Land cover

5-79 Source：NGFS Phase 3 Scenario Explorer https://data.ene.iiasa.ac.at/ngfs/#/workspaces

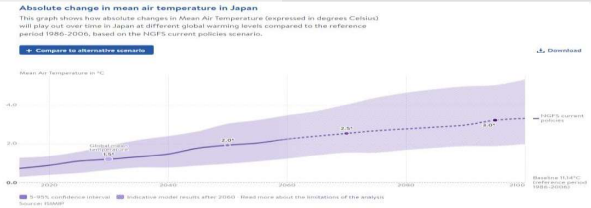
NGFS CA Climate Impact Explorer

(Reference, Physical risk)【NGFS CA Climate Impact Explorer Parameter】

The available parameters in the NGFS CA Climate Impact Explorer

NGFS CA Climate Impact Explorer

Issuing Agency	**NGFS**
Scenario	**RCP 2.6 / 4.5 / 6.0 / 8.5** **NGFS Net Zero 2050 / Delayed Transition / Current Policies / CAT Current Policies**
Time horizon	**2015～2100, every 5 years**



List of available parameters

Category	Details
Economic damages	• Annual expected damage from river floods • Annual expected damage from tropical cyclones • 1-in-100 year expected damage from tropical cyclones
Peril-specific hazards	• Land fraction annually exposed to river floods • Annual maximum river flood depth • Land fraction annually exposed to crop failures • Fraction of population annually exposed to crop failures • Land fraction annually exposed to wildfires • Fraction of population annually exposed to wildfires • Land fraction annually exposed to heatwaves • Fraction of population annually exposed to heatwaves
Agriculture	• Soil moisture • Annual mean maize yield • Annual mean rice yield • Annual mean soy yield • Annual mean wheat yield

Category	Details
Climate	• Relative humidity • Specific humidity • Precipitation • Snowfall • Atmospheric pressure (surface) • Atmospheric pressure (adjusted to sea level) • Downwelling longwave radiation • Wind speed
Mean air temperature	• Daily maximum air temperature • Daily minimum air temperature
Freshwater	• Surface runoff • River discharge • Maximum of daily river discharge • Minimum of daily river discharge
Labor productivity	• Reduced labor productivity due to heat stress

Source：NGFS CA Climate Impact Explorer Climate Analytics — Climate impact explorer

【Outline of IPR scenario】

PRI The Inevitable Policy Response

IPR (the Inevitable Policy Response) is an initiative for supporting investor efforts to incorporate climate change risks into portfolio valuation; in December 2021, it released detailed information for the 1.5ºC scenario group

Summary

- Initiative commissioned by PRI in 2018 to promote industry knowledge of climate change risk and support investor efforts to incorporate climate change risk into portfolio valuation
- The Energy Transition Advisers and Vivid Economies led policy research and scenario modeling, working together with institutions such as 2Dii, Carbon Tracker Initiative, Climate Bonds Initiative, Quinbrook Infrastructure Partners, and Planet Tracker

Overview of IPR

IPR Policy Forecast
Forceful policy responses to climate change and policy forecasts for energy, agriculture, and land use implications

Three policy-based scenarios

IPR 1.8°C Forecast Policy Scenario (FPS)	Models the impact of policy projections on the economy through 2050, a scenario that reduces global emissions by 80% by 2050 and **addresses warming below 2°C (1.8°C)**
IPR FPS + Nature	**First integrated nature-climate beta scenario for investors** that explores the possible impacts of nature-related policies incorporated into climate-related scenarios
IPR 1.5℃ RPS Scenario	**Scenarios seeking policies aligned with the 1.5°C target based on the IEA NZE scenarios**, with deeper analysis of policy, land use, emerging economies, and value drivers

IPR supply chain analysis
Provides indicators for investors to more comprehensively and accurately assess transition risks for downstream companies (retail, distribution, etc.) dealing with tropical agricultural commodities. Supports reallocation of capital to companies with supply chains that do not involve deforestation

IPR value drivers
A set of publicly available outputs from the FPS and 1.5ºC RPS that offer significant granularity at the sector and country level allowing investors to assess their own climate risk

Release schedule

January - October 2021
- Announced the IPR explanatory materials, FPS report on land use / energy, and the 1.5ºC RPS policy summary

December 2021
- Announced drivers for portfolio valuation and the detailed edition of the 1.5ºC RPS 2021 report

January 2023
- Released IPR FPS + Nature as the first integrated nature-climate scenario for use by investors. Fills a critical gap in risk assessment and provides an exploratory future perspective on the potential impact of policy, technological, and social trends on key value drivers

5-81 Source：Investable Policy Response “Preparing financial markets for climate-related policy and regulatory risks” （October 2021）

【List of IPR 1.5℃ RPS 2021 Value Drivers Parameters】

IPR 1.5℃ RPS 2021

GHG emissions, CO2 removal, New Deployment, Capex, Capacity, Technology stock, Price

Parameter			Region		Unit	Time Horizon
Category	Variable	Industry	World	Japan		
GHG Emission	CO2 Emission	Power, Buildings, Transport, Other Energy, Industry, Total, Land use	●	●	Mt	2020-2050
CO2 removal	BECCS	Power, Industry, Total	●	●	Mt	2020-2050
	DACS	Total	●	–	Mt	2020-2050
New Deployment	Electricity Generation	Power, Hydrogen	●	●	GW	2020-2050
	Vehicles	Transport	●	●	Vehicles (thousands)	2020-2050
	Heating systems	Buildings	●	●	% mix	2020-2050
	Battery capacity	Total	●	●	GWh	2020-2050
Capex	Electricity generation	Power, Hydrogen	●	●	USD (million)	2020-2050
	Vehicles	Transport	●	●	USD (million)	2020-2050
	Heating systems	Buildings	●	●	USD (million)	2020-2050
Capacity	Electricity generation	Power	●	●	GW	2020-2050
Technology Stock	Electricity	Hydrogen	●	●	GW	2020-2050
	Vehicles	Transport	●	●	Vehicles (thousands)	2020-2050
	Heating systems	Buildings	●	●	% mix	2020-2050
Price	Battery	–	●	–	USD / kWh	2020-2050
	Nickel	–	●	–	USD / tonne	2020-2050
	Copper	–	●	–	USD / tonne	2020-2050
	Aluminum	–	●	–	USD / tonne	2020-2050
	Lithium	–	●	–	USD / tonne	2020-2050
	Cobalt	–	●	–	USD / tonne	2020-2050
	石炭	–	–	●	USD / tonne	2020-2050
	Oil	–	–	●	USD / tCO2	2020-2050

Source：PRI “IPR FPS 2021 Value Drivers Database”、“IPR 1.5°C RPS 2021 Value Drivers Database”、“IPR FPS + Nature 2023 Value Drivers”（AS of February 2023）

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IPR 1.5℃ RPS 2021

【List of IPR 1.5℃ RPS 2021 Value Drivers Parameter】
Electricity Generation, Production

Parameter			Region		Unit	Time Horizon
Category	Variable	Industry	World	Japan		
Electricity Generation	Coal	Power	●	●	TWh	2020-2050
	Coal CCS	Power	●	●	TWh	2020-2050
	Oil	Power	●	●	TWh	2020-2050
	Natural gas	Power	●	●	TWh	2020-2050
	Natural gas CCS	Power	●	●	TWh	2020-2050
	Nuclear	Power	●	●	TWh	2020-2050
	Hydro	Power	●	●	TWh	2020-2050
	Biomass	Power	●	●	TWh	2020-2050
	Biomass CCS	Power	●	●	TWh	2020-2050
	Solar	Power	●	●	TWh	2020-2050
	Onshore Wind	Power	●	●	TWh	2020-2050
	Offshore Wind	Power	●	●	TWh	2020-2050
	Hydrogen	Power	●	●	TWh	2020-2050
Production	Steel	Industry	●	●	Mt	2020-2050
	Cement	Industry	●	●	Mt	2020-2050
	Hydrogen	Industry	●	●	Mt	2020-2050
	Chemicals	Industry	●	●	Mt	2020-2050
	Aggregates	Industry	●	●	Mt	2020-2050
	Nickel	Industry	●	–	kt	2020-2050
	Steel	Industry	●	–	kt	2020-2050
	Aluminum	Industry	●	–	kt	2020-2050
	Lithium	Industry	●	–	kt	2020-2050
	Cobalt	Industry	●	–	kt	2020-2050

Source：PRI “IPR FPS 2021 Value Drivers Database”、“IPR 1.5°C RPS 2021 Value Drivers Database”、“IPR FPS + Nature 2023 Value Drivers”（As of February 2023）

IPR 1.5℃ RPS 2021

【List of IPR 1.5℃ RPS 2021 Value Drivers Parameters】
Sector energy demand, Primary energy demand, Demand, Population, Price (high), Price (low)

Parameter			Region		Unit	Time Horizon
Category	Variable	Industry	World	Japan		
Sector Energy Demand	Oil	Power, Buildings, Transport, Industry, No-energy use, Other energy	●	●	PJ	2020-2050
	Natural Gas	Power, Buildings, Transport, Industry, No-energy use, Other energy	●	●	PJ	2020-2050
	Coal	Power, Buildings, Transport, Industry, No-energy use, Other energy	●	●	PJ	2020-2050
	Biomass	Power, Buildings, Transport, Industry, Other energy	●	●	PJ	2020-2050
	Electricity	Power, Buildings, Transport, Industry, Other energy	●	●	PJ	2020-2050
	Hydrogen	Power, Buildings, Transport, Industry, Other energy	●	●	PJ	2020-2050
Primary Energy Demand	Oil	Total	●	●	PJ	2020-2050
	Natural gas	Total	●	●	PJ	2020-2050
	Coal	Total	●	●	PJ	2020-2050
	Biomass	Total	●	●	PJ	2020-2050
Demand	Aviation	Transport	●	●	RTK (billion)	2020-2050
Population	–	Total	●	●	Million Population	2020-2050
Price (High)	Oil	–	●	–	USD / Barrel	2020-2050
Price (Low)	Oil	–	●	–	USD / Barrel	2020-2050

 Source：PRI “IPR FPS 2021 Value Drivers Database”、“IPR 1.5°C RPS 2021 Value Drivers Database”、“IPR FPS + Nature 2023 Value Drivers”（As of February 2023）

IPR 1.5℃ RPS 2021

【List of IPR 1.5℃ RPS 2021 Value Drivers Parameters】
Nature-based solutions, Bioenergy, Timber, Agriculture, Alternative meat

Parameter			Region		Unit	Time Horizon
Category	Variable	Industry	World	Japan		
Nature-based Solutions	Area	Land Use	●	●	Million ha	2020-2050
	Carbon Value	Land Use	●	●	USD 2020	2020-2050
	CAPEX	Land Use	●	●	USD 2020 , USD 2020/ha , Index (2020 = 1)	2020-2050
	OPEX	Land Use	●	●	USD 2020/ha/yr (average over project lifetime)	2020
Bioenergy	Production	Land Use	●	–	EJ/yr	2020-2050
	Price Index	Land Use	●	–	Index (2025 = 100)	2020-2050
Timber	Industrial roundwood	Land Use	●	–	Million M3, Index (2020 = 100)	2020-2050
Agriculture	Production	Land Use	●	–	Mt DM/yr	2020-2050
	Crop Yields	Land Use	●	–	t DM/ha	2020-2050
	Average annual food price change 2020-2050	Land Use	●	–	Percent	2020
Alternative Meat	Production	Land Use	●	–	Mt DM	2020-2050
	Production Cost	Land Use	●	–	Index （Animal meat average 2020年＝100）	2020-2050

Source：PRI “IPR FPS 2021 Value Drivers Database”、“IPR 1.5°C RPS 2021 Value Drivers Database”、“IPR FPS + Nature 2023 Value Drivers”（As of February 2023）

FPS 2021 Energy

【List of FPS 2021 Energy Parameters】
GHG emissions, CO2 removal, New deployment, Capex, Capacity, Technology stock, Price

Parameter			Region		Unit	Time Horizon
Category	Variable	Industry	World	Japan		
GHG emissions	CO2 emissions	Power, Buildings, Industry, Transport, Other energy, Total	●	●	Mt	2020-2050
CO2 Removal	BECCS	Power, Industry	●	●	Mt	2020-2050
	DACS	Total	●	–	Mt	2020-2050
New Deployment	Electricity Generation	Power, Hydrogen	●	●	GW	2020-2050
	Vehicles	Transport	●	●	Vehicles (thousands)	2020-2050
	Heating systems	Buildings	●	●	% mix	2020-2050
	Battery capacity	Total	●	●	GWh	2020-2050
Capex	Electricity Generation	Power, Hydrogen	●	●	USD (million)	2020-2050
	Vehicles	Transport	●	●	USD (million)	2020-2050
	Heating systems	Buildings	●	●	USD (million)	2020-2050
Capacity	Electricity Generation	Power	●	●	GW	2020-2050
Technology Stock	Electricity Generation	Hydrogen	●	●	GW	2020-2050
	Vehicles	Transport	●	●	Vehicles (thousands)	2020-2050
	Heating systems	Buildings	●	●	% mix	2020-2050
Price	Battery	–	●	–	USD / kWh	2020-2050
	Nickel	–	●	–	USD / tonne	2020-2050
	Copper	–	●	–	USD / tonne	2020-2050
	Aluminum	–	●	–	USD / tonne	2020-2050
	Lithium	–	●	–	USD / tonne	2020-2050
	Cobalt	–	●	–	USD / tonne	2020-2050
	Coal	–	–	●	USD / tonne	2020-2050
	Carbon	–	–	●	USD / tCO2	2020-2050

 Source：PRI “IPR FPS 2021 Value Drivers Database”、“IPR 1.5°C RPS 2021 Value Drivers Database”、“IPR FPS + Nature 2023 Value Drivers”（As of February 2023）

FPS 2021 Energy

【List of FPS 2021 Energy Parameters】
Electricity Generation, Production

Parameter			Region		Unit	Time Horizon
Category	Variable	Industry	World	Japan		
Electricity Generation	Coal	Power	●	●	TWh	2020-2050
	Coal CCS	Power	●	●	TWh	2020-2050
	Oil	Power	●	●	TWh	2020-2050
	Natural gas	Power	●	●	TWh	2020-2050
	Natural gas CCS	Power	●	●	TWh	2020-2050
	Nuclear	Power	●	●	TWh	2020-2050
	Hydrogen	Power	●	●	TWh	2020-2050
	Biomass	Power	●	●	TWh	2020-2050
	Biomass CCS	Power	●	●	TWh	2020-2050
	Solar	Power	●	●	TWh	2020-2050
	Onshore wind	Power	●	●	TWh	2020-2050
	Offshore wind	Power	●	●	TWh	2020-2050
	Hydrogen	Power	●	●	TWh	2020-2050
Production	Steel	Industry	●	●	Mt	2020-2050
	Cement	Industry	●	●	Mt	2020-2050
	Hydrogen		●	●	Mt	2020-2050
	Chemicals	Industry	●	●	Mt	2020-2050
	Aggregates	Industry	●	●	Mt	2020-2050
	Nickel	Industry	●	–	kt	2020-2050
	Copper	Industry	●	–	kt	2020-2050
	Aluminum	Industry	●	–	kt	2020-2050
	Lithium	Industry	●	–	kt	2020-2050
	Cobalt	Industry	●	–	kt	2020-2050

Source：PRI “IPR FPS 2021 Value Drivers Database”、“IPR 1.5°C RPS 2021 Value Drivers Database”、“IPR FPS + Nature 2023 Value Drivers”（As of February 2023）

FPS 2021 Energy

【FPS 2021 Energy Parameters】
Sector energy demand, Primary energy demand, Demand, Population, Price (high), Price (low)

Parameter			Region		Unit	Time Horizon
Category	Variable	Industry	World	Japan		
Sector energy demand	Oil	Power, Buildings, Transport, Industry, Non-energy use, Other energy	●	●	PJ	2020-2050
	Natural gas	Power, Buildings, Transport, Industry, Non-energy use, Other energy	●	●	PJ	2020-2050
	Coal	Power, Buildings, Industry, Non-energy use, Other energy	●	●	PJ	2020-2050
	Biomass	Power, Buildings, Transport, Industry, Other energy	●	●	PJ	2020-2050
	Electricity	Power, Buildings, Transport, Industry, Other energy	●	●	PJ	2020-2050
	Hydrogen	Power, Buildings, Transport, Industry, Other energy	●	●	PJ	2020-2050
Primary energy demand	Oil	Total	●	●	PJ	2020-2050
	Natural gas	Total	●	●	PJ	2020-2050
	Coal	Total	●	●	PJ	2020-2050
	Biomass	Total	●	●	PJ	2020-2050
Demand	Aviation	Transport	●	●	RTK(billion)	2020-2050
Population	–	Total	●	●	Million	2020-2050
Price (high)	Oil	–	●	–	USD / Barrel	2020-2050
Price (low)	Oil	–	●	–	USD / Barrel	2020-2050

 Source：PRI “IPR FPS 2021 Value Drivers Database”、“IPR 1.5°C RPS 2021 Value Drivers Database”、“IPR FPS + Nature 2023 Value Drivers”（As of February 2023）

FPS 2022 Land Use

【List of FPS 2022 Land Use Parameters】
Opex, Capex, Annual revenue

Parameter			Region		Unit	Time Horizon
Category	Variable	Industry	World	Japan		
Opex	Cropland-improve	Land use	●	–	USD 2021/ha/yr (average over project lifetime)	2020
	Forest-avoid	Land use	●	–	USD 2021/ha/yr (average over project lifetime)	2020
	Forest-plant	Land use	●	–	USD 2021/ha/yr (average over project lifetime)	2020
	Forest-restore	Land use	●	–	USD 2021/ha/yr (average over project lifetime)	2020
	Mangrove-restore	Land use	●	–	USD 2021/ha/yr (average over project lifetime)	2020
	Pasture-improve	Land use	●	–	USD 2021/ha/yr (average over project lifetime)	2020
	Peat-restore	Land use	●	–	USD 2021/ha/yr (average over project lifetime)	2020
Capex	Cropland-improve	Land use	●	–	USD 2021/ha	2020-2050
	Forest-avoid	Land use	●	–	USD 2021/ha	2020-2050
	Forest-plant	Land use	●	–	USD 2021/ha	2020-2050
	Forest-restore	Land use	●	–	USD 2021/ha	2020-2050
	Mangrove-restore	Land use	●	–	USD 2021/ha	2020-2050
	Pasture-improve	Land use	●	–	USD 2021/ha	2020-2050
	Peat-restore	Land use	●	–	USD 2021/ha	2020-2050
Annual Revenue	Cropland-improve	Land use	●	–	USD 2021	2020-2050
	Forest-avoid	Land use	●	–	USD 2021	2020-2050
	Forest-restore-plant	Land use	●	–	USD 2021	2020-2050
	Mangrove-restore	Land use	●	–	USD 2021	2020-2050
	Pasture-improve	Land use	●	–	USD 2021	2020-2050
	Peat-restore	Land use	●	–	USD 2021	2020-2050
	All NBS	Land use	●	–	USD 2021	2020-2050

Source：PRI “IPR FPS 2021 Value Drivers Database”、“IPR 1.5°C RPS 2021 Value Drivers Database”、“IPR FPS + Nature 2023 Value Drivers”（As of February 2023）

FPS 2022 Land Use

【List of FPS 2022 Land Use Parameters】
Cumulative investment, Cumulative area

Parameter			Region		Unit	Time Horizon
Category	Variable	Industry	World	Japan		
Cumulative Investment	Cropland-improve	Land Use	●	–	USD 2021	2020-2050
	Forest-avoid	Land Use	●	–	USD 2021	2020-2050
	Forest-restore-plant	Land Use	●	–	USD 2021	2020-2050
	Mangrove-restore	Land Use	●	–	USD 2021	2020-2050
	Pasture-improve	Land Use	●	–	USD 2021	2020-2050
	Peat-restore	Land Use	●	–	USD 2021	2020-2050
	All NBS	Land Use	●	–	USD 2021	2020-2050
Cumulative area	Cropland-improve	Land Use	●	–	Mha	2020-2050
	Forest-avoid	Land Use	●	–	Mha	2020-2050
	Forest-restore-plant	Land Use	●	–	Mha	2020-2050
	Mangrove-restore	Land Use	●	–	Mha	2020-2050
	Pasture-improve	Land Use	●	–	Mha	2020-2050
	Peat-restore	Land Use	●	–	Mha	2020-2050
	All NBS	Land Use	●	–	Mha	2020-2050

Source：PRI “IPR FPS 2021 Value Drivers Database”、“IPR 1.5°C RPS 2021 Value Drivers Database”、“IPR FPS + Nature 2023 Value Drivers”（As of February 2023）

FPS + Nature 2022 Land Use

【List of FPS + Nature 2022 Land Use Parameters】
CO2, Land price index, Opex, Price

Parameters			Region		Unit	Time Horizon
Category	Variable	Industry	World	Japan		
CO2	–	Land Use	●	–	Mt CO2/yr	2020-2050
Land price index	–	Land Use	●	–	Index（2020 = 100）	2020-2050
Opex	Cropland-improve	Land Use	●	–	USD 2021/ha/yr (average over project lifetime)	2020
	Forest-avoid	Land Use	●	–	USD 2021/ha/yr (average over project lifetime)	2020
	Forest-plant	Land Use	●	–	USD 2021/ha/yr (average over project lifetime)	2020
	Forest-restore	Land Use	●	–	USD 2021/ha/yr (average over project lifetime)	2020
	Mangrove-restore	Land Use	●	–	USD 2021/ha/yr (average over project lifetime)	2020
	Pasture-improve	Land Use	●	–	USD 2021/ha/yr (average over project lifetime)	2020
	Peat-restore	Land Use	●	–	USD 2021/ha/yr (average over project lifetime)	2020
Price	Coffee	Land Use	●	–	Index(2020 = 100)	2020-2050
	Cocoa	Land Use	●	–	Index(2020 = 100)	2020-2050
	Rubber	Land Use	●	–	Index(2020 = 100)	2020-2050
	Sugar cane	Land Use	●	–	Index(2020 = 100)	2020-2050
	Maize	Land Use	●	–	Index(2020 = 100)	2020-2050
	Oil palm fruit	Land Use	●	–	Index(2020 = 100)	2020-2050
	Temperate cereals	Land Use	●	–	Index(2020 = 100)	2020-2050
	Poultry meat	Land Use	●	–	Index(Animal meat average 2020＝100)	2020-2050
	Industrial roundwood	Land Use	●	–	Index(2020 = 100)	2020-2050
	Soybean	Land Use	●	–	Index(2020 = 100)	2020-2050
	Monogastric meat	Land Use	●	–	Index(Animal meat average 2020＝100)	2020-2050
	Ruminant meat	Land Use	●	–	Index(Animal meat average 2020＝100)	2020-2050
	Animal meat average	Land Use	●	–	Index(Animal meat average 2020＝100)	2020-2050
	Dairy	Land Use	●	–	Index (Dairy average 2020＝100) , Index (2020 = 100)	2020-2050
	Rice	Land Use	●	–	Index(2020 = 100)	2020-2050

Source：PRI “IPR FPS 2021 Value Drivers Database”、“IPR 1.5°C RPS 2021 Value Drivers Database”、“IPR FPS + Nature 2023 Value Drivers”（As of February 2023）

FPS + Nature 2022 Land Use

【List of FPS + Nature 2022 Land Use Parameters】
Price index, Food price index, Production, Capex

Parameter			Region		Unit	Time Horizon
Category	Variable	Industry	World	Japan		
Price index	Second-generation	Land Use	●	–	Index(2020 = 100)	2020-2050
Food price index	–	Land Use	●	–	Index(2020 = 100)	2020-2050
Production	Coffee	Land Use	●	–	Mt DM/yr	2020-2050
	Cocoa	Land Use	●	–	Mt DM/yr	2020-2050
	Rubber	Land Use	●	–	Mt DM/yr	2020-2050
	Sugar cane	Land Use	●	–	Mt DM/yr	2020-2050
	Maize	Land Use	●	–	Mt DM/yr	2020-2050
	Oil palm fruit	Land Use	●	–	Mt DM/yr	2020-2050
	Temperate cereals	Land Use	●	–	Mt DM/yr	2020-2050
	Poultry meat	Land Use	●	–	Mt DM/yr	2020-2050
	Industrial roundwood	Land Use	●	–	Mm3/yr	2020-2050
	Soybean	Land Use	●	–	Mt DM/yr	2020-2050
	Second-generation	Land Use	●	–	EJ/yr	2020-2050
	Monogastric meat	Land Use	●	–	Mt DM/yr	2020-2050
	Ruminant meat	Land Use	●	–	Mt DM/yr	2020-2050
	Dairy	Land Use	●	–	Mt DM/yr	2020-2050
	Rice	Land Use	●	–	Mt DM/yr	2020-2050
Capex	Cropland-improve	Land Use	●	–	USD 2021/ha	2020-2050
	Forest-avoid	Land Use	●	–	USD 2021/ha	2020-2050
	Forest-plant	Land Use	●	–	USD 2021/ha	2020-2050
	Forest-restore	Land Use	●	–	USD 2021/ha	2020-2050
	Mangrove-restore	Land Use	●	–	USD 2021/ha	2020-2050
	Pasture-improve	Land Use	●	–	USD 2021/ha	2020-2050
	Peat-restore	Land Use	●	–	USD 2021/ha	2020-2050

Source：PRI “IPR FPS 2021 Value Drivers Database”、“IPR 1.5°C RPS 2021 Value Drivers Database”、“IPR FPS + Nature 2023 Value Drivers”（As of February 2023）

FPS + Nature 2022 Land Use

【List of FPS + Nature 2022 Land Use Parameter】

Annual revenue, Average crop yields, Cumulative investment, Cumulative area

Parameter			Region		Unit	Time Horizon
Category	Variable	Industry	World	Japan		
Annual revenue	Cropland-improve	Land Use	●	–	USD21	2020-2050
	Forest-avoid	Land Use	●	–	USD21	2020-2050
	Forest-restore-plant	Land Use	●	–	USD21	2020-2050
	Mangrove-restore	Land Use	●	–	USD21	2020-2050
	Pasture-improve	Land Use	●	–	USD21	2020-2050
	Peat-restore	Land Use	●	–	USD21	2020-2050
	All NBS	Land Use	●	–	USD21	2020-2050
Average crop yields	–	Land Use	●	–	t DM/ha	2020-2050
Cumulative Investment	Cropland-improve	Land Use	●	–	USD21	2020-2050
	Forest-avoid	Land Use	●	–	USD21	2020-2050
	Forest-restore-plant	Land Use	●	–	USD21	2020-2050
	Mangrove-restore	Land Use	●	–	USD21	2020-2050
	Pasture-improve	Land Use	●	–	USD21	2020-2050
	Peat-restore	Land Use	●	–	USD21	2020-2050
	All NBS	Land Use	●	–	USD21	2020-2050
Cumulative Area	Cropland-improve	Land Use	●	–	Mha	2020-2050
	Forest-avoid	Land Use	●	–	Mha	2020-2050
	Forest-restore-plant	Land Use	●	–	Mha	2020-2050
	Mangrove-restore	Land Use	●	–	Mha	2020-2050
	Pasture-improve	Land Use	●	–	Mha	2020-2050
	Peat-restore	Land Use	●	–	Mha	2020-2050
	All NBS	Land Use	●	–	Mha	2020-2050

 Source：PRI “IPR FPS 2021 Value Drivers Database”、“IPR 1.5°C RPS 2021 Value Drivers Database”、“IPR FPS + Nature 2023 Value Drivers”（As of February 2023）

PRI IPR Supply Chain Analysis 2022

【IPR Parameter】

Tools related to “IPR Supply Chain Analysis 2022“

IPR Supply Chain Analysis 2022

Issuing Agency	**Inevitable Policy Response**
Scenario	**IPR FPS/IPR RPS/BAU** **※R6/R7: IPR FPS only**
Time Horizon	2020−2050, every 5 years
Item/ Use case	• R1：Commodity production • R2：Commodity global prices • R6：Upgrading Operation costs • R7：Commodity price premia
R1	1. Modeled after several policy scenarios and explores **the long-term trends** in global and regional productions 2. To assess the likelihood of downstream companies facing **chronic demand shift**
R2	1. A **chronological study of price trends** in various policy scenarios 2. To analyze the impact of global price change on **downstream company`s business models**
R6	1. To assess the **total cost of operational improvements** that downstream firms must bear to reduce deforestation
R7	1. To evaluate the **sum of the prices** that downstream firms must pay to **procure goods that internalize the cost of deforestation** using the Price Premier Value Driver

R1/R6：List of available parameters

Category	Region
Soybean	• SEA：Southeast Asia • ANZ：Australia and NZ • CHA：China, Korean Democratic People`s Republic, Taiwan, HK, and Macau • EUR：West Europe • NEU：North Europe • IND：India • DEA：Japan and Korea • MEA：Middle East Asia • CAN：Canada, Saint Pierre and Miquelon • TLA：Tropical Latin America • USA：USA • REF：East Europe • RUS：Russia • SAS：South Asia • SCO：Latin America`s Southern Cone • BRA：Brazil • TAF：Tropical Africa • SAF：Southern Africa
Beef	
Palm oil	
Timber	
Cocoa	
Coffee	
Rubber	

R2/R7：List of available parameters

Category	Region
Same as above	• Global

Source： IPR Supply Chain Analysis 2022 Value drivers、Inevitable Policy Response – Supply Chain Analysis (SCA) download (unpri.org)（October 2022）

【Overview of SSP（Shared Socioeconomic Pathways）】

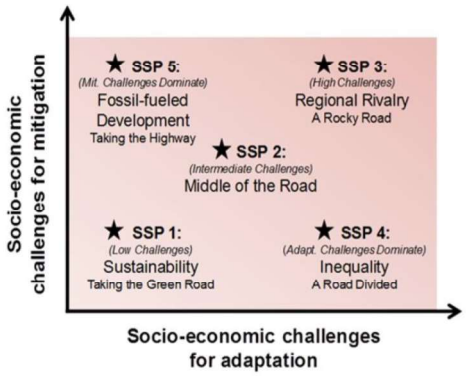
SSP Public Database Version2.0

SSP was developed as a socio-economic scenario based on recent policies and socio-economic environment

- Based on the issues of the socio-economic scenario “SRES” related to the evaluation of existing climate change, National Institute for Environmental Studies（Japan）, PNNL（US）, PBL（Netherland）, IIASA（Austria）and Germany（PIK）has developed **SSP**[*1]
  - SPES has problems such as the old base year (1990) and the inability to reflect recent policies
  - SSP considers recent changes in the external environment such as **recent policies, vital statistics, GDP, and urbanization** [*2], and has relevance to existing socio-economic scenarios such as "SERS" and "RCPs". Developed as a scenario. It consists of 5 scenarios

5 Scenario Composition of SSP

SSP	Scenario	Scenario Outline [*3]
SSP1	Sustainability	A scenario that assumes the realization of both international mitigation measures and adaptation measures related to climate change
SSP2	Middle of the Road	A scenario that assumes that the current socio-economic growth will continue
SSP3	Regional Rivalry	A scenario that assumes a situation where the country is divided, and it is difficult to realize international mitigation measures and adaptation measures
SSP4	Inequality	A scenario that assumes an international economic society with widening disparities
SSP5	Fossil-fueled Development	A scenario that assumes that the international community will develop depending on fossil fuels



*1： https://www.nies.go.jp/whatsnew/20170221/20170221.html 、*2： https://unfccc.int/sites/default/files/part1_iiasa_rogelj_ssp_poster.pdf
*3： https://www.carbonbrief.org/explainer-how-shared-socioeconomic-pathways-explore-future-climate-change

【List of SSP Public Database Version2.0 Parameters（1/10）】

SSP Public Database Version2.0

IAM Scenarios Model：GDP, Population, Primary Energy, Secondary Energy (Electricity)

Category			Unit	SSP					Remark
Large	Medium	Small		SSP1	SSP2	SSP3	SSP4	SSP5	
GDP	PPP	—	billionUS$ 2005/yr	○	○	○	○	○	
Population	Population	—	million	○	○	○	○	○	
Energy	Primary Energy	Total	EJ/yr	○	○	○	○	○	
Energy	Primary Energy	Biomass(Total / Traditional / with CCS/ without CCS)	EJ/yr	○	○	△	○	○	Some data（Traditional, CCS）is not available in SSP3
Energy	Primary Energy	Coal (Total / with CCS /without CCS)	EJ/yr	○	○	△	○	○	Some data（CCS）is not available in SSP3
Energy	Primary Energy	Oil (Total / with CCS / wihout CCS)	EJ/yr	○	△	△	○	△	Some data（CCS）is not available in SSP2,3,5
Energy	Primary Energy	Gas (Total / with CCS/ without CCS)	EJ/yr	○	○	△	○	○	Some data（CCS）is not available in SSP3
Energy	Primary Energy	Fossil (Total , with CCS, wihout CCS)	EJ/yr	○	○	△	○	○	Some data（CCS）is not available in SSP3
Energy	Primary Energy	Nuclear	EJ/yr	○	○	○	○	○	
Energy	Primary Energy	Non-Biomass Renewables	EJ/yr	○	○	○	○	○	
Energy	Primary Energy	Hydro	EJ/yr	○	○	○	○	○	
Energy	Primary Energy	Geothermal	EJ/yr	—	○	○	○	○	Data is not available in SSP1
Energy	Primary Energy	Other	EJ/yr	○	○	○	—	—	Data is not available in SSP4,5
Energy	Primary Energy	Solar	EJ/yr	○	○	○	○	○	
Energy	Primary Energy	Wind	EJ/yr	○	○	○	○	○	
Energy	Primary Energy	Secondary Energy Trade	EJ/yr	—	—	○	—	—	Data is not available in SSP1,2,4,5
Energy	Secondary Energy (Electricity)	Total	EJ/yr	○	○	○	○	○	
Energy	Secondary Energy (Electricity)	Biomass(Total / with CCS/ without CCS)	EJ/yr	○	○	△	○	○	Some data（CCS）is not available in SSP3
Energy	Secondary Energy (Electricity)	Coal (Total / with CCS /without CCS)	EJ/yr	○	○	△	○	○	Some data（CCS）is not available in SSP3
Energy	Secondary Energy (Electricity)	Oil	EJ/yr	○	○	○	○	○	
Energy	Secondary Energy (Electricity)	Gas (Total / with CCS/ without CCS)	EJ/yr	○	○	△	○	○	Some data（CCS）is not available in SSP3
Energy	Secondary Energy (Electricity)	Geothermal	EJ/yr	—	○	○	○	○	Data is not available in SSP1
Energy	Secondary Energy (Electricity)	Hydro	EJ/yr	○	○	○	○	○	
Energy	Secondary Energy (Electricity)	Non-Biomass Renewables	EJ/yr	○	○	○	○	○	
Energy	Secondary Energy (Electricity)	Nuclear	EJ/yr	○	○	○	○	○	
Energy	Secondary Energy (Electricity)	Solar	EJ/yr	○	○	○	○	○	
Energy	Secondary Energy (Electricity)	Wind	EJ/yr	○	○	○	○	○	

 Source：SSP Public Database Version2.0（As of February 2023）

※Extract parameters for which Global values can be obtained
※2005, 2010~2100, data is available for each 10 years

SSP Public Database Version2.0

【List of SSP Public Database Version2.0 Parameters（2/10）】

IAM Scenarios Model：Secondary Energy, Final Energy

Category			Unit	SSP					Remark
Large	Medium	Small		SSP1	SSP2	SSP3	SSP4	SSP5	
Energy	Secondary Energy (Gases)	Total	EJ/yr	○	○	○	○	○	
Energy	Secondary Energy (Gases)	Biomass	EJ/yr	—	○	—	○	○	Data is not available in SSP1,3
Energy	Secondary Energy (Gases)	Coal	EJ/yr	—	○	—	○	○	Data is not available in SSP1,3
Energy	Secondary Energy (Gases)	Natural Gas	EJ/yr	○	○	○	○	○	
Energy	Secondary Energy (Heat)	Total	EJ/yr	—	○	○	—	○	Data is not available in SSP1,4
Energy	Secondary Energy (Heat)	Geothermal	EJ/yr	—	○	○	—	○	Data is not available in SSP1,4
Energy	Secondary Energy (Hydrogen)	Total	EJ/yr	○	○	—	○	○	Data is not available in SSP3
Energy	Secondary Energy (Hydrogen)	Biomass(Total / with CCS/ without CCS)	EJ/yr	○	○	—	○	○	Data is not available in SSP3
Energy	Secondary Energy (Hydrogen)	Electricity	EJ/yr	○	○	—	○	○	Data is not available in SSP3
Energy	Secondary Energy (Liquids)	Total	EJ/yr	○	○	○	○	○	
Energy	Secondary Energy (Liquids)	Biomass(Total / with CCS/ without CCS)	EJ/yr	△	○	△	○	○	Some data（CCS）is not available in SSP1, （CCU・without CCU）is not available in SSP1
Energy	Secondary Energy (Liquids)	Coal (Total / with CCS /without CCS)	EJ/yr	—	○	—	—	○	Data is not available in SSP1,3,4
Energy	Secondary Energy (Liquids)	Gas (Total / with CCS/ without CCS)	EJ/yr	—	○	—	—	—	Data is not available in SSP1,3,4,5
Energy	Secondary Energy (Liquids)	Oil	EJ/yr	○	○	○	○	○	
Energy	Secondary Energy (Solids)	—	EJ/yr	○	○	—	—	○	Data is not available in SSP3,4
Energy	Final Energy	Total	EJ/yr	○	○	○	○	○	
Energy	Final Energy	Electricity	EJ/yr	○	○	○	○	○	
Energy	Final Energy	Gases	EJ/yr	○	○	○	○	○	
Energy	Final Energy	Heat	EJ/yr	○	○	○	○	○	
Energy	Final Energy	Hydrogen	EJ/yr	○	○	—	○	○	Data is not available in SSP3
Energy	Final Energy	Liquids	EJ/yr	○	○	○	○	○	
Energy	Final Energy	Solar	EJ/yr	○	○	—	—	—	Data is not available in SSP3,4,5
Energy	Final Energy (Solids)	Total	EJ/yr	○	○	○	○	○	
Energy	Final Energy (Solids)	Biomass (Total, Traditional)	EJ/yr	○	○	△	○	○	Some data（Traditional）is not available in SSP3
Energy	Final Energy (Solids)	Coal	EJ/yr	○	○	○	○	○	
Energy	Final Energy	Industry	EJ/yr	○	○	○	○	—	Data is not available in SSP5
Energy	Final Energy	Residential and Commercial	EJ/yr	○	○	○	○	—	Data is not available in SSP5
Energy	Final Energy	Transportation	EJ/yr	○	○	○	○	○	

Source：SSP Public Database Version2.0（As of February 2023）

※Extract parameters for which Global values can be obtained
※2005, 2010~2100, data is available for each 10 years

SSP Public Database Version2.0

【List of SSP Public Database Version2.0 Parameters（3/10）】

IAM Scenarios Model：Energy Service (Transportation), Land Cover, Emissions（unharmonized）

Category			Unit	SSP					Remark
Large	Medium	Small		SSP1	SSP2	SSP3	SSP4	SSP5	
Energy	Energy Service (Transportation)	Freight	bn tkm/yr	○	—	—	○	○	Data is not available in SSP2,3
Energy	Energy Service (Transportation)	Passenger	bn pkm/yr	○	—	—	○	○	Data is not available in SSP2,3
Land Cover	Built-up Area	—	million ha	○	—	○	○	○	Data is not available in SSP2
Land Cover	Cropland	—	million ha	○	○	○	○	○	
Land Cover	Forest	—	million ha	○	○	○	○	○	
Land Cover	Pasture	—	million ha	○	○	○	○	○	
Emissions (unharmonized)	BC	—	Mt BC/yr	○	○	○	○	○	
Emissions (unharmonized)	CH4	Total	Mt CH4/yr	○	○	○	○	○	
Emissions (unharmonized)	CH4	Fossil Fuels and Industry	Mt CH4/yr	—	—	—	○	○	Data is not available in SSP1,2,3
Emissions (unharmonized)	CH4	Land Use	Mt CH4/yr	○	○	○	○	○	
Emissions (unharmonized)	CO	—	Mt CO/yr	○	○	○	○	○	
Emissions (unharmonized)	CO2	Total	Mt CO2/yr	○	○	○	○	○	
Emissions (unharmonized)	CO2 (Carbon Capture and Storage)	Total	Mt CO2/yr	○	○	—	○	○	Data is not available in SSP3
Emissions (unharmonized)	CO2 (Carbon Capture and Storage)	Biomass	Mt CO2/yr	○	○	—	○	○	Data is not available in SSP3
Emissions (unharmonized)	CO2	Fossil Fuels and Industry	Mt CO2/yr	○	○	○	○	○	
Emissions (unharmonized)	CO2	Land Use	Mt CO2/yr	○	○	○	○	○	
Emissions (unharmonized)	F-Gases	—	Mt CO2-equiv/yr	○	○	○	○	○	
Emissions (unharmonized)	Kyoto Gases	—	Mt CO2-equiv/yr	○	○	○	○	○	
Emissions (unharmonized)	N2O	Total	kt N2O / yr	○	○	○	○	○	
Emissions (unharmonized)	N2O	Land Use	kt N2O / yr	○	○	○	○	○	
Emissions (unharmonized)	NH3	—	Mt NH3/yr	○	○	○	○	○	
Emissions (unharmonized)	NOx	—	Mt NO2/yr	○	○	○	○	○	
Emissions (unharmonized)	OC	—	Mt OC/yr	○	○	○	○	○	
Emissions (unharmonized)	Sulfur	—	Mt SO2/yr	○	○	○	○	○	
Emissions (unharmonized)	VOC	—	Mt VOC/yr	○	○	○	○	○	

 Source：SSP Public Database Version2.0（As of February 2023）

※Extract parameters for which Global values can be obtained
※2005, 2010~2100, data is available for each 10 years

SSP Public Database Version2.0

【List of SSP Public Database Version2.0 Parameters（4/10）】

IAM Scenarios Model：Emissions (harmonized), Climate

Category			Unit	SSP					Remark
Large	Medium	Small		SSP1	SSP2	SSP3	SSP4	SSP5	
Emissions (harmonized)	BC	—	Mt BC/yr	—	—	○	—	○	Data is not available in SSP1,2,4
Emissions (harmonized)	CH4	Total	Mt CH4/yr	—	—	○	—	○	Data is not available in SSP1,2,4
Emissions (harmonized)	CH4	Fossil Fuels and Industry	Mt CH4/yr	—	—	○	—	○	Data is not available in SSP1,2,4
Emissions (harmonized)	CH4	Land Use	Mt CH4/yr	—	—	○	—	○	Data is not available in SSP1,2,4
Emissions (harmonized)	CO	—	Mt CO/yr	—	—	○	—	○	Data is not available in SSP1,2,4
Emissions (harmonized)	CO2	Total	Mt CO2/yr	—	—	○	—	○	Data is not available in SSP1,2,4
Emissions (harmonized)	CO2	Fossil Fuels and Industry	Mt CO2/yr	—	—	○	—	○	Data is not available in SSP1,2,4
Emissions (harmonized)	CO2	Land Use	Mt CO2/yr	—	—	○	—	○	Data is not available in SSP1,2,4
Emissions (harmonized)	F-Gases	—	Mt CO2-equiv/yr	—	—	○	—	○	Data is not available in SSP1,2,4
Emissions (harmonized)	Kyoto Gases	—	Mt CO2-equiv/yr	—	—	○	—	○	Data is not available in SSP1,2,4
Emissions (harmonized)	N2O	—	kt N2O/yr	—	—	○	—	○	Data is not available in SSP1,2,4
Emissions (harmonized)	NH3	—	Mt NH3/yr	—	—	○	—	○	Data is not available in SSP1,2,4
Emissions (harmonized)	NOx	—	Mt NO2/yr	—	—	○	—	○	Data is not available in SSP1,2,4
Emissions (harmonized)	OC	—	Mt OC/yr	—	—	○	—	○	Data is not available in SSP1,2,4
Emissions (harmonized)	Sulfur	—	Mt SO2/yr	—	—	○	—	○	Data is not available in SSP1,2,4
Emissions (harmonized)	VOC	—	Mt VOC/yr	—	—	○	—	○	Data is not available in SSP1,2,4
Climate	Concentration	CO2	ppm	○	○	○	○	○	
Climate	Concentration	CH4	ppb	○	○	○	○	○	
Climate	Concentration	N2O	ppb	○	○	○	○	○	
Climate	Forcing	Total	W/m2	○	○	○	○	○	
Climate	Forcing	CO2	W/m2	○	○	○	○	○	
Climate	Forcing	CH4	W/m2	○	○	○	○	○	
Climate	Forcing	N2O	W/m2	○	○	○	○	○	
Climate	Forcing	Kyoto Gases	W/m2	○	○	○	○	○	
Climate	Forcing	F-Gases	W/m2	○	○	○	○	○	
Climate	Forcing	Aerosol	W/m2	○	○	○	○	○	
Climate	Temperature	Global Mean	℃	○	○	○	○	○	

Source：SSP Public Database Version2.0（As of February 2023）

※Extract parameters for which Global values can be obtained
※2005, 2010~2100, data is available for each 10 years

SSP Public Database Version2.0

【List of SSP Public Database Version2.0 Parameters（5/10）】

IAM Scenarios Model：Agricultural Indicators, Economic Indicators, Technological Indicators

Category			Unit	SSP					Remark
Large	Medium	Small		SSP1	SSP2	SSP3	SSP4	SSP5	
Agricultural Indicators	Demand	Crops	million t DM/yr	○	○	○	—	—	Data is not available in SSP4,5
Agricultural Indicators	Demand	Crops (Energy)	million t DM/yr	—	—	○	—	○	Data is not available in SSP1,2,4
Agricultural Indicators	Demand	Livestock	million t DM/yr	○	○	○	—	○	Data is not available in SSP4
Agricultural Indicators	Production	Crops (Energy)	million t DM/yr	○	○	○	○	○	
Agricultural Indicators	Production	Crops (Non-Energy)	million t DM/yr	○	○	○	○	○	
Agricultural Indicators	Production	Livestock	million t DM/yr	○	○	○	○	○	
Economic Indicators	Consumption	—	billion US$2005/yr	○	○	○	—	○	Data is not available in SSP4
Economic Indicators	Price (Carbon)	—	US$2005/t CO2	○	○	—	○	○	Data is not available in SSP3
Technological Indicators	Capacity (Electricity)	Total	GW	○	○	○	○	○	
Technological Indicators	Capacity (Electricity)	Biomass	GW	○	○	○	○	○	
Technological Indicators	Capacity (Electricity)	Coal	GW	○	○	○	○	○	
Technological Indicators	Capacity (Electricity)	Gas	GW	○	○	○	○	○	
Technological Indicators	Capacity (Electricity)	Geothermal	GW	—	○	○	○	○	Data is not available in SSP1
Technological Indicators	Capacity (Electricity)	Hydro	GW	○	○	○	—	○	Data is not available in SSP4
Technological Indicators	Capacity (Electricity)	Nuclear	GW	○	○	○	○	○	
Technological Indicators	Capacity (Electricity)	Oil	GW	○	○	○	○	—	Data is not available in SSP5
Technological Indicators	Capacity (Electricity)	Other	GW	○	—	—	—	—	Data is not available in SSP2,3,4,5
Technological Indicators	Capacity (Electricity)	Solar (Total, CSP, PV)	GW	○	○	△	△	○	Data is not available in SSP3（CSP）, and SSP4（CSP, PV）
Technological Indicators	Capacity (Electricity)	Wind (Total, Offshore, Onshore)	GW	○	○	△	△	△	Data is not available in SSP3（Onshore）, and SSP4,5（Onshore, Offshore）

Source：SSP Public Database Version2.0（As of February 2023）

※Extract parameters for which Global values can be obtained
※2005, 2010~2100, data is available for each 10 years

SSP Public Database Version2.0

【List of SSP Public Database Version2.0 Parameters（6/10）】
CMIP6 Emissions Model：BC, C2F6, CF4, CH4

Category		Unit	SSP					Remark
Large	Medium		SSP1	SSP2	SSP3	SSP4	SSP5	
BC	Agricultural Waste Burning	Mt BC/yr	○	○	○	○	○	
BC	Aircraft	Mt BC/yr	○	○	○	○	○	
BC	Energy Sector	Mt BC/yr	○	○	○	○	○	
BC	Forest Burning	Mt BC/yr	○	○	○	○	○	
BC	Grassland Burning	Mt BC/yr	○	○	○	○	○	
BC	Industrial Sector	Mt BC/yr	○	○	○	○	○	
BC	International Shipping	Mt BC/yr	○	○	○	○	○	
BC	Peat Burning	Mt BC/yr	○	○	○	○	○	
BC	Residential Commercial Other	Mt BC/yr	○	○	○	○	○	
BC	Transportation Sector	Mt BC/yr	○	○	○	○	○	
BC	Total	Mt BC/yr	○	○	○	○	○	
BC	Waste	Mt BC/yr	○	○	○	○	○	
C2F6	—	kt C2F6/yr	○	○	○	○	○	
CF4	—	kt CF4/yr	○	○	○	○	○	
CH4	Agricultural Waste Burning	Mt CH4/yr	○	○	○	○	○	
CH4	Agriculture	Mt CH4/yr	○	○	○	○	○	
CH4	Energy Sector	Mt CH4/yr	○	○	○	○	○	
CH4	Forest Burning	Mt CH4/yr	○	○	○	○	○	
CH4	Grassland Burning	Mt CH4/yr	○	○	○	○	○	
CH4	Industrial Sector	Mt CH4/yr	○	○	○	○	○	
CH4	International Shipping	Mt CH4/yr	○	○	○	○	○	
CH4	Peat Burning	Mt CH4/yr	○	○	○	○	○	
CH4	Residential Commercial Other	Mt CH4/yr	○	○	○	○	○	
CH4	Transportation Sector	Mt CH4/yr	○	○	○	○	○	
CH4	Total	Mt CH4/yr	○	○	○	○	○	
CH4	Waste	Mt CH4/yr	○	○	○	○	○	

Source：SSP Public Database Version2.0（As of February 2023）

※Extract parameters for which Global values can be obtained
※2005, 2010~2100, data is available for each 10 years

SSP Public Database Version2.0

【List of SSP Public Database Version2.0 Parameters（7/10）】
CMIP6 Emissions Model：CO2, CO, HFC, N2O

Category		Unit	SSP					Remark
Large	Medium		SSP1	SSP2	SSP3	SSP4	SSP5	
CO2	AFOLU	Mt CO2/yr	○	○	○	○	○	
CO2	Aircraft	Mt CO2/yr	○	○	○	○	○	
CO2	Energy Sector	Mt CO2/yr	○	○	○	○	○	
CO2	Industrial Sector	Mt CO2/yr	○	○	○	○	○	
CO2	International Shipping	Mt CO2/yr	○	○	○	○	○	
CO2	Residential Commercial Other	Mt CO2/yr	○	○	○	○	○	
CO2	Solvents Production and Application	Mt CO2/yr	○	○	○	○	○	
CO2	Transportation Sector	Mt CO2/yr	○	○	○	○	○	
CO2	Total	Mt CO2/yr	○	○	○	○	○	
CO2	Waste	Mt CO2/yr	○	○	○	○	○	
CO	Agricultural Waste Burning	Mt CO/yr	○	○	○	○	○	
CO	Aircraft	Mt CO/yr	○	○	○	○	○	
CO	Energy Sector	Mt CO/yr	○	○	○	○	○	
CO	Forest Burning	Mt CO/yr	○	○	○	○	○	
CO	Grassland Burning	Mt CO/yr	○	○	○	○	○	
CO	Industrial Sector	Mt CO/yr	○	○	○	○	○	
CO	International Shipping	Mt CO/yr	○	○	○	○	○	
CO	Peat Burning	Mt CO/yr	○	○	○	○	○	
CO	Residential Commercial Other	Mt CO/yr	○	○	○	○	○	
CO	Transportation Sector	Mt CO/yr	○	○	○	○	○	
CO	Total	Mt CO/yr	○	○	○	○	○	
CO	Waste	Mt CO/yr	○	○	○	○	○	
HFC	—	Mt CO2-equiv/yr	○	○	○	○	○	
N2O	—	kt N2O/yr	○	○	○	○	○	

Source：SSP Public Database Version2.0（As of February 2023）

※Extract parameters for which Global values can be obtained
※2005, 2010~2100, data is available for each 10 years

SSP Public Database Version2.0

【List of SSP Public Database Version2.0 Parameters（8/10）】
CMIP6 Emissions Model：NH3, Nox

Category		Unit	SSP					Remark
Large	Medium		SSP1	SSP2	SSP3	SSP4	SSP5	
NH3	Agricultural Waste Burning	Mt NH3/yr	○	○	○	○	○	
NH3	Agriculture	Mt NH3/yr	○	○	○	○	○	
NH3	Aircraft	Mt NH3/yr	○	○	○	○	○	
NH3	Energy Sector	Mt NH3/yr	○	○	○	○	○	
NH3	Forest Burning	Mt NH3/yr	○	○	○	○	○	
NH3	Grassland Burning	Mt NH3/yr	○	○	○	○	○	
NH3	Industrial Sector	Mt NH3/yr	○	○	○	○	○	
NH3	International Shipping	Mt NH3/yr	○	○	○	○	○	
NH3	Peat Burning	Mt NH3/yr	○	○	○	○	○	
NH3	Residential Commercial Other	Mt NH3/yr	○	○	○	○	○	
NH3	Transportation Sector	Mt NH3/yr	○	○	○	○	○	
NH3	Total	Mt NH3/yr	○	○	○	○	○	
NH3	Waste	Mt NH3/yr	○	○	○	○	○	
Nox	Agricultural Waste Burning	Mt NOx/yr	○	○	○	○	○	
Nox	Agriculture	Mt NOx/yr	○	○	○	○	○	
Nox	Aircraft	Mt NOx/yr	○	○	○	○	○	
Nox	Energy Sector	Mt NOx/yr	○	○	○	○	○	
Nox	Forest Burning	Mt NOx/yr	○	○	○	○	○	
Nox	Grassland Burning	Mt NOx/yr	○	○	○	○	○	
Nox	Industrial Sector	Mt NOx/yr	○	○	○	○	○	
Nox	International Shipping	Mt NOx/yr	○	○	○	○	○	
Nox	Peat Burning	Mt NOx/yr	○	○	○	○	○	
Nox	Residential Commercial Other	Mt NOx/yr	○	○	○	○	○	
Nox	Solvents Production and Application	Mt NOx/yr	○	○	○	○	○	
Nox	Transportation Sector	Mt NOx/yr	○	○	○	○	○	
Nox	Total	Mt NOx/yr	○	○	○	○	○	
Nox	Waste	Mt NOx/yr	○	○	○	○	○	

Source：SSP Public Database Version2.0（As of February 2023）

※Extract parameters for which Global values can be obtained
※2005, 2010~2100, data is available for each 10 years

SSP Public Database Version2.0

【List of SSP Public Database Version2.0 Parameters（9/10）】
CMIP6 Emissions Model：OC, SF6, Sulfur

Category		Unit	SSP					Remark
Large	Medium		SSP1	SSP2	SSP3	SSP4	SSP5	
OC	Agricultural Waste Burning	Mt OC/yr	○	○	○	○	○	
OC	Aircraft	Mt OC/yr	○	○	○	○	○	
OC	Energy Sector	Mt OC/yr	○	○	○	○	○	
OC	Forest Burning	Mt OC/yr	○	○	○	○	○	
OC	Grassland Burning	Mt OC/yr	○	○	○	○	○	
OC	Industrial Sector	Mt OC/yr	○	○	○	○	○	
OC	International Shipping	Mt OC/yr	○	○	○	○	○	
OC	Peat Burning	Mt OC/yr	○	○	○	○	○	
OC	Residential Commercial Other	Mt OC/yr	○	○	○	○	○	
OC	Transportation Sector	Mt OC/yr	○	○	○	○	○	
OC	Total	Mt OC/yr	○	○	○	○	○	
OC	Waste	Mt OC/yr	○	○	○	○	○	
SF6	—	kt SF6/yr	○	○	○	○	○	
Sulfur	Agricultural Waste Burning	Mt SO2/yr	○	○	○	○	○	
Sulfur	Aircraft	Mt SO2/yr	○	○	○	○	○	
Sulfur	Energy Sector	Mt SO2/yr	○	○	○	○	○	
Sulfur	Forest Burning	Mt SO2/yr	○	○	○	○	○	
Sulfur	Grassland Burning	Mt SO2/yr	○	○	○	○	○	
Sulfur	Industrial Sector	Mt SO2/yr	○	○	○	○	○	
Sulfur	International Shipping	Mt SO2/yr	○	○	○	○	○	
Sulfur	Peat Burning	Mt SO2/yr	○	○	○	○	○	
Sulfur	Residential Commercial Other	Mt SO2/yr	○	○	○	○	○	
Sulfur	Transportation Sector	Mt SO2/yr	○	○	○	○	○	
Sulfur	Total	Mt SO2/yr	○	○	○	○	○	
Sulfur	Waste	Mt SO2/yr	○	○	○	○	○	

Source：SSP Public Database Version2.0（As of February 2023）

※Extract parameters for which Global values can be obtained
※2005, 2010~2100, data is available for each 10 years

【List of SSP Public Database Version2.0 Parameters（10/10）】
CMIP6 Emissions Model：VOC

Category		Unit	SSP					Remark
Large	Medium		SSP1	SSP2	SSP3	SSP4	SSP5	
VOC	Agricultural Waste Burning	Mt VOC/yr	○	○	○	○	○	
VOC	Aircraft	Mt VOC/yr	○	○	○	○	○	
VOC	Energy Sector	Mt VOC/yr	○	○	○	○	○	
VOC	Forest Burning	Mt VOC/yr	○	○	○	○	○	
VOC	Grassland Burning	Mt VOC/yr	○	○	○	○	○	
VOC	Industrial Sector	Mt VOC/yr	○	○	○	○	○	
VOC	International Shipping	Mt VOC/yr	○	○	○	○	○	
VOC	Peat Burning	Mt VOC/yr	○	○	○	○	○	
VOC	Residential Commercial Other	Mt VOC/yr	○	○	○	○	○	
VOC	Solvents Production and Application	Mt VOC/yr	○	○	○	○	○	
VOC	Transportation Sector	Mt VOC/yr	○	○	○	○	○	
VOC	Total	Mt VOC/yr	○	○	○	○	○	
VOC	Waste	Mt VOC/yr	○	○	○	○	○	

Source：SSP Public Database Version2.0（As of February 2023）

※Extract parameters for which Global values can be obtained
※2005, 2010~2100, data is available for each 10 years

5. Scenario Analysis Parameters and Tools for reference

5-1. Parameter List

5-2. Physical risk assessment tools

5-3. List of TCFD-related reports

Chapter 5. Scenario Analysis Parameters and Tools for reference

Provide useful materials for scenario analysis based on past supporting case studies.

【Physical risk tools used in past project】

Physical risk tools used in past projects (excerpt)

#	Issuing Agency	Tool Name	URL	Subject region	Explanation related page
1	World Resources Institute (WRI)	Aqueduct Water Risk Atlas	https://www.wri.org/aqueduct	Global	5-108
2	World Bank	Climate Change Knowledge Portal	https://climateknowledgeportal.worldbank.org/	Global	5-110
3	AP-PLAT	Climate Impact Viewer	https://a-plat.nies.go.jp/ap-plat/asia_pacific/index.html	Asia	5-111
4	A-PLAT	Web GIS	https://adaptation-platform.nies.go.jp/webgis/index.html	Japan	5-112～5-122
5	European Commission	European Climate Adaptation Platform （Climate-ADAPT）	https://climate-adapt.eea.europa.eu/	EU	― ※European Adaptation Platform
6	IPCC TGICA	IPCC Data Distribution Centre	https://www.ipcc-data.org/	Global	― ※Database of the Intergovernmental Panel on Climate Change (IPCC)
7	FAO	The future of food and agriculture Alternative pathways to 2050	https://www.fao.org/global-perspectives-studies/food-agriculture-projections-to-2050/en/	Global	―

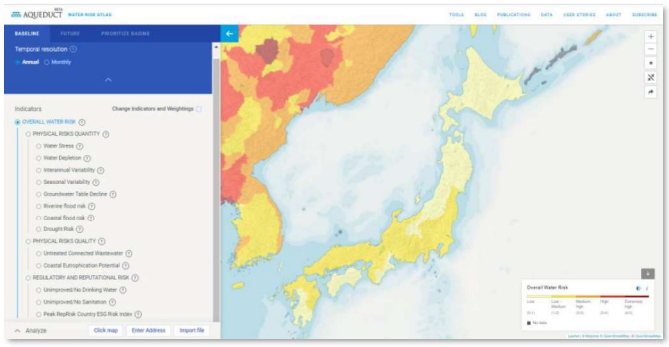
【Physical risk tools used in past projects (excerpt)：Parameter】

WRI AQUEDUCT Water Risk Atlas

AQUEDUCT Water Risk Atlas (WRI)

AQUEDUCT Water Risk Atlas

Issuing Agency	World Resource Institution
Scenario	Pessimistic / Business as usual / Optimistic
Time Horizon	Baseline / 2030―2040



List of available parameters

Indicators （Current）	
Physical Risks （Quantity）	• Water Stress • Water Depletion • Interannual Variability • Seasonal Variability • Groundwater Table Decline • Riverine flood risk／Coastal flood risk • Drought Risk
Physical Risks （Quality）	• Untreated Connected Wastewater • Coastal Eutrophication Potential
Regulatory and Reputational Risk	• Unimproved/No Drinking Water • Unimproved/No Sanitation • Peak RepRisk Country ESG Risk Index

Indicators （2030-2040）
• Water Stress • Seasonal Variability • Water Supply • Water Demand

Source：AQUEDUCT Water Risk Atlas
https://www.wri.org/applications/aqueduct/water-risk-atlas/#/?advanced=false&basemap=hydro&indicator=w_awr_def_tot_cat&lat=30&lng=-80&mapMode=view&month=1&opacity=0.5&ponderation=DEF&predefined=false&projection=absolute&scenario=optimistic&scope=baseline&timeScale=annual&year=baseline&zoom=3 (As of February 2023)

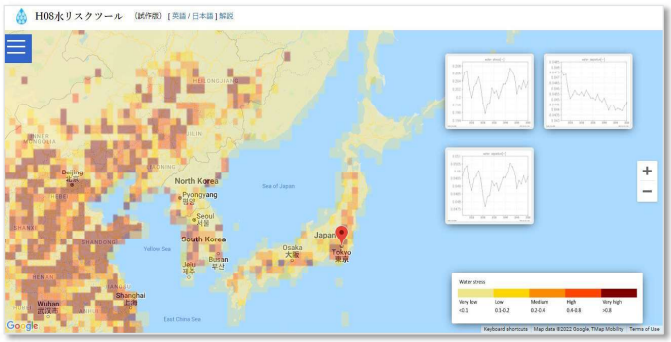
National Institute for Environmental Studies
H08 Water Risk Tool

【(Reference) Physical risk tools (excerpt): Parameter】

H08 Water Risk Tool（National Institute for Environmental Studies）

H08 Water Risk Tool

Issuing agency	National Institute for Environmental Studies
Scenario	RCP2.6（2℃ increase）/ RCP7.0（3℃increase）/ RCP8.5（4℃ increase）
Time Horizon	1901－2090 (Selected per year)



Results from the H08 water risk tool can also be compared with results from other tools, such as Aqueduct, to enhance analysis and improve the reliability of information on the tightness of water resources.

List of available parameters

Indicators（map）	
Climate Model	• GFDL-ESM4 • MPI-ESM1-2-HR • IPSL-CM6A-LR • MRI-ESM2-0 • UKESM1-0-LL • Ensemble（Average of the above five models）
Water stress index	• Water stress • Water depletion • Interannual variability • Seasonal variability • Groundwater level decline • Possible sustainable water intake
Basic variables	• Total water withdrawal • Annual river discharge（water resources） • Water intake from sustainable water sources

Indicators（Time series）
• Specify the location on map • Specify the location from the name of place • Specify the location from the latitude and longitude

Source：H08 Water Risk Tool https://h08.nies.go.jp/~ddc/cgi-bin/viewer2021/index_ja.php （As of February 2023）

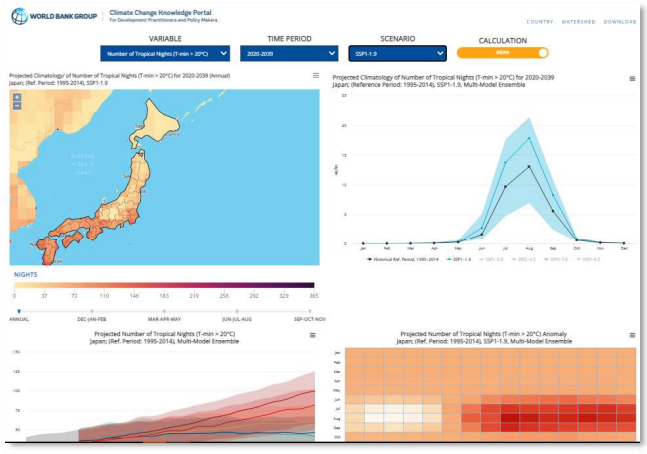
World Bank Climate Change Knowledge Portal

【Physical risk tools used in past projects (excerpt)：Parameter】

Climate Change Knowledge Portal (World Bank)

Climate Change Knowledge Portal

Issuing agency	World Bank
Scenario	SSP1-1.9 / SSP1-2.6 / SSP2-4.5 / SSP3-7.0 / SSP5-8.5
Time Horizon	2020－2039 / 2040－2059 / 2060－2079 / 2080－2099



List of available parameters

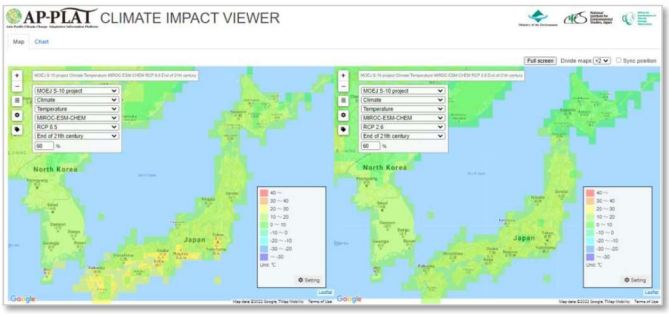
Item	Variable
Essential Climate Variable	• Mean-Temperature（month・year） • Max-Temperature（month・year） • Min-Temperature（month・year） • Precipitation（month・year）
Temperature	• Days with heat index（＞35℃） • Maximum of Daily Max-Temperature • Number of Frost Days (T-min<0℃) • Number of Summer Days (T-max>25℃) • Number of Tropical Nights (T-min>20℃、26℃) • Number of Hot Days (T-max＞35℃、40℃、42℃、45℃) • Minimum of Daily Min-Temperature • Warm Spell Duration Index
Precipitation	• Average Largest 1-Day Precipitation • Average Largest 5-Day Cumulative Precipitation • Days with Precipitation>20mm • Max Number of Consecutive Dry Days • Max Number of Consecutive Wet Days • Precipitation Percent Change • Average Largest Monthly Cumulative Precipitation • Days with Precipitation>50mm • Precipitation amount during wettest days
Additional Variables	• Relative humidity • Growing Season Length

Source：World Bank, Climate Change Knowledge Portal
https://climateknowledgeportal.worldbank.org/country/japan/climate-data-projections （As of February 2023）

Climate Impact Viewer (AP-PLAT)

Climate Impact Viewer（MOEJ S-14 project）

Issuing agency	AP-PLAT
Scenario	RCP2.6 / 4.5 / 6.0 / 8.5
Time Horizon	2011-2020 / 2021-2030 / 2031-2040 / 2041-2050 / 2051-2060 / 2061-2070 / 2071-2080 / 2081-2090 / 2091-2100



The AP-PLAT Platform page introduces climate information for each region and country, which can be referred to.
https://ap-plat.nies.go.jp/platforms/index.html

List of available parameters

Item	Index
Climate	• Daily mean temperature • Daily maximum temperature • Daily minimum temperature • Daily total precipitation • Daily mean downward shortwave radiation flux • Daily mean downward longwave radiation flux • Daily mean relative humidity • Daily mean specific humidity • Daily mean wind speed • Daily mean surface pressure • Daily mean absolute humidity • Number of days that reached 35℃ or greater • Number of days that reached 30℃ or greater • Number of dry days • Number of days that reached 50mm/day precipitation or greater • Number of days that reached 100mm/day precipitation or greater • Number of days that reached 150mm/day precipitation or greater • Number of days that reached 200mm/day precipitation or greater • Annual maximum daily precipitation

Item	Index	
Impact	• Crop Yield	• Maize • Rice • Soybean • Wheat
	• Hydropower	–
	• Sea level rise	• Inundated area • Affected population • Economic damage
	• Heat Mortality	–
	• Labor capacity	–
	• Degree Days	–

5-111 Source： AP-PLAT, Climate Impact Viewer https://a-plat.nies.go.jp/ap-plat/asia_pacific/index.html（As of February 2023）

5. Scenario Analysis Parameters and Tools for Reference

5-1. Parameter List

5-2. Physical risk assessment tools

5-3. List of TCFD-related reports

Chapter 5. Scenario Analysis Parameters and Tools for reference
Provide useful materials for scenario analysis based on past supporting case studies.

【List of reports released by TCFD】
The TCFD has issued recommendations, manuals and guidance on the recommended disclosure items, including scenario analysis

Category	Document title and URL (Original/Japanese)	Overview
TCFD recommendation as a whole	■ **Final Report: "Recommendations of the Task Force on Climate-related Financial Disclosures"** (June 2017) ➢ (Original) https://assets.bbhub.io/company/sites/60/2021/10/FINAL-2017-TCFD-Report.pdf ➢ (Japanese) https://www.sustainability-fj.org/susfjwp/wp-content/uploads/2019/01/ccc822ae11df3bb3f0543d9bd3c7232d.pdf	Final report providing background and frameworks for climate-related financial disclosures
	■ **Annex: "Implementing the Recommendations of the Task Force on Climate-related Financial Disclosures"** (revised in October 2021)* ➢ (Original) https://assets.bbhub.io/company/sites/60/2021/07/2021-TCFD-Implementing_Guidance.pdf ➢ (Japanese) https://tcfd-consortium.jp/pdf/about/2021_TCFD_Implementing_Guidance_2110_jp.pdf	Report providing detailed information that is useful when **implementing the recommended disclosure items**
Strategy	■ **Technical Supplement: "The Use of Scenario Analysis in Disclosure of Climate-Related Risks and Opportunities"** (June 2017) ➢ (Original) https://assets.bbhub.io/company/sites/60/2021/03/FINAL-TCFD-Technical-Supplement-062917.pdf ➢ (Japanese) https://www.sustainability-fj.org/susfjwp/wp-content/uploads/2019/01/ccc822ae11df3bb3f0543d9bd3c7232d.pdf	Report providing detailed information for referencing when **considering scenario analysis**
	(Non-financial) ■ **"Guidance on Scenario Analysis for Non-Financial Companies"** (October 2020) ➢ (Original) https://assets.bbhub.io/company/sites/60/2020/09/2020-TCFD_Guidance-Scenario-Analysis-Guidance.pdf	Guidance on practical processes for scenario analysis and ideas for resilience disclosures for different climate-related scenarios
Risk management	■ **"Guidance on Risk Management Integration and Disclosure"** (October 2020) ➢ (Original) https://assets.bbhub.io/company/sites/60/2020/09/2020-TCFD_Guidance-Risk-Management-Integration-and-Disclosure.pdf	Guidance targeted at companies that integrate climate-related risks into their existing risk management processes and disclose this information
Metrics & targets	■ **"Guidance on Metrics, Targets, and Transition Plans"** (October 2021) ➢ (Original) https://assets.bbhub.io/company/sites/60/2021/07/2021-Metrics_Targets_Guidance-1.pdf	Guidance explaining the latest trends in climate-related metrics, transition plans, and cross-industry climate-related metrics
Other	■ **"2022 Status Report"** (October 2022) ➢ (Original) 2022-TCFD-Status-Report.pdf (bbhub.io)	Annual report explaining progress, insights, and challenges in climate-related disclosure (Issued annually from 2018)

For those looking to understand the general concept of the TCFD recommendations

For those looking to learn the details of the individual TCFD recommendation items

Progress status

Can be referred together with this guide

※Information as of February 2023 *: The Annex includes financial and non-financial sectors (key sectors are energy, transport, materials/architecture, and agriculture/food/forestry products)

【List of Japanese reports related to the TCFD and scenario analysis】
Some excerpts from the guidelines on TCFD and scenario analysis practices in Japan

Category	Document title and URL	Overview
For all industries	■ "Guidance on Climate-related Financial Disclosures 3.0 (TCFD Guidance 3.0)" (TCFD Consortium, October 2022) https://tcfdconsortium.jp/pdf/news/22100501/TCFD_Guidance_3.0_J.pdf	Explains the TCFD Final Report from a corporate perspective
	■ "Practical guide for Scenario analysis in line with the TCFD recommendations 2022" (Ministry of the Environment, March 2023) ※This guide	Aimed at the smooth implementation of corporate scenario analysis in line with the TCFD recommendations; contains explanations covering procedures for those in charge of implementation to those for management, as well as summarized explanations of disclosure case studies, etc.
	■ "A Guide to Physical Risk Assessment in TCFD Recommendations: Flood Inundation Risk Assessment Based on Climate Change" (Ministry of Land, Infrastructure, Transport and Tourism, to be released at the end of March 2023)	A manual for assessing the physical risks in corporate climate-related disclosures, especially those related to flooding
By sector	**(Banking)** ■ "A Practical Guide to Implementing Scenario Analysis for Climate Change Risks and Opportunities in Line with the TCFD Recommendations (Banking Sector) ver. 2.0" (Ministry of the Environment, April 2022) https://www.env.go.jp/content/900518880.pdf	Released as guidance focusing on scenario analysis methods for quantifying and evaluating transition risks/physical risks that are reliable enough to withstand disclosure
	(Real estate) ■ "Guidance for the Real Estate Sector on Addressing 'TCFD Recommendations for Climate-Related Financial Disclosures' (TCFD Response Guidance for the Real Estate Field)" (Ministry of Land, Infrastructure, Transport and Tourism, March 2021) https://www.mlit.go.jp/totikensangyo/totikensangyo_tk5_000215.html	Comprehensive explanation based on progress of ESG investment covering information specific to the real estate sector for information disclosures in line with the TCFD recommendations; also covers illustrative examples of scenario analysis
	(Food products) ■ "Introduction to Disclosure of Climate-Related Risks and Opportunities in the Food, Agriculture, Forestry, and Fishery Industries" (Ministry of Agriculture, Forestry, and Fisheries, June 2021) https://tcfd-consortium.jp/pdf/news/21062401/visual-60.pdf ■ "Disclosure of Information on Climate-related Risks and Opportunities in Food, Agriculture, Forestry and Fisheries (Practical Edition)" (Ministry of Agriculture, Forestry, and Fisheries, June 2022) https://www.maff.go.jp/j/press/kanbo/b_kankyo/attach/pdf/220603-5.pdf	Explains information on climate-related risks and opportunities for information disclosures in line with the TCFD recommendations for the food, agriculture, forestry, and fishery industries by sectors such as livestock and agricultural products
For investors	■ "Guidance for Utilizing Climate-related Information to Promote Green Investment 2.0 (Green Investment Guidance 2.0)" (Ministry of Economy, Trade and Industry, October 2021) https://tcfd-consortium.jp/pdf/news/21100501/green_investment_guidance20-j.pdf	Explains perspectives from which investors and others can interpret corporate information disclosures based on the TCFD recommendations

looking to understand the general concept of the TCFD recommendati

For those looking to learn the details of the individual TCFD recommendation items

Investment related

※Information as of February 2023

Ministry of the Environment

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