Electric Power Industry in Japan 2025

July 2025

Japan Electric Power Information Center, Inc.

Country Profile

Copyright © 2025 JEPIC. All rights reserved

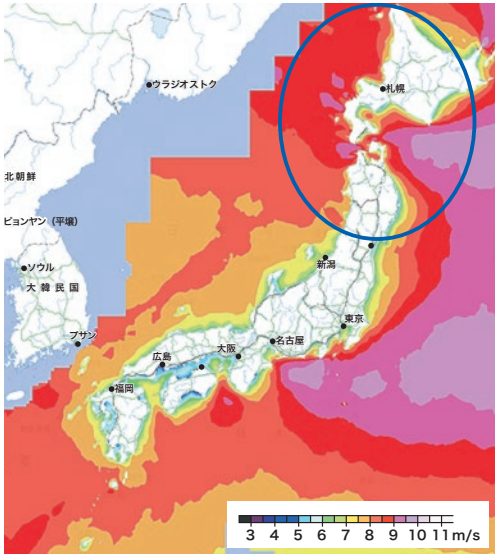
Geographic Profile

JEPIC

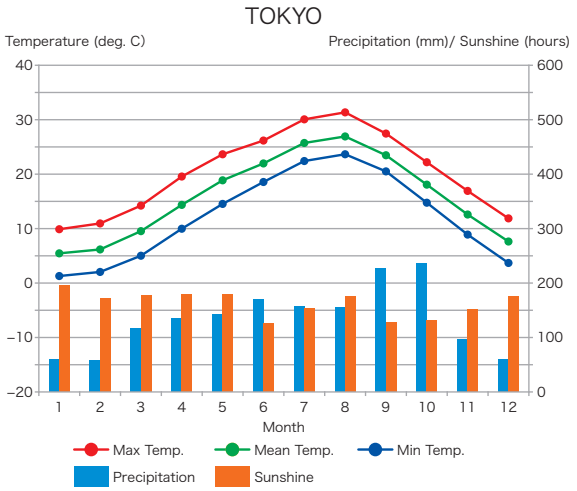
■ **Population :** 123 million

■ **Land area :** 378,000km^2

Source: Geospatial Information Authority of Japan
website: https://www.gsi.go.jp/common/000102099.pdf



Source: NEDO, NeoWins
website:https://appwdc1.infoc.nedo.go.jp/Nedo_Webgis/index.html



Source: Japan Meteorological Agency website:
https://www.data.jma.go.jp/cpd/longfcst/en/tourist_japan.html

Copyright © 2025 JEPIC. All rights reserved

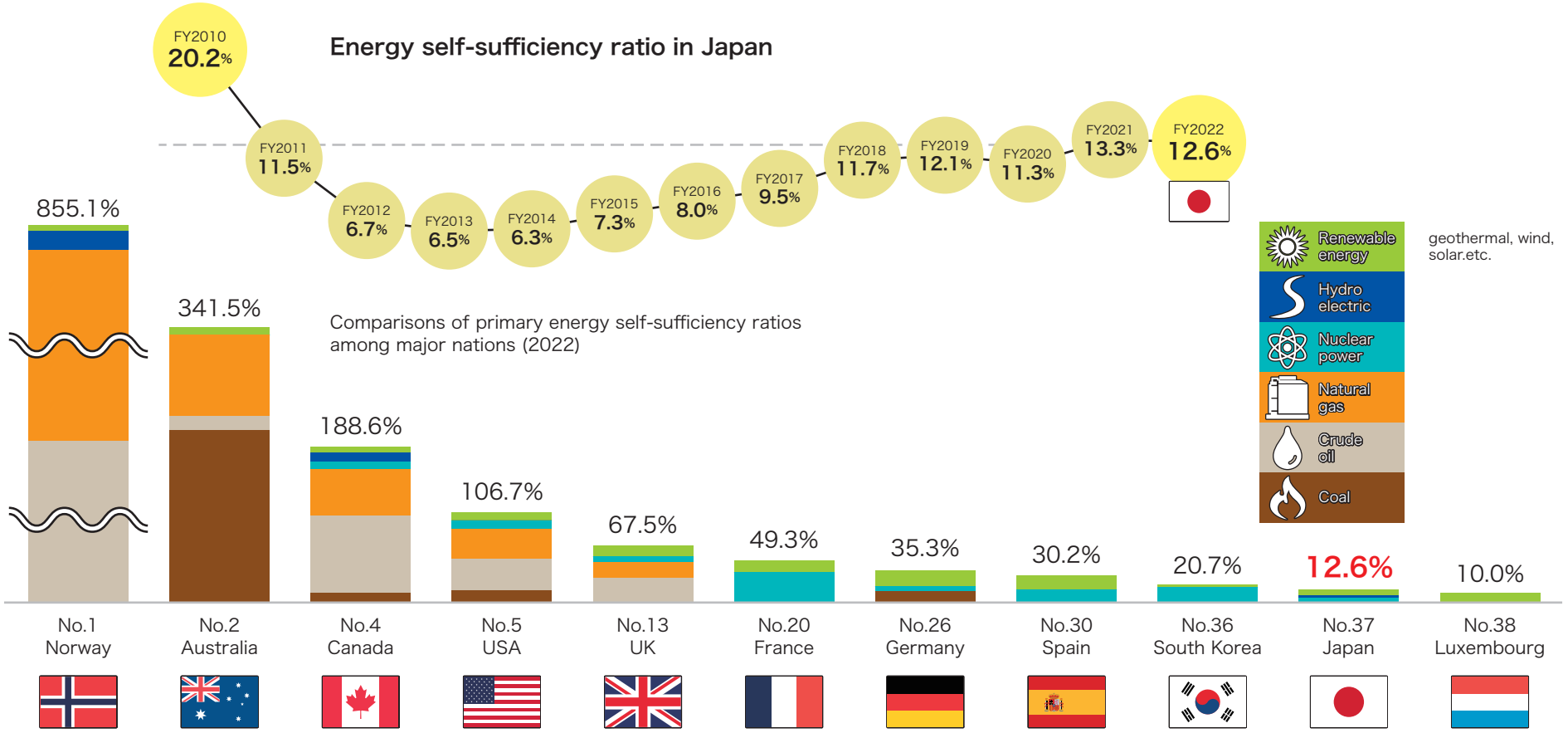
Energy Policy

Copyright © 2025 JEPIC. All rights reserved

Primary Energy Self-Sufficiency Ratio

JEPIC

■ In FY2022, Japan's energy self-sufficiency ratio was 12.6%, a low level compared to other OECD countries.



Source: Estimates for 2022 from IEA "World Energy Balances 2023", except for data on Japan, which are confirmed values of FY 2022, derived from "Comprehensive Energy Statistics of Japan", published by the Agency for Natural Resources and Energy

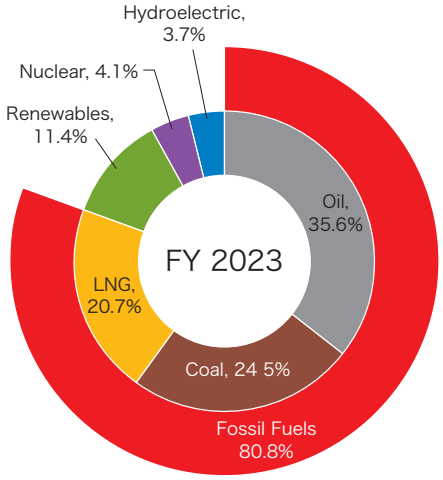
Copyright © 2025 JEPIC. All rights reserved

Primary Energy Mix and Fuel Import Partners

JEPIC

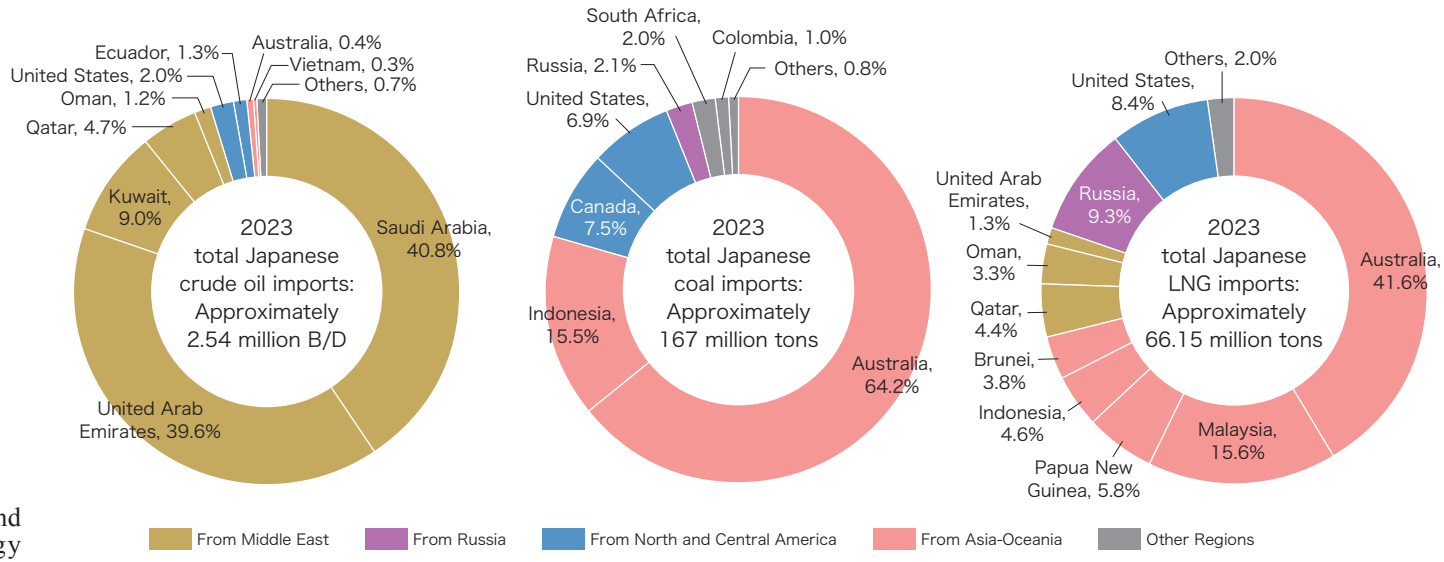
- 80.8% of Japan's primary energy supply relies on fossil fuels.
- Due to its limited domestic resources, Japan imports nearly all of its fossil fuels.
- Oil imports are particularly concentrated, with over 90% coming from the Middle East.
- Maritime routes from the Middle East include chokepoints such as the Strait of Malacca, posing significant geopolitical risks.

Primary Energy Mix



Source: Agency for Natural Resources and Energy, Comprehensive Energy Statistics of Japan

Sources of Japanese fossil fuel imports (2023)



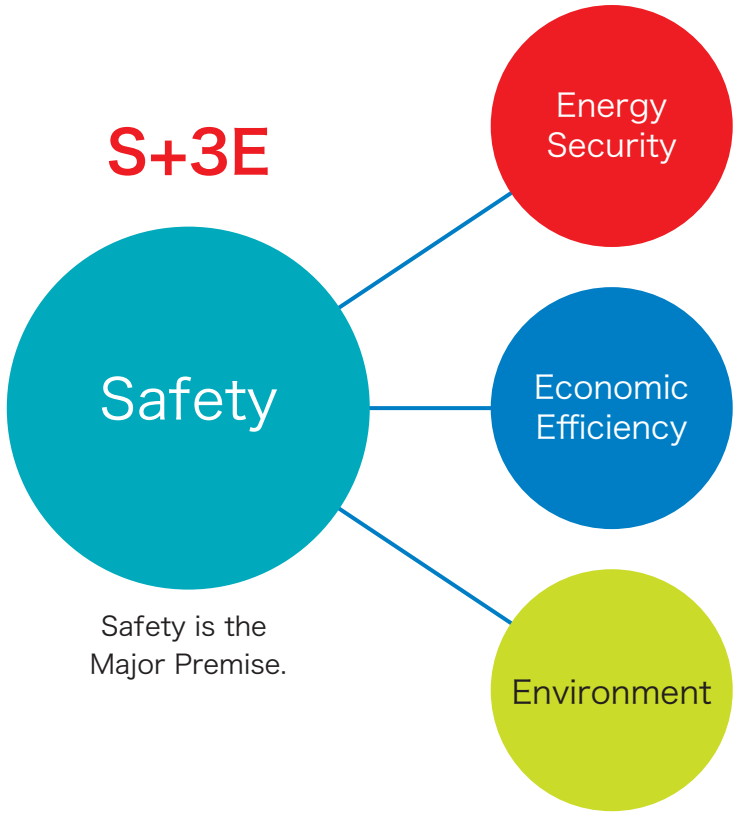
Source: Ministry of Finance, Trade Statistics of Japan

Copyright © 2025 JEPIC. All rights reserved

Basic Principles of Energy Policy: S+3E

JEPIC

- As Japan is a country with limited natural resources, it is essential to create a multi-layered energy supply structure.
- "S+3E" is a fundamental principle that prioritizes Safety above all else, while aiming to balance the following three "E"s.



Energy Security (Self-sufficiency rate)

30–40% energy self-sufficiency by FY2040
(12.6% in FY2022)

Economic Efficiency (Electricity cost)

Price comparable to international standards

Environment (Greenhouse gas emissions)

Aiming for ambitious emission reduction targets aligned with the global 1.5℃ goal: ▲60% by FY2035 and ▲73% by FY2040(compared to FY2013 levels)

Copyright © 2025 JEPIC. All rights reserved

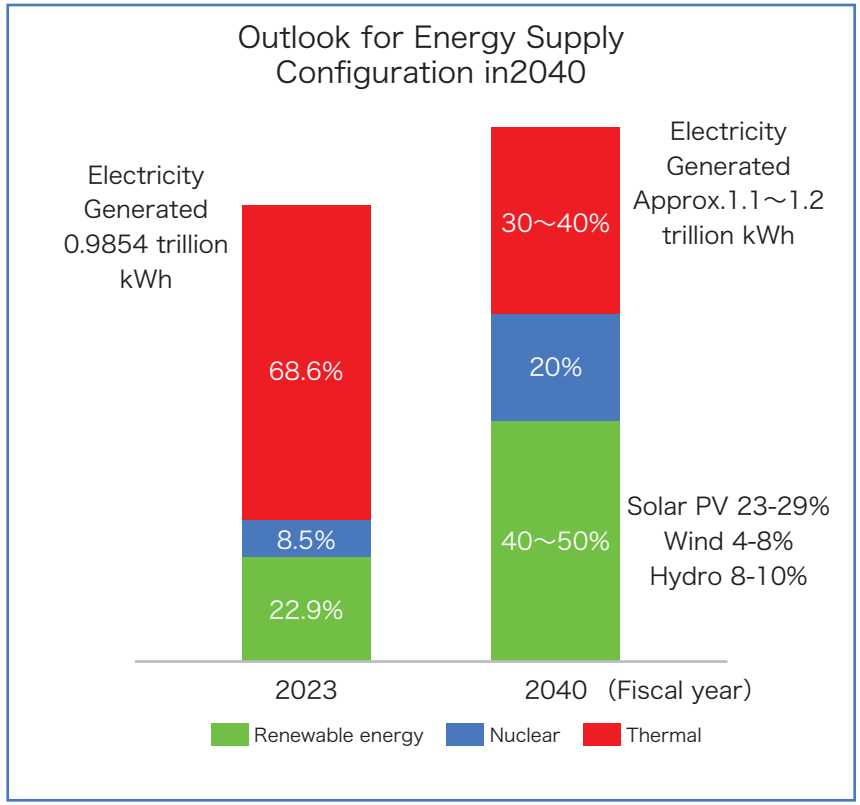
The 7th Strategic Energy Plan

JEPIC

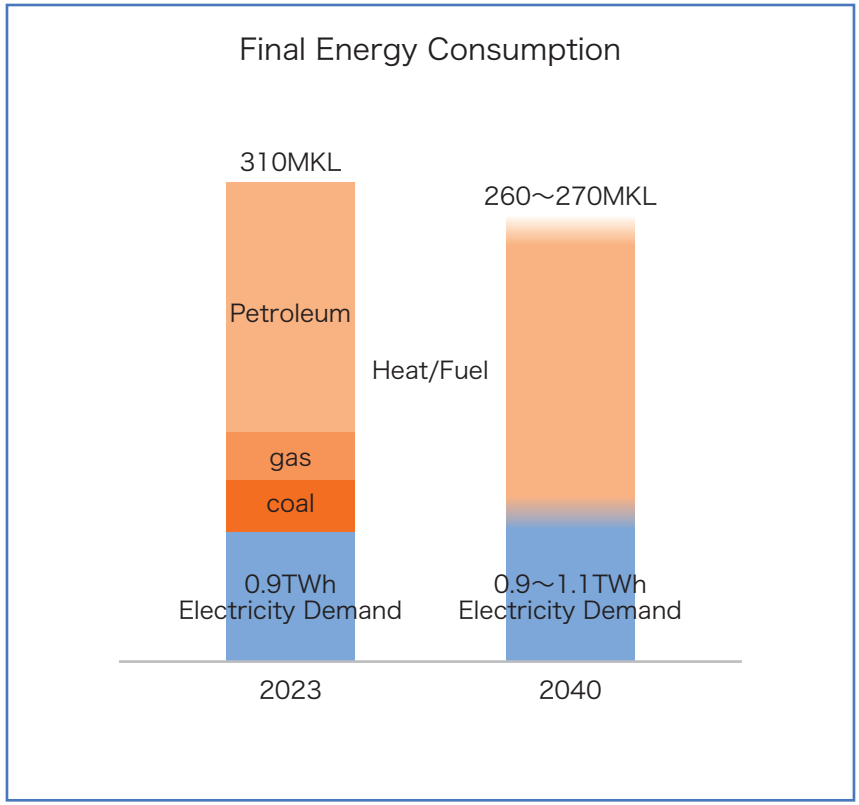
■ The basic direction of the national energy policy

■ Changes since the 6th Revision

- Increased economic security demands
- Expected increase in electricity demand due to the progress of DX, GX
- Expanding diverse and realistic approaches while maintaining ambitious goals toward realizing carbon neutrality



Source:METI



Source:METI

Copyright © 2025 JEPIC. All rights reserved

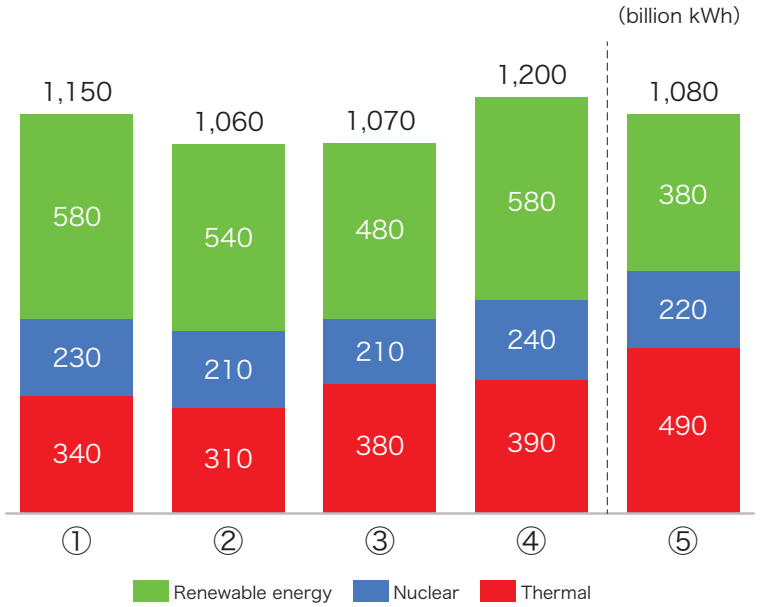
The 7th Strategic Energy Plan

JEPIC

■ The energy supply and demand outlook for 2040 is based on multiple scenarios.

- There are various uncertainties.
- The outlook is affected by trends in innovative technology.

Power generation by scenario in 2040



① Expansion of renewable energy
Renewables grow via new technologies and lower costs.

② Utilization of hydrogen and new fuels
Hydrogen, ammonia, and synthetic methane use expands.

③ Utilization of CCS
CCS adoption grows with better cost and capacity.

④ Innovative technology
Various technologies advance balanced decarbonization.

⑤Limited Progress
Existing technologies expand amid slow innovation.

Source:METI

- In addition to the scenario achieving a 73% reduction by fiscal year 2040, a reference scenario ⑤ that falls short of this target (achieving a 61% reduction) is also presented.
  In this case Natural gas primary energy supply is about 74 million ton.

Copyright © 2025 JEPIC. All rights reserved

The 7th Strategic Energy Plan

JEPIC

■ Policy Direction toward 2040

- 73% reduction in GHG emission compared to FY2013
- Maximize the use of decarbonized energy sources that contribute to energy security
- Balanced power generation mix

Source:METI

Renewable 	・Promote the maximum introduction as a major power source ・Adoption of perovskite solar cells (target: 20GW by 2040) ・Form offshore wind power projects, including floating, with a total capacity of 30 ~ 45GW by 2040
Nuclear 	・Continuously utilize the necessary amount of generation capacity ・Deploy next-generation advanced reactors, including replacement at other sites owned by operators with decommissioned plants
Thermal 	・Play key roles in supplying power, regulating output, and providing inertial and synchronous power ・Ensure generation capacity necessary for a stable electricity supply ・Reduce electricity output from inefficient coal-fired power plants ・Promote the development and replacement of LNG-fired power plants

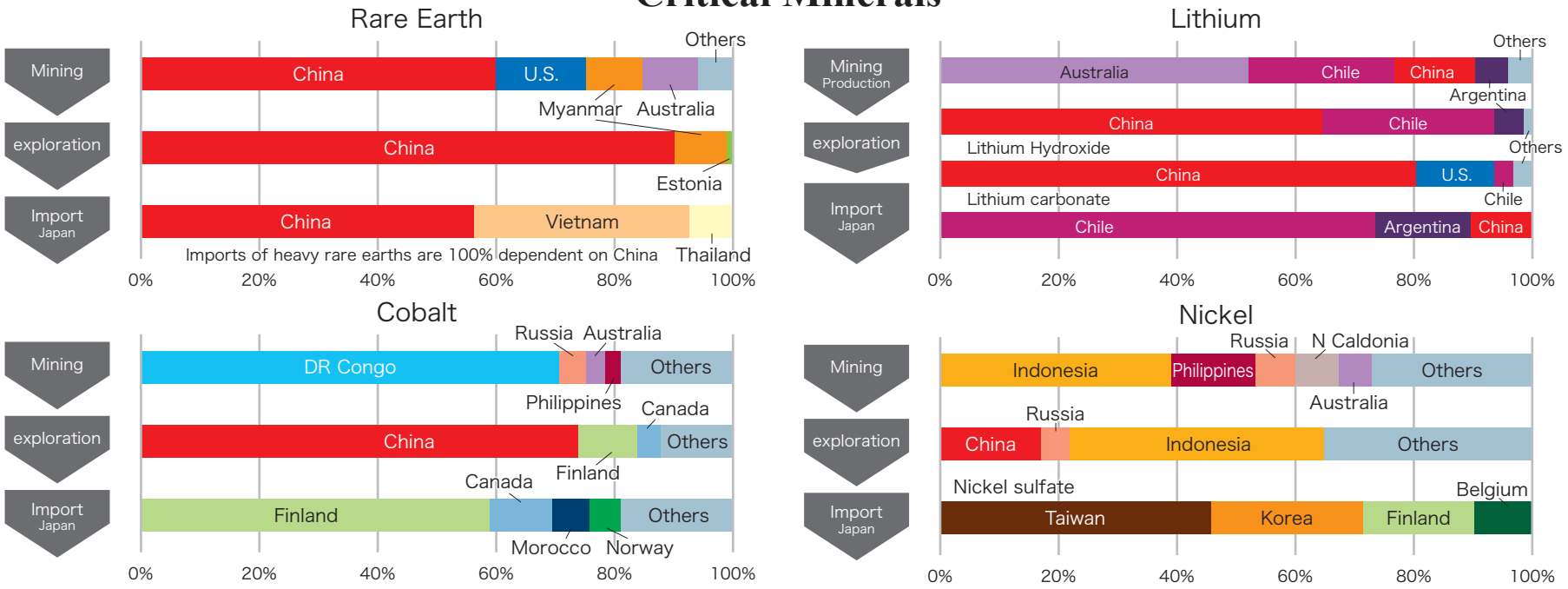
Copyright © 2025 JEPIC. All rights reserved

The 7th Strategic Energy Plan

JEPIC

- **Some critical minerals are dependent on specific countries, it is important to take measures to ensure a stable supply, including diversification of supply sources.**
- **Economic Security Promotion Act of 2022 identified the critical products with strategic importance. Policy for Securing Stable Supply of Critical Minerals of 2023 set the procurement targets required for domestic production in 2030.**

Critical Minerals



※ rare earth: for EV motor and Wind power, Lithium/ Co/Ni: for EV and Battery

Source:METI

Copyright © 2025 JEPIC. All rights reserved

GX 2040 Promotion Strategy - Key Laws & Policies

JEPIC

Policy/Legislation		Key Content
GX Promotion Act (Enacted 2023)		Issuance of GX Bonds (20 trillion yen); Introduction of carbon pricing (ETS, fossil fuel surcharge); Establishment of GX Promotion Agency; Total GX investment target of 150 trillion yen over 10 years (public and private)
GX Act Amendments (Amended 2023)		Legalization of ETS (mandatory from FY2026); Fossil fuel surcharge from FY2028; Strengthened financial support for GX investment
GX Decarbonization Power Supply Act (Enacted 2023)	Electricity Business Act (Amended)	Sets nominal reactor life at 40 years; up to 20-year extension possible with METI approval based on GX contributions and safety upgrades. Unforeseen non-operational periods not counted toward limit.
	Atomic Energy Basic Act (Amended)	Clarifies fundamental nuclear policy: safety-first, energy security and GX role, and institutional responsibility.
	Reactor Regulation Act (Amended)	Requires technical assessments every 10 years after 30 years of operation; long-term management plans must be approved by NRA.
	Spent Nuclear Fuel Reprocessing Implementation Act (Amended)	Expands Nuclear Reprocessing Organization's role to oversee national decommissioning, conduct joint R&D, and levy decommissioning contributions from operators.
Hydrogen Society Promotion Act (Enacted 2024)		Defines basic policies and business approval scheme; Subsidizes price differences between hydrogen and existing fuels; Allows regulatory exemptions; Sets operational criteria for hydrogen suppliers.
CCS Business Act (Enacted 2024)		Licensing systems for storage and trial drilling; Legal frameworks for storage/drilling rights; Regulations for CCS and CO_2 pipelines.

Source:METI

GX 2040 Vision

Copyright © 2025 JEPIC. All rights reserved

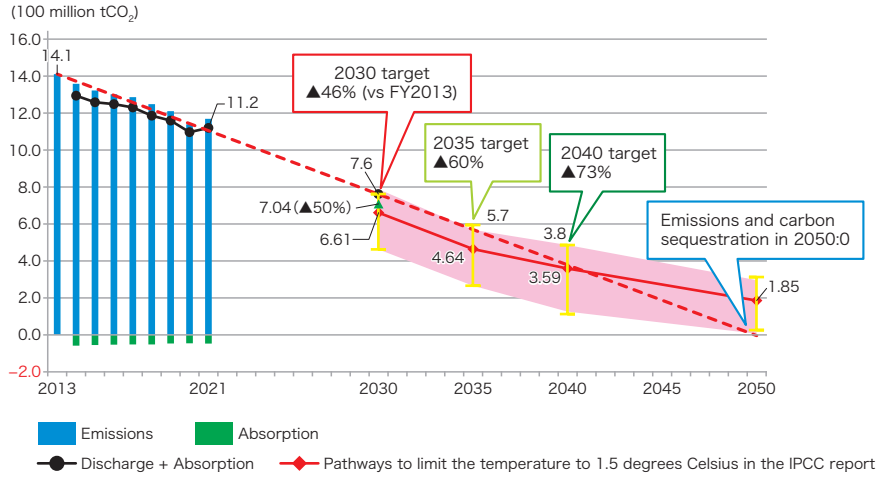
GX 2040 Vision

JEPIC

■ Revision of the Strategy for Promoting Transition to a Decarbonized Growth-Oriented Economic Structure

- Expand inter-regional lines, install storage facilities, and use smart grids to balance supply and demand.
- Promote wind, geothermal, and storage through FIP (market + premium); reform capacity market to support hydrogen and CCUS-equipped thermal.
- Strengthen LNG contracts (Middle East, U.S., Australia)

Japan's Progress Toward Net Zero by 2050



GX 2040 Vision – Key Steps

Year	Key Steps
2026	Launch ETS; mandatory for emitters >100,000 t-CO_2
2028	Introduce carbon levy on coal, LNG, and oil
2030	Renewables 36–38%; GHG -46% vs. 2013
2033	Auction starts for power sector
2040	Renewables 40–50%
2050	Carbon neutral; zero-emission power mix

Source:METI

Copyright © 2025 JEPIC. All rights reserved

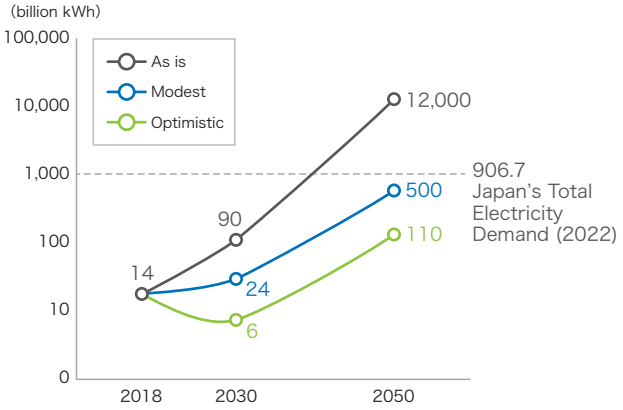
GX 2040 Vision

JEPIC

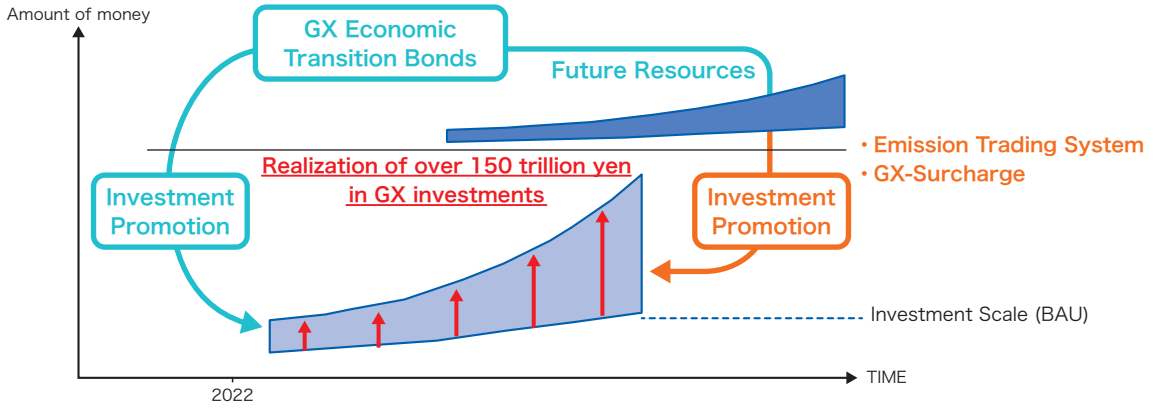
■ Future Energy Strategy, Pro-Growth Carbon Pricing Framework

- AI/Data Center Electricity Demand:DC/AI power demand projected to increase towards 2050, Promote regional DC siting and decarbonized power supply integration
- Green Industrial Policy: Support hydrogen-based steel and low-carbon materials, Leverage corporate and public procurement
- GX bonds will fund decarbonization; ETS starts in 2026 and a fossil fuel levy in 2028 to boost investment certainty and industrial transition.
- GX bonds are funded by ETS schemes. The auctions starts for the power sector in 2033.
- Emitters over 100,000 tons of CO_2 per year must participate in the GX-ETS scheme starting in FY2026. Entities failing to surrender sufficient allowances will be subject to a non-compliance surcharge.

Increase in electricity demand driven by data centers



Pro-Growth Carbon Pricing Concept



Source:METI

Copyright © 2025 JEPIC. All rights reserved

History of the Electric Power Industry

Copyright © 2025 JEPIC. All rights reserved

Development of Electric Power Industry

JEPIC

YR	Events	YR	Events
1886	Tokyo Electric Light Co. opened for business	1995	Deregulation in generation (IPPs have entered the market)
~1930s	Approx. 800 private/local utilities operated	2000	Deregulation in retail sector (only for high-voltage customers)
1939	Japan Electric Generation and Transmission Co. established	2003	JEPX is established
1945	**End of World War II**	**2011**	**Great East Japan Earthquake**
1951	Industry restructured into 9 EPCOs	2015	OCCTO is established
1952 1957	Wholesale Electric Utilities (J-Power, JAPC) opened for business	2016	Full retail competition
1972	Okinawa EPCO opened for business (become 10 EPCOs)	2020	Legal separation of T&D from EPCos

Copyright © 2025 JEPIC. All rights reserved

Structure of the Electric Power Industry

Copyright © 2025 JEPIC. All rights reserved

Electricity Sector Reform

JEPIC

■ Reform started in 1995

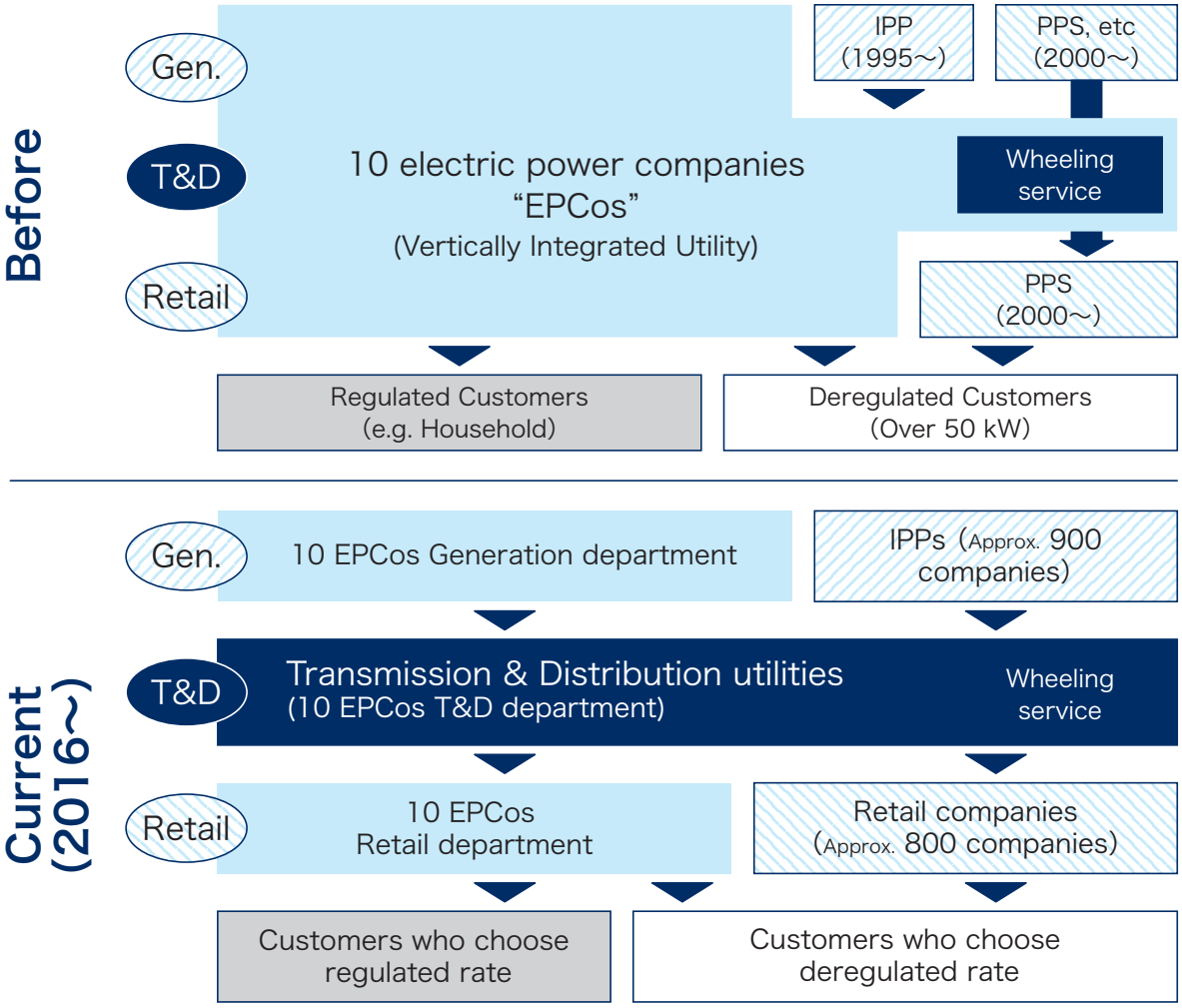
■ Goals for Reform:

- Secure Stable Supply
- Keep Electricity Prices Affordable
- Enlarge Customers' Choices and Suppliers' Business Opportunities

■ Current Status

- In sufficient mechanisms for maintaining Power station and Fuels
- Prices are Increased
- Customers' Choices and Suppliers' Business Opportunities are enlarged

Electricity system before and after Reform



Source: METI, Detailed System Design for Full Retail Deregulation, 2013

Copyright © 2025 JEPIC. All rights reserved

Regulatory Authority and Rule Maker

JEPIC

■ METI*

- Policy Making
- Supervise and regulation

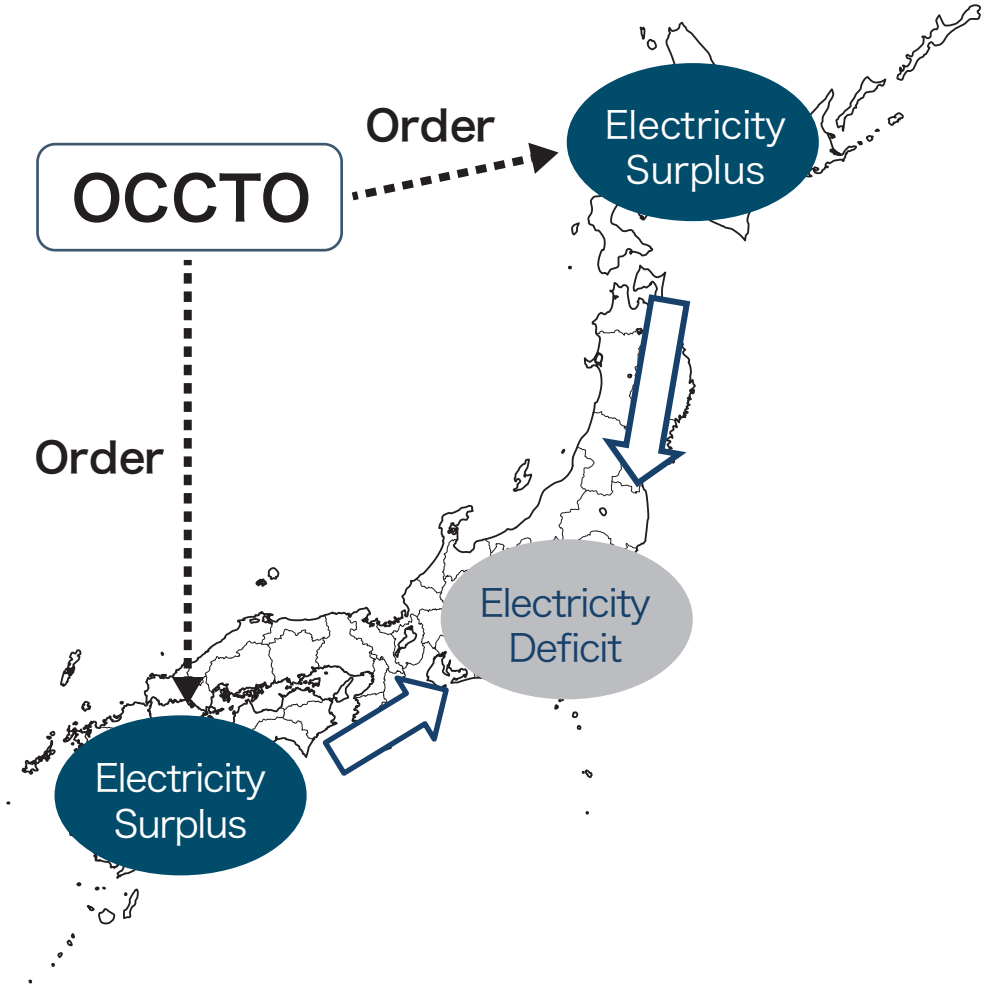
■ OCCTO* (Established in 2016).

- Formulate regulations and codes
- Formulate Long-term Policy and Cross-regional Network Development Plan
- Monitoring the national electricity supply and demand balance

■ General Electric T&D Utility

- Draft network facilities plan
- Adjustment of generation to demand

Nationwide Electricity Supply and Demand Adjustment Mechanism



*Ministry of Economy, Trade and Industry
*Organization for Cross-regional Coordination of Transmission Operators

Source: METI, Activities of the OCCTO, 2019

Copyright © 2025 JEPIC. All rights reserved

Electricity Market

JEPIC

■ Capacity Market (kW), 166GW/y, 2021~

- Generation capacity needed in future.
- Approx. 56% of installed generation capacity is traded.
- Taker: OCCTO Maker: Generation

■ Wholesale Market (kWh), 275TWh/y, 2005~

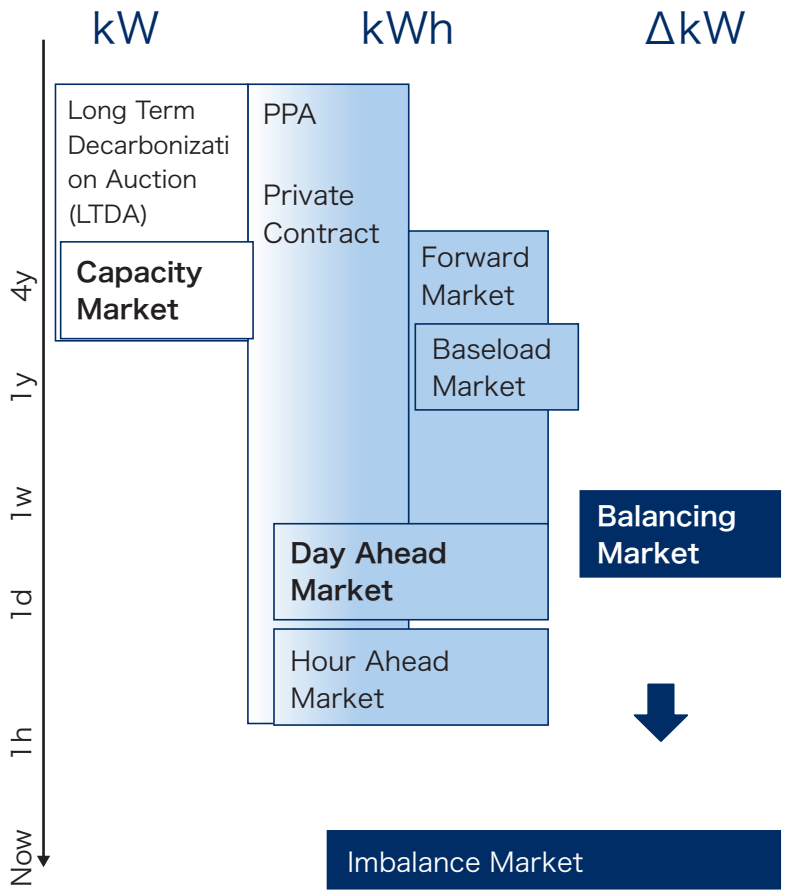
- Electricity actually generated.
- Approx. 32 % of electricity demand is traded.
- Taker: Retail Maker: Generation

■ Balancing Market (ΔkW), 181ΔTW/y, 2021~

- Adjustment ability for real time grid operation.
- Approx. 52% of required amount is traded.
- Taker: Transmission Maker: Generation

*Only major players described as Maker or Taker

Schedule for each electricity market



Source: METI, The Study on the Simultaneous Market, 2024

Copyright © 2025 JEPIC. All rights reserved

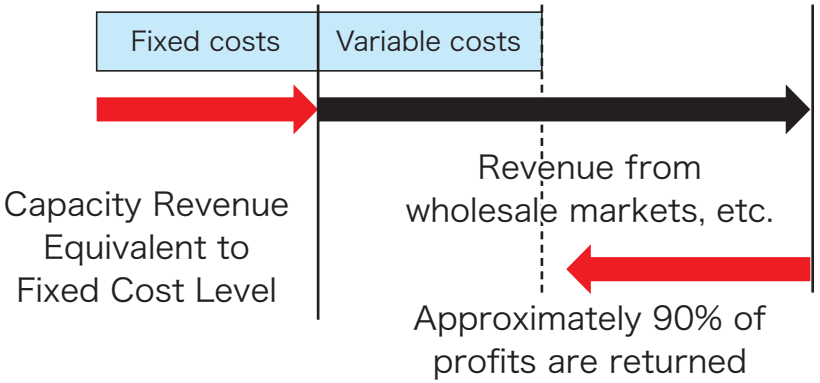
Electricity Market

JEPIC

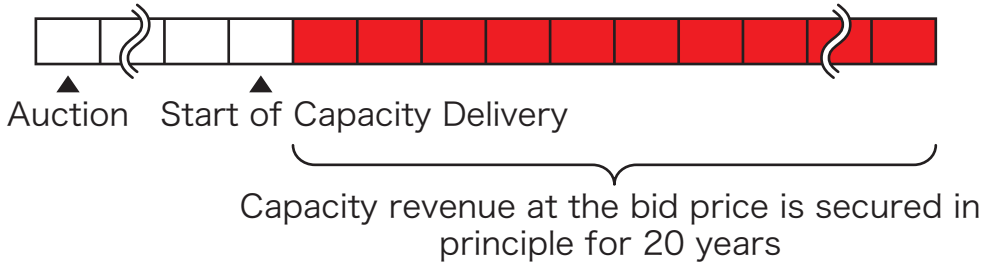
■ Long Term Decarbonization Auction (kW), 5GW/y, 2023~

- The scheme is aimed at new investments of generation facilities contribute to decarbonization (LNG, nuclear, battery, etc.)
- CAPEX for 20 years are guaranteed, but 90% of other revenues must be repaid.
- Taker: OCCTO Maker: Generation

Revenue Level



Revenue Period



■ Non-fossil value trading market (kWh), 13.4TWh/y, 2018~

- Trade the value of electricity generated from decarbonization sources (Hydro, solar, wind, nuclear, etc.)
- Equivalent to 2 % of electricity demand is traded.
- Taker: Retail Maker: Generation

■ Equal treatment between internal and external suppliers

- General Electric Power Company recommended to sell electricity to their own retail divisions and to other retail companies under the same terms.

Copyright © 2025 JEPIC. All rights reserved

New Entries in the Retail Market

JEPIC

■ New Retail Electricity Suppliers

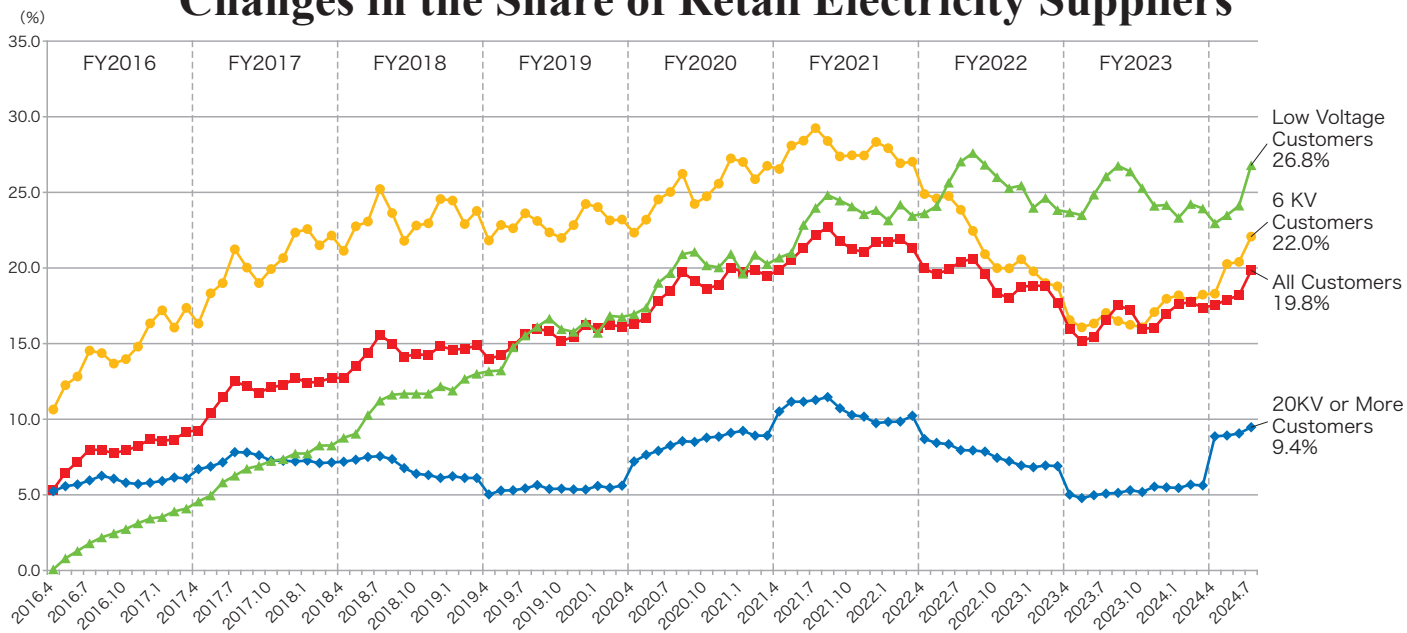
- Number: Approx. 800, Share: 19.8%.

■ Until 2021: The share has increased as the reform develops.

■ 2021-2024: Some discontinued business due to the rise in fuel costs and the whole price.

■ Most recent: The share is on the rise again.

Changes in the Share of Retail Electricity Suppliers



Source: METI, Progress in the Full Liberalization of Electricity and Gas Retailing, 2024

Copyright © 2025 JEPIC. All rights reserved

Supply and Demand

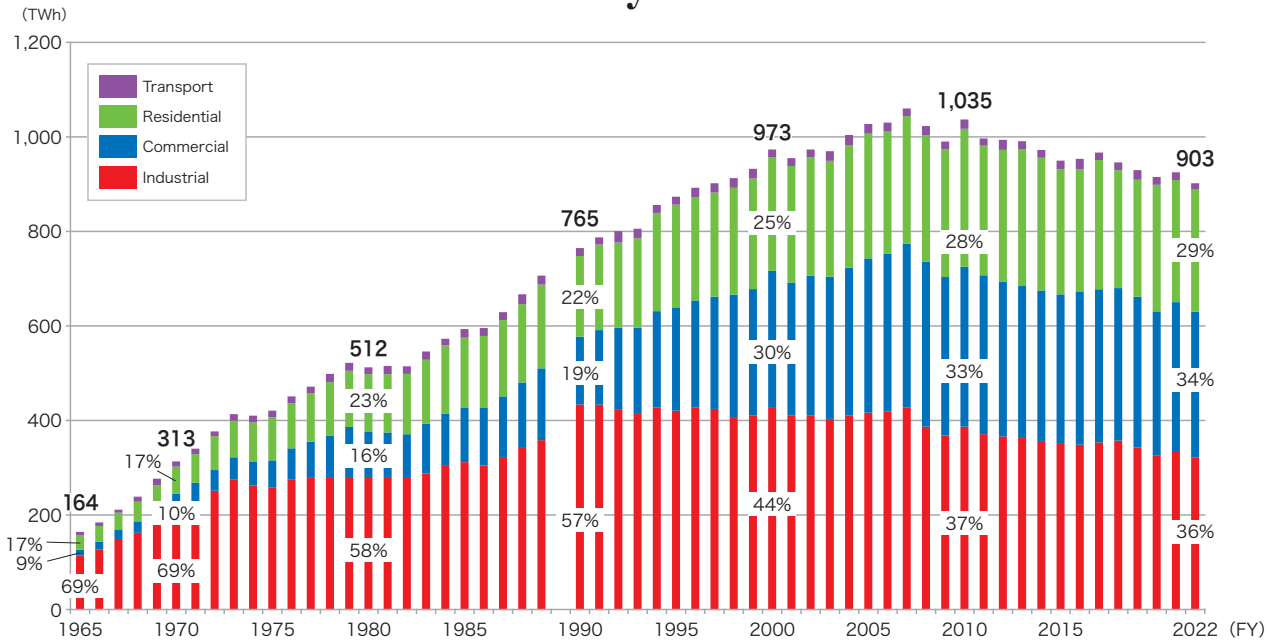
Copyright © 2025 JEPIC. All rights reserved

Electricity Supply and Demand

JEPIC

- **Japan's total electricity demand has shown steady increase until 2011 (the year of the Great East Japan Earthquake).**
- **Electricity demand has been declining moderately in recent years, especially in industrial sector, due to slow economic growth, improved energy conservation and demographic decline.**

Electricity Demand



Source: METI, "FY2023 Annual Report on Energy"

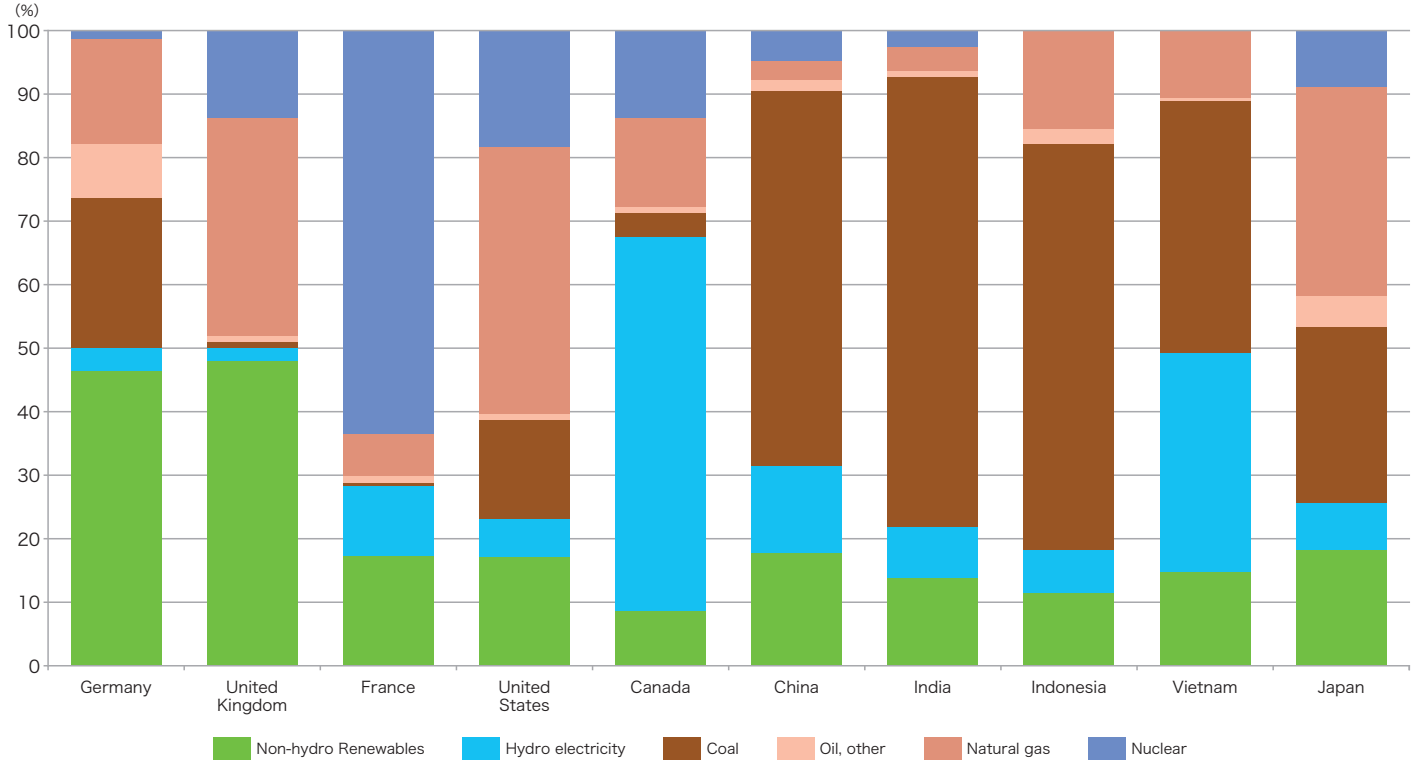
Copyright © 2025 JEPIC. All rights reserved

Electricity Supply and Demand

JEPIC

- Japan's total electricity generation: 945TWh (2023)
- Renewables: 26% (Non-hydro: 18%, Hydro: 8%), Coal 28%, Natural Gas: 33%, Oil and other fossil: 5%, Nuclear 9%

Electricity Generation Mix in each Country (2023)



Source: U.S. EIA, International

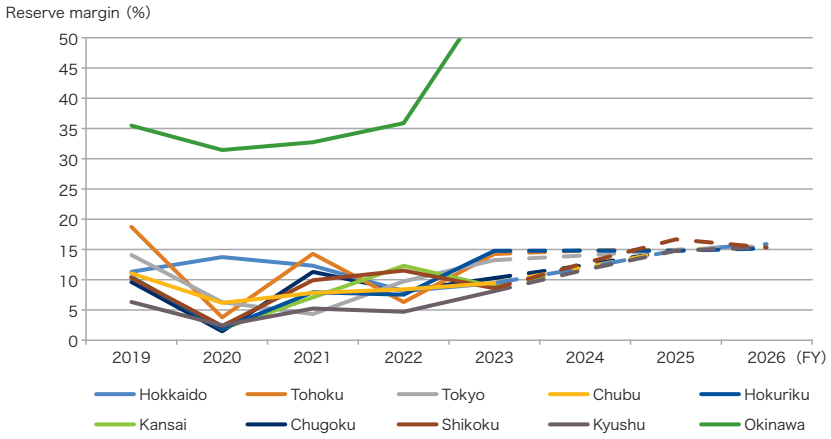
Copyright © 2025 JEPIC. All rights reserved

Electricity Supply and Demand

JEPIC

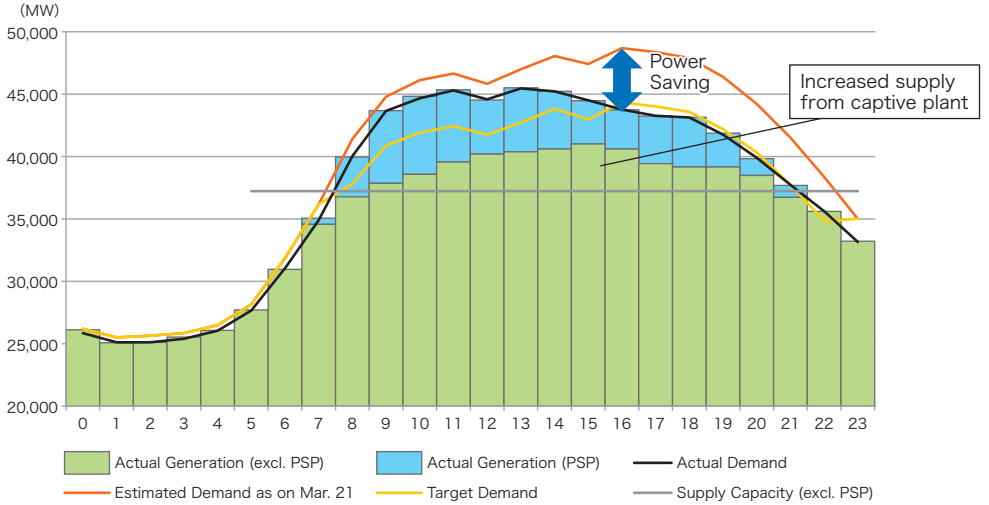
- Reserve margin (RM) between electricity supply and demand has been consequently tight after the Earthquake in 2011.
- RM became tight in Jan. 2021 due to high demand, LNG shrinkage
- The Government issued an electric supply warning by abnormal weather event despite the non-high demand period in 2022
- RM is anticipated to be improved due to new plant operation

Reserve margin (Winter)



Source: Data from OCCTO, “Annual Report”, each year

Power Saving correspond to Warning in Tokyo area (Mar. 22, 2022)



Source: ANRE, Mar. 25, 2022

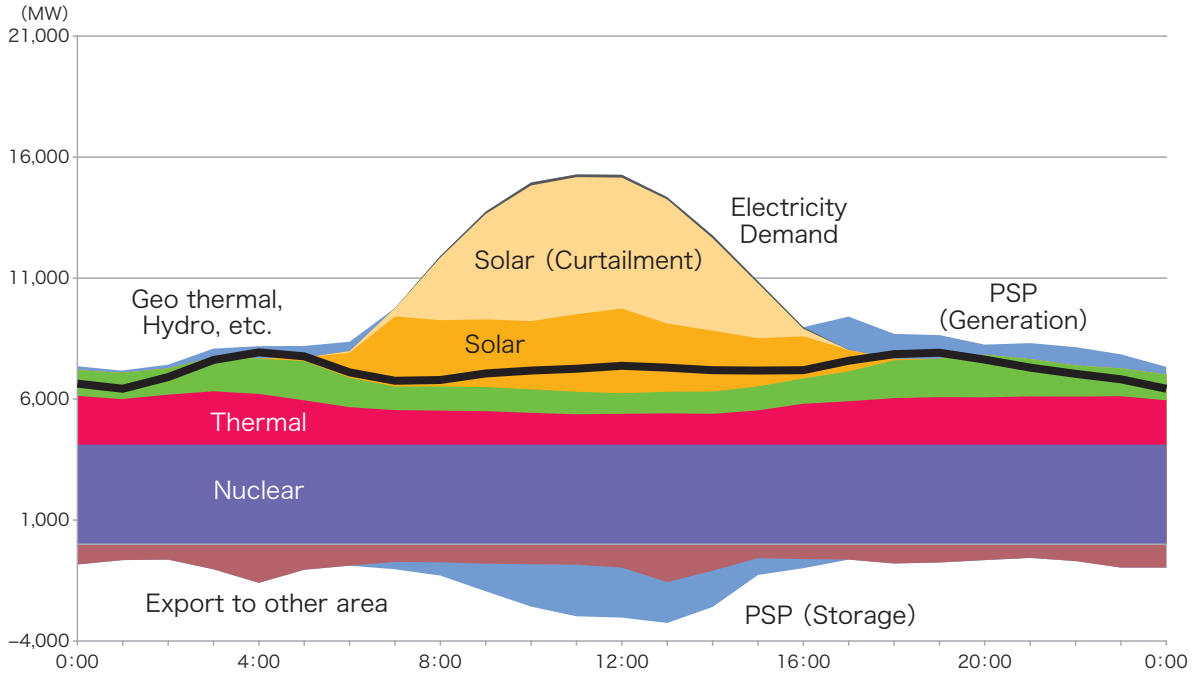
Copyright © 2025 JEPIC. All rights reserved

Electricity Supply and Demand

JEPIC

- Increase of solar power generation changes electricity supply mix.
- Electricity from solar power is used for pumping operation of PSP during daytime, and stored power is released after evening.
- In case of little demand, solar power generation is curtailed.

Demand and Solar Power Generation Curtailment in Kyushu area (May 3, 2023)



Source: METI, “FY2023 Annual Report on Energy”

Copyright © 2025 JEPIC. All rights reserved

Electric Power Facilities

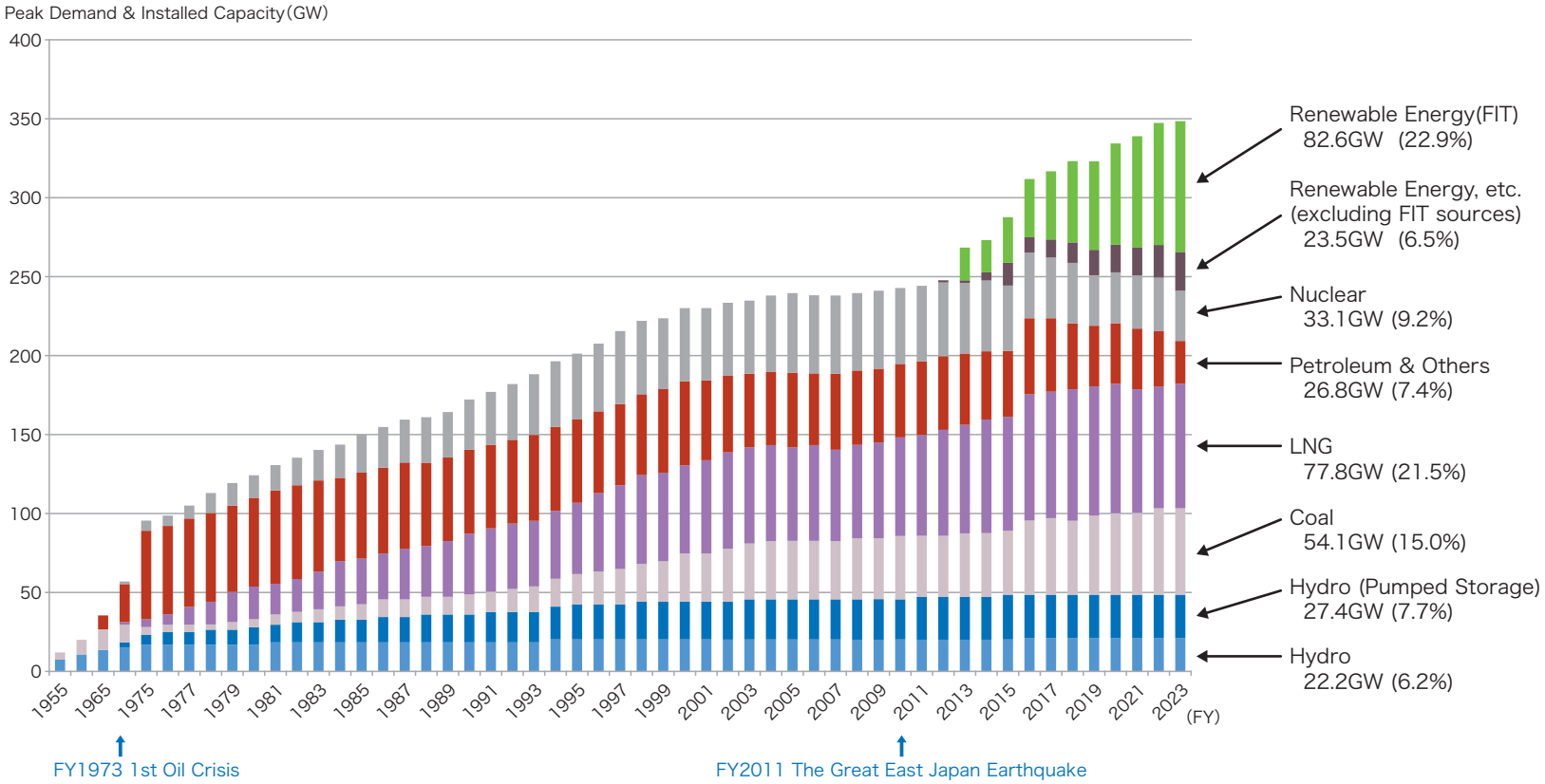
Copyright © 2025 JEPIC. All rights reserved

Installed Generating Capacity

JEPIC

■ **Since the oil crisis in 1973, other sources have been developed as alternative energy sources in an effort to shift from oil.**

10 EPCos and Wholesale Electric Utilities



Source:The Feceration of Electric Power Companies of Japan

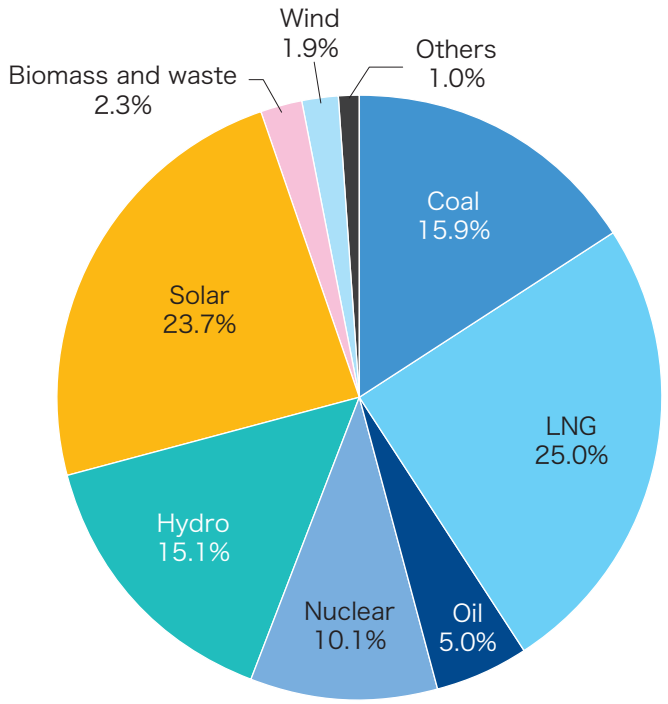
Copyright © 2025 JEPIC. All rights reserved

Coal Power Reduction

JEPIC

- In recent years, the operating rate of thermal power generation has been declining as a result of the increase in renewable energy generation.
- The Government of Japan intends to phase out inefficient coal-fired power plants by 2030 as a part of climate strategies.
- Starting in fiscal year 2023, a new benchmark standard specifically for coal-fired power generation has been introduced under the Energy Conservation Act.(power efficiency 43%)

Commercial Power Generation Facilities by Source(FY2024)



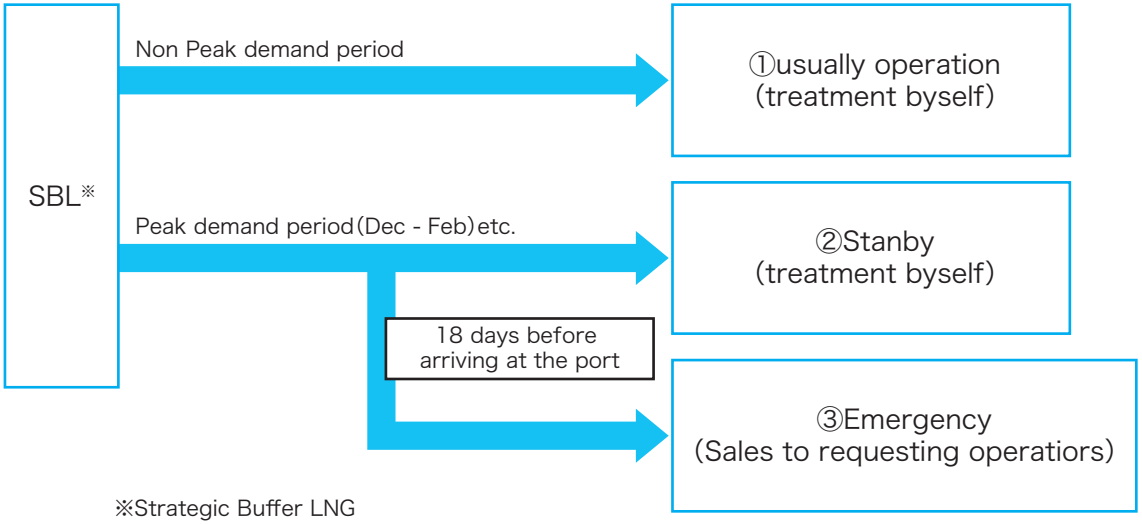
Source: OCCTO

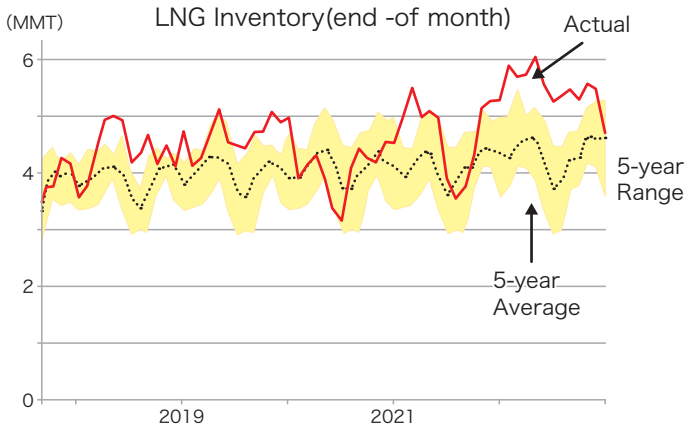
Copyright © 2025 JEPIC. All rights reserved

Energy Security and LNG Resilience

JEPIC

- It is essential to maintain the supply-demand balance through thermal power generation to enable the large-scale introduction of renewable energy.
- 7th Strategic Energy Plan identifies CCUS and carbon recycling as important technologies. Power companies have conducted demonstration experiments using NH_3 or H_2 for decarbonization.
- As Japan relies heavily on LNG imports, it introduced the SBL Mechanism in November 2023 to mitigate energy security risks.





Source:JOGMEC

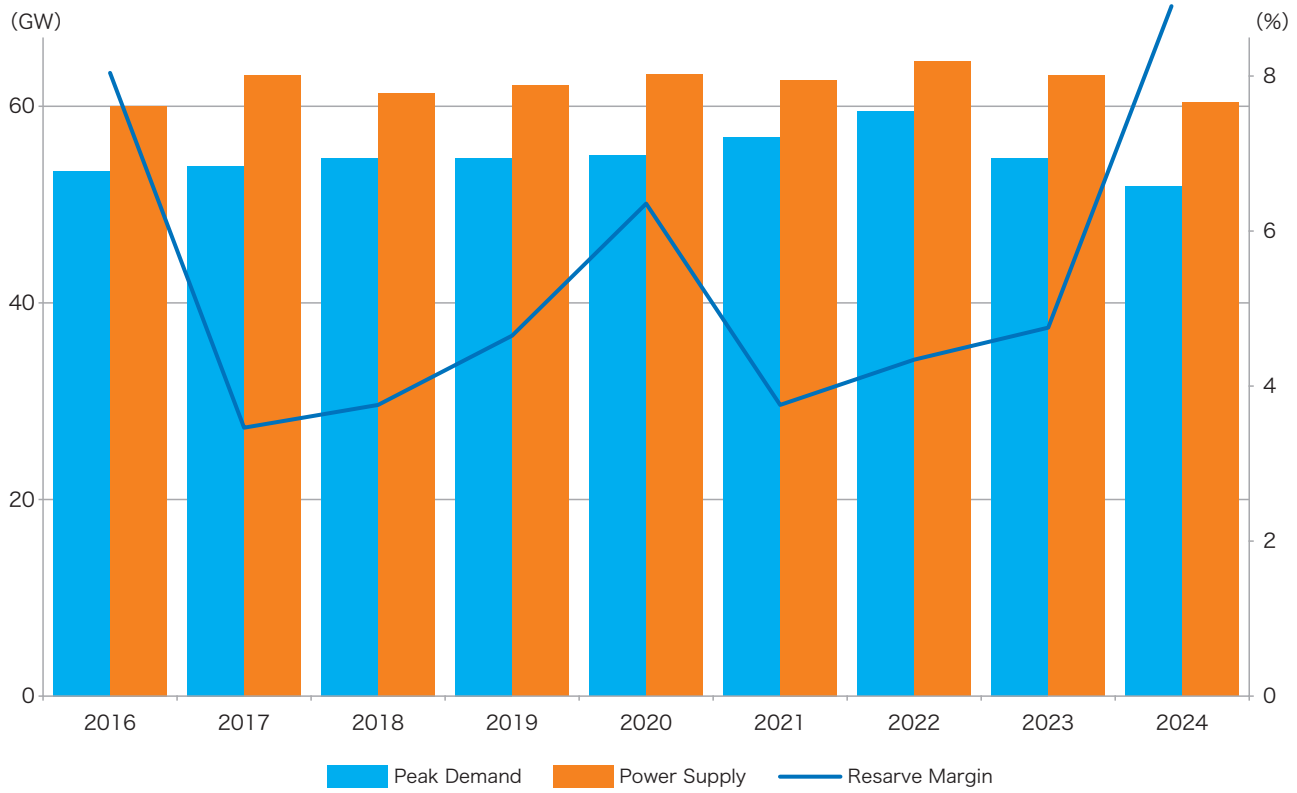
Copyright © 2025 JEPIC. All rights reserved

Power Supply Balance and Reserve Margin

JEPIC

- In TEPCO's service area, there have been multiple years in which the reserve margin fell below 4%.
- The reserve margin has been maintained through increased thermal power generation and reducing peak demand.by energy efficiency.

Peak Demand, Power Supply Balance and Reserve Margin (Result) at TEPCO



Source: TEPCO PG

Copyright © 2025 JEPIC. All rights reserved

Transmission & Distribution

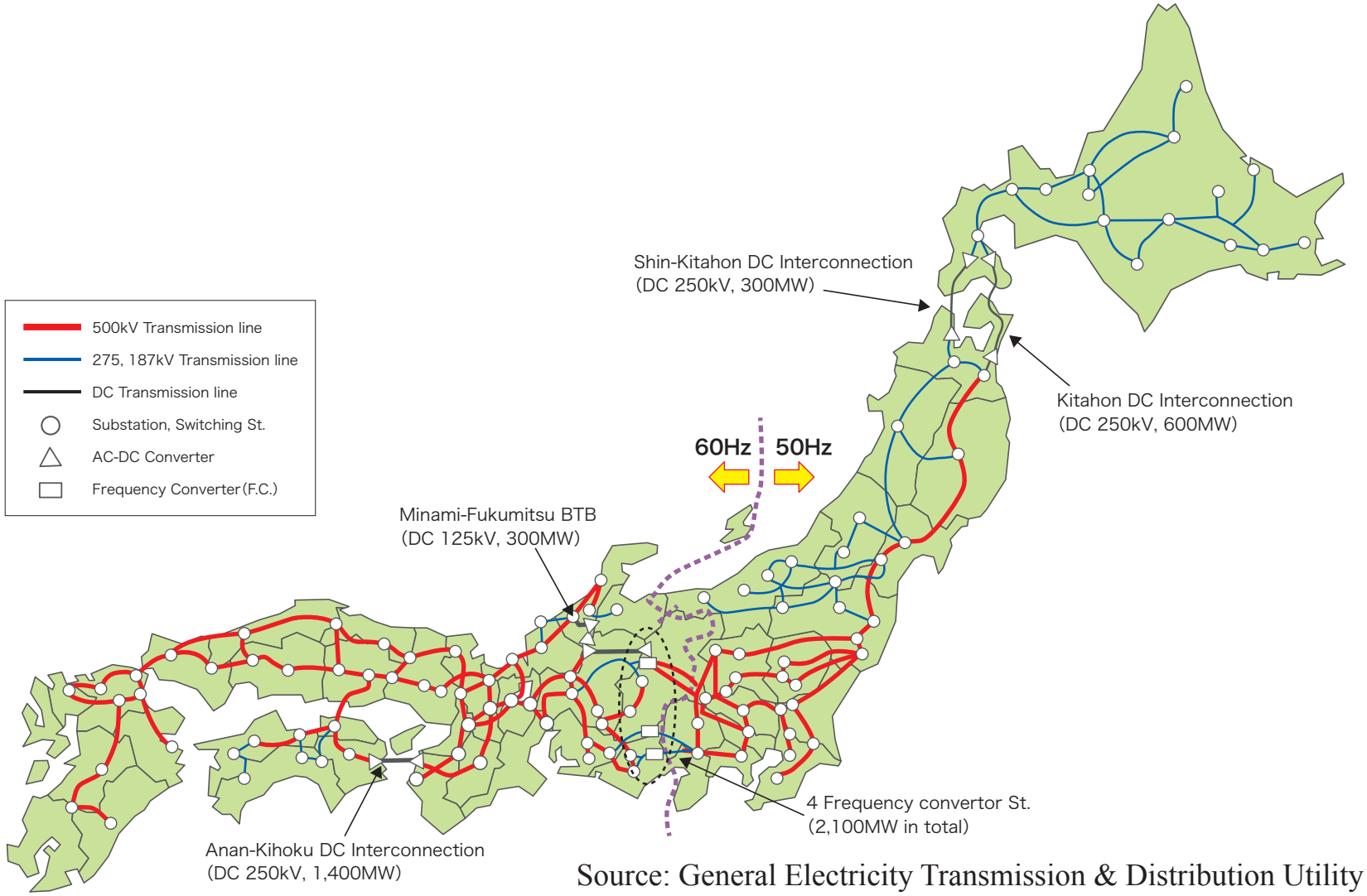
Copyright © 2025 JEPIC. All rights reserved

Bulk Transmission System

JEPIC

■ The grids operated by the 9 power companies are interconnected.

■ Japan's system is operated on two different frequencies.



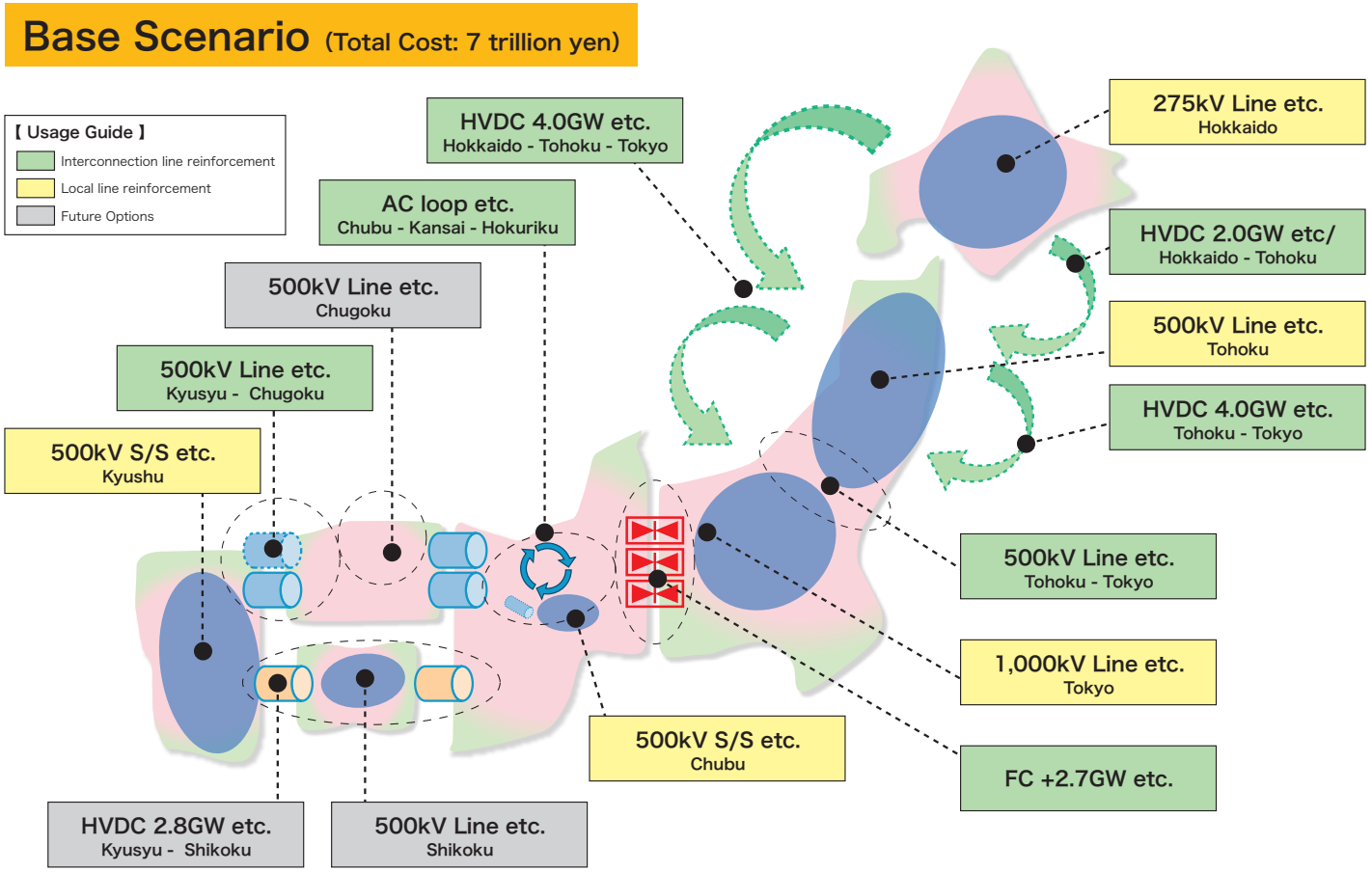
Source: General Electricity Transmission & Distribution Utility Website

Copyright © 2025 JEPIC. All rights reserved

Reinforcement Plan of Transmission Networks

JEPIC

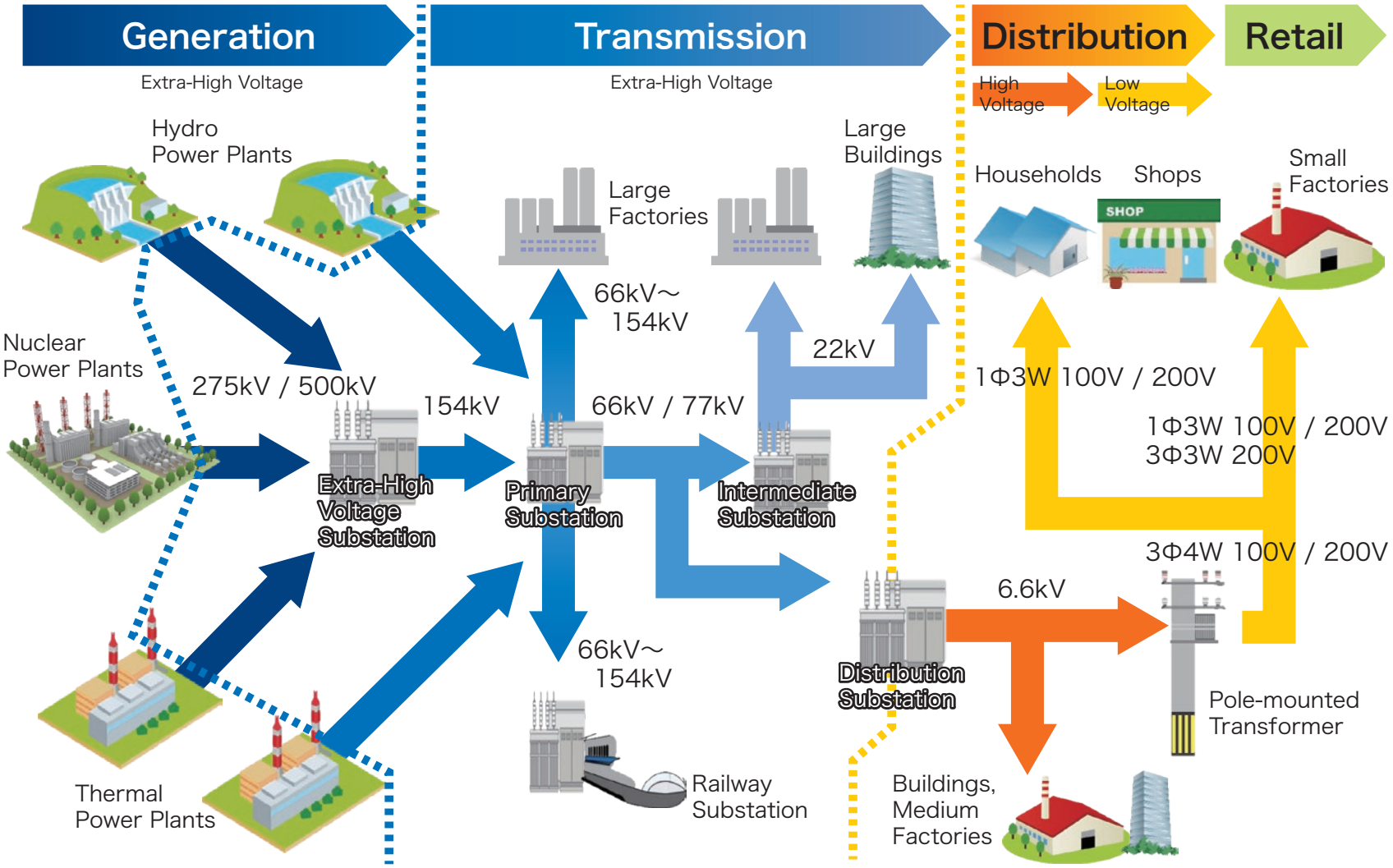
■ **The master plan for the cross-regional interconnection system was formulated by OCCTO in March 2023 in order to realize the shift to renewable energy as the main power source and the network system resilience.**



Source: OCCTO, Master plan for the cross-regional interconnection system 2023, p27

Copyright © 2025 JEPIC. All rights reserved

Structure of the Power System



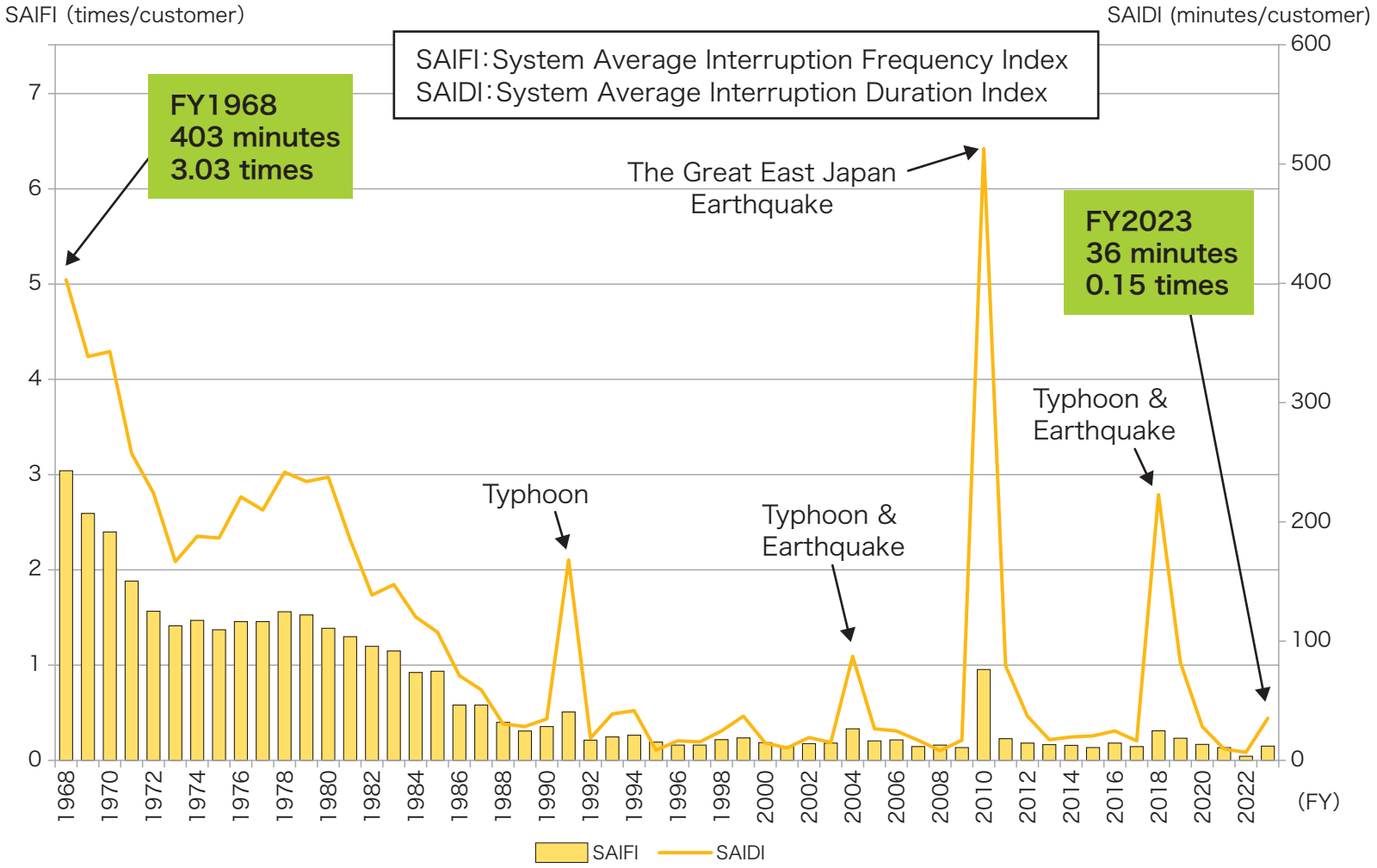
Source: The Federation of Electric Power Companies of Japan, INFOBASE 2024, p10

Copyright © 2025 JEPIC. All rights reserved

Trend of SAIFI and SAIDI

JEPIC

■ **Most blackouts are caused by natural disasters, usually not by facility failures.**



Source: The Federation of Electric Power Companies of Japan, INFOBASE 2024, p26

Copyright © 2025 JEPIC. All rights reserved

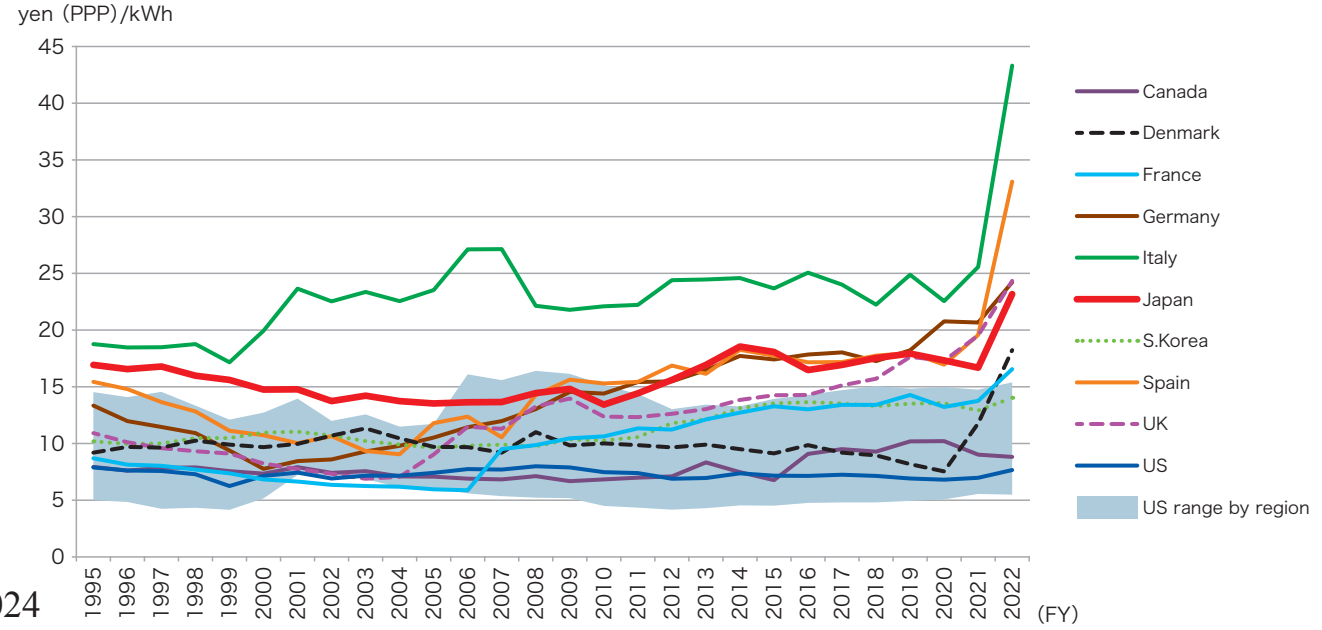
Electricity Rates

Copyright © 2025 JEPIC. All rights reserved

International Comparison of Electricity Prices

JEPIC

- Compared to other major countries, Japan's electricity price (industrial use) is in the middle to upper range, and the impact of the renewable energy surcharge and fluctuations in fuel prices are reflected in the price.
- Europe, electricity prices have risen significantly due to renewable energy surcharges, increases in network costs, and the impact of fuel price hikes caused by the situation in Russia and Ukraine. In Japan, on the other hand, the renewable energy surcharge, the high level of dependence on fossil fuels, and the weakening of the yen have had an impact on electricity prices.



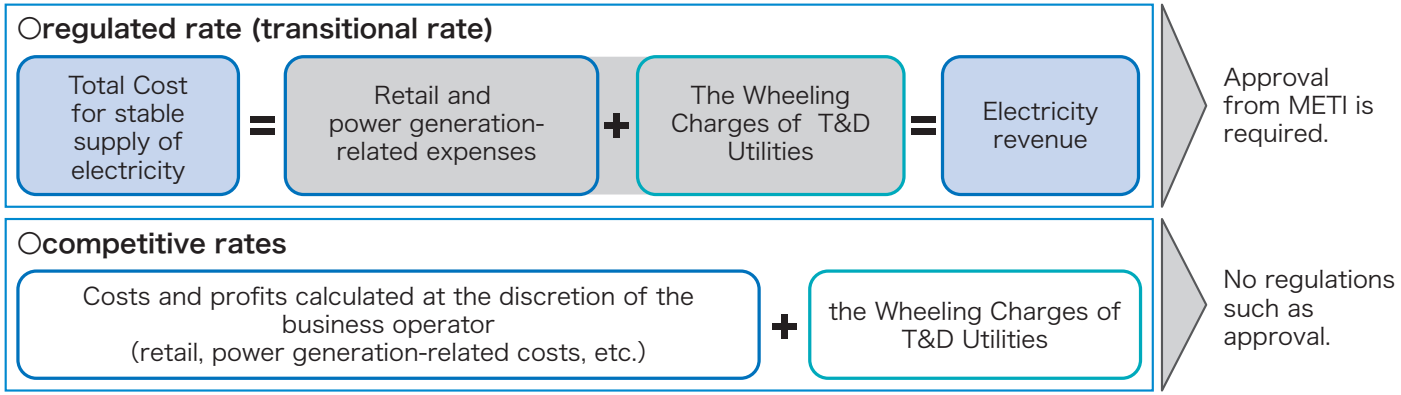
Source: CRIEPI 2024

Copyright © 2025 JEPIC. All rights reserved

Regulated and Liberalized Rates

JEPIC

- **Before the full deregulation of the retail electricity market in 2016, the traditional utilities sold electricity at regulated rates approved by METI, but after the deregulation, new power companies were able to enter the retail electricity market, and competitive rates were introduced. Incidentally, deregulation began in 2000 for extra-high voltage (20kV) users and in 2004 for high voltage (6kV) users.**
- **In order to prevent unregulated monopolies by major electric power companies, regulated rates (transitional rates) remain in place for low-voltage consumers.**
- **The decision to abolish the transitional rates will be made after considering a range of factors, including the level of awareness of electricity deregulation, trends in switching between retail electricity providers, and the existence of competitors with a certain market share.**



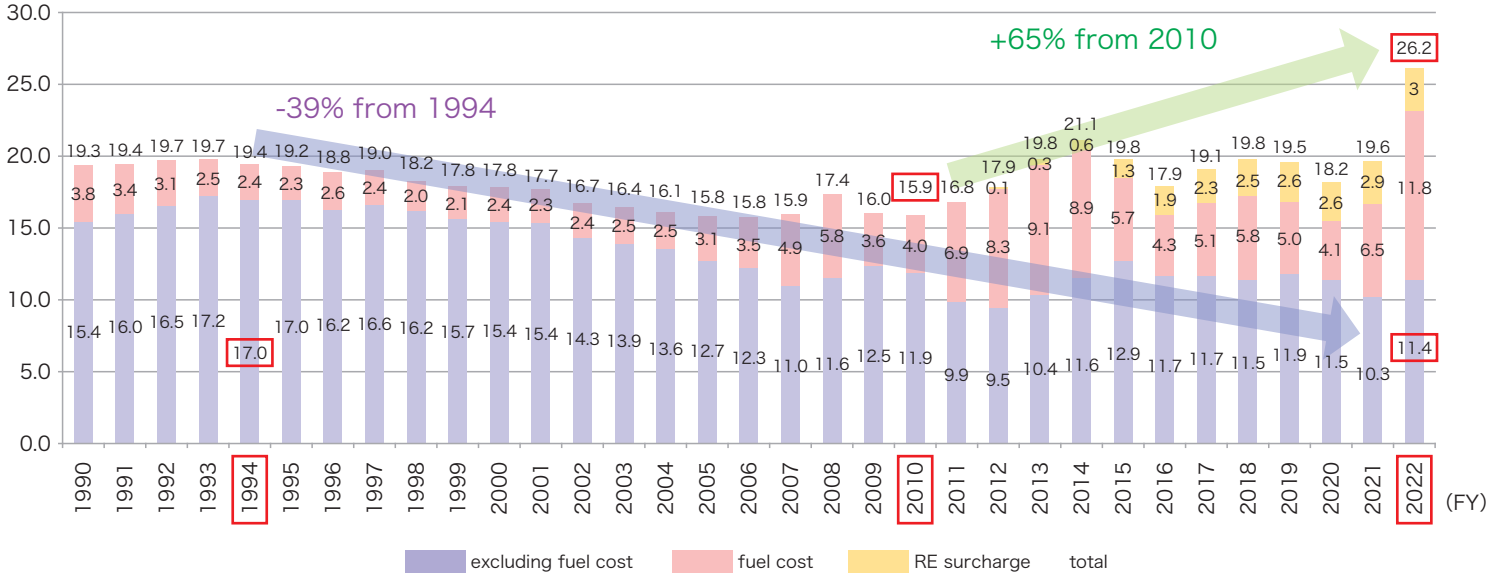
Source: METI HP

Copyright © 2025 JEPIC. All rights reserved

Trends in Price Levels and Surcharges

JEPIC

- After a sharp rise in electricity prices in the 1970s due to the oil shock, there was a downtrend from the 1990s, but from 2010, due to factors such as increased fuel costs and the introduction of renewable energy surcharges, there has been a rise in electricity prices, and by 2022, they had reached +65% compared to 2010.
- The portion excluding fuel costs and the renewable energy surcharge fell by 39% compared to 1994.



Source: METI HP

Copyright © 2025 JEPIC. All rights reserved

Nuclear Power

Copyright © 2025 JEPIC. All rights reserved

Role of Nuclear Power in 7th Strategic Energy Plan

JEPIC

■ **In the Seventh Strategic Energy Plan, Japan will maximize the use of decarbonized power sources such as renewable energy and nuclear power.**

■ **Key points in the plan:**

- Replacement of decommissioned nuclear power plants[*1],

  *1 It is possible to replace next-generation advanced reactors within the site of nuclear power plants owned by operators that have decided to decommission them.

- Up to 60-year operation[*2&3],

  *2 Recovery of inoperable years after 2011 due to legistrative changes, administrative orders, court order for provisional suspension.
  *3 New rule for safety review for extension in every 10 years after 30 years of initial operating license.

- New electricity demand of data centers and semiconductor factories,
- Expediting plant restarts (Recently restarted: two BWRs),
- Promoting R&D of next-generation reactors.

Source: METI, 7th Strategic Energy Plan 2025; Tohoku & Chugoku Electric Power Co., Inc. 2025

Onagawa Unit 2 (BWR)

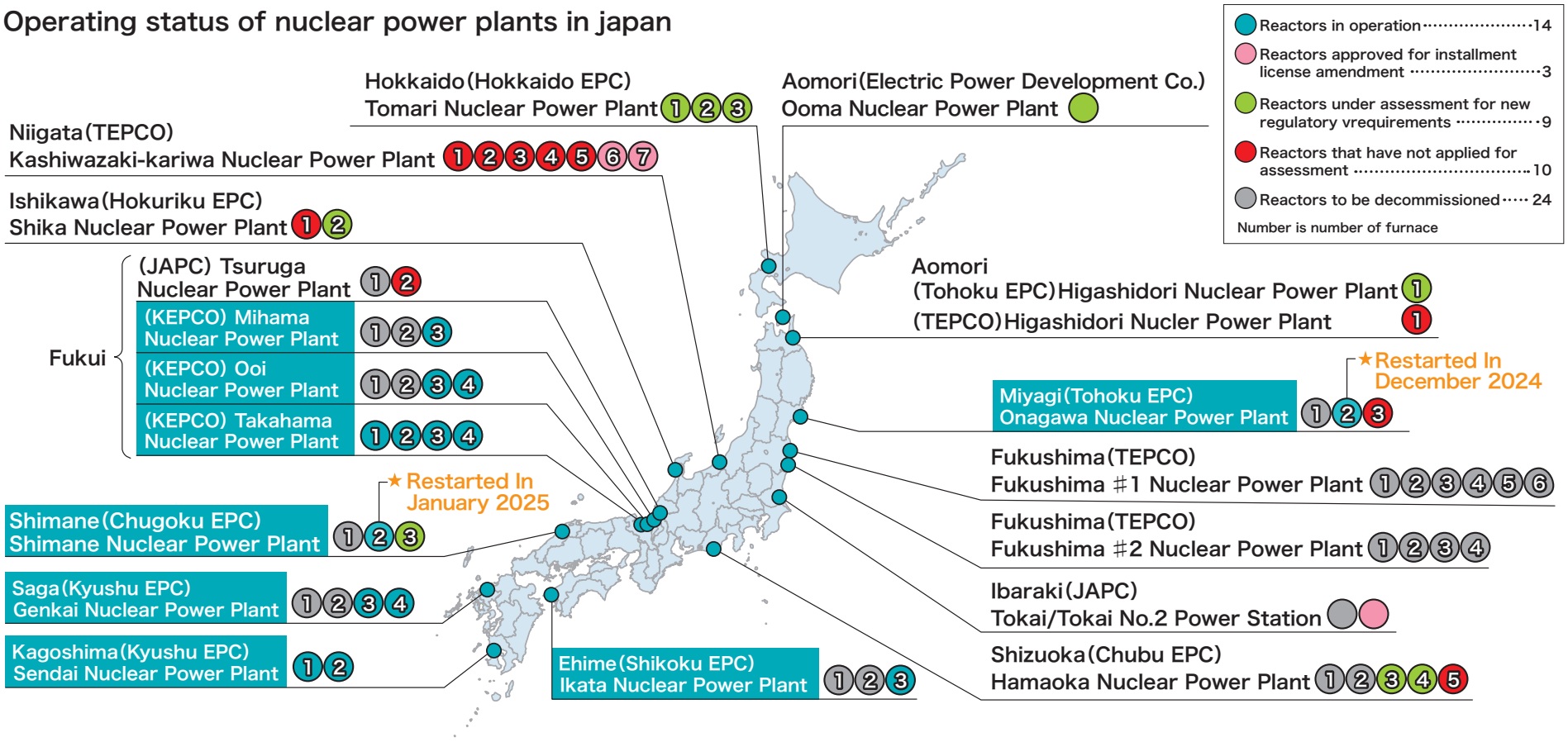
Shimane Unit 2 (BWR)

Copyright © 2025 JEPIC. All rights reserved

Recent BWR Restarts and Nuclear Power Plant Status

JEPIC

■ As of January 2025, 14 nuclear power plants, including two recently restarted BWRs, are in operation nationwide.



Source: METI, JAPAN'S ENERGY 2024
Note: Reflects the status as of 2025

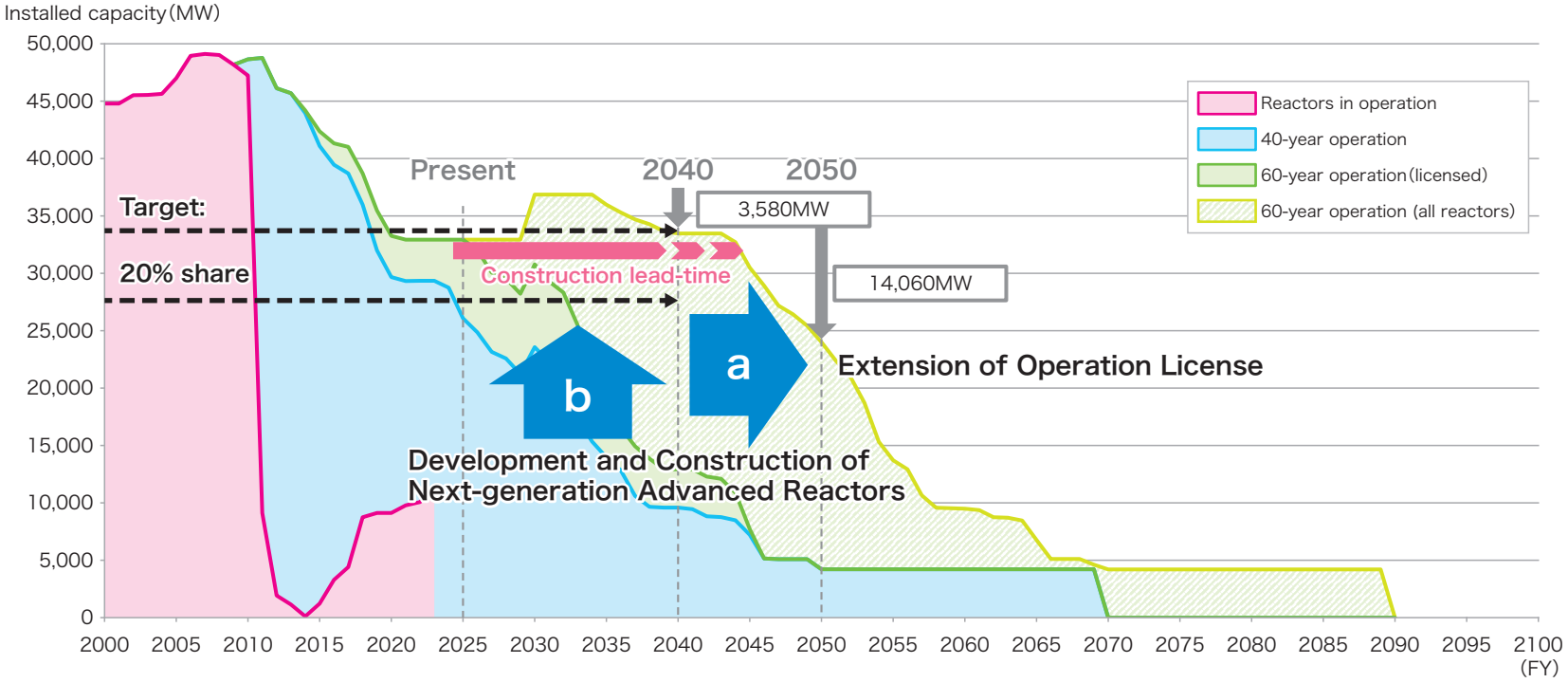
Copyright © 2025 JEPIC. All rights reserved

Nuclear Capacity toward 2050 and beyond

JEPIC

■ **The 7th Strategic Energy Plan aims to achieve a 20% share of nuclear power generation in the power mix by 2040.**

a. Extension of operation license,
b. Development and construction of next-generation advanced reactors.



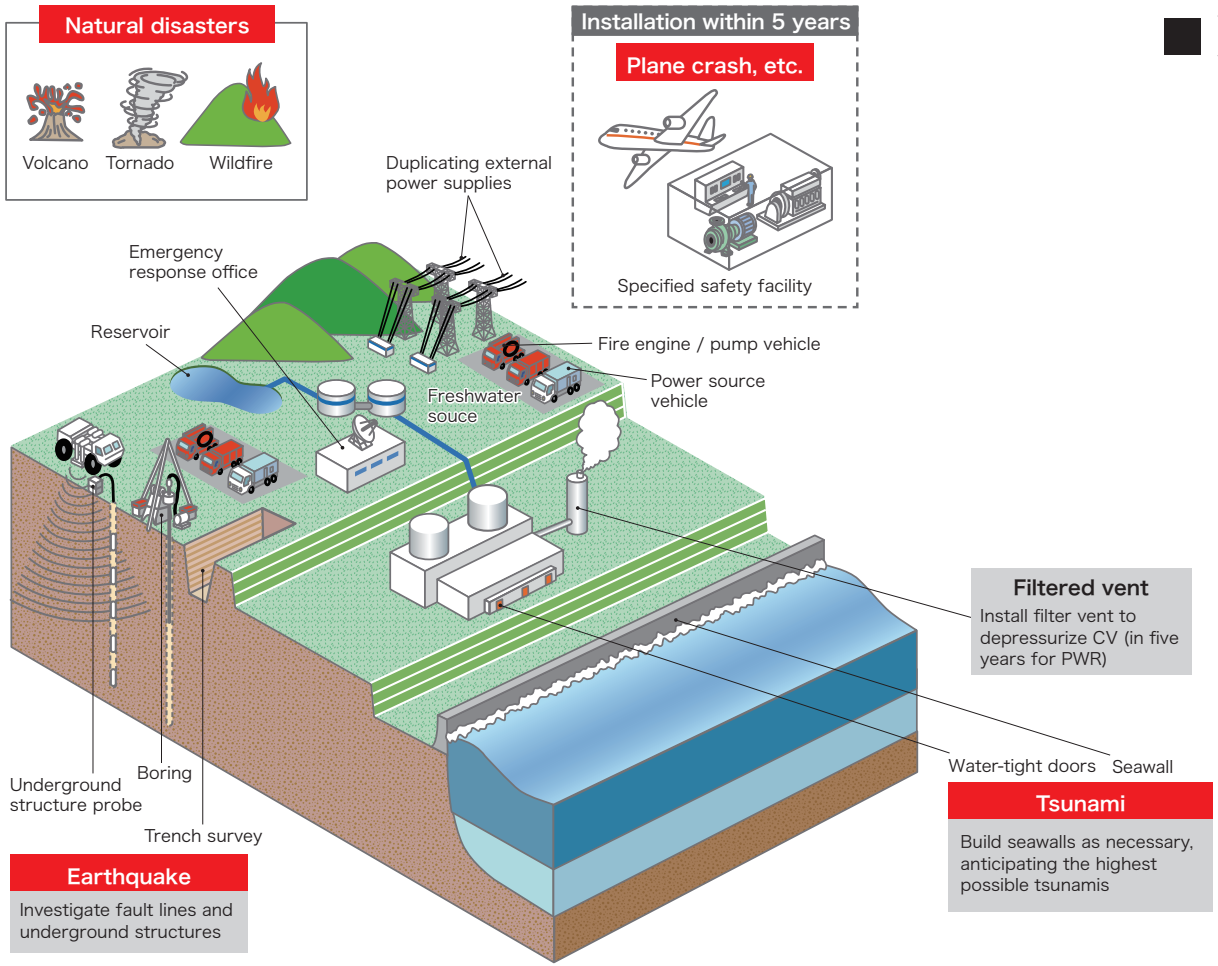
Source: METI, Efforts towards Practical Application of Next-Generation Advanced Reactors in Japan 2024

Copyright © 2025 JEPIC. All rights reserved

Safety Measures by New Regulatory Requirements

JEPIC

■ **The Great East Japan Earthquake in 2011 caused the nuclear accident at Fukushima Daiichi, releasing radioactive materials.**



■ **In response, electric power companies have implemented extensive safety measures to protect against natural disasters (e.g. volcano, tornado), airplane crashes, earthquakes, and tsunamis.**

Source: FEPC, ELECTRICITY REVIEW JAPAN 2024

Copyright © 2025 JEPIC. All rights reserved

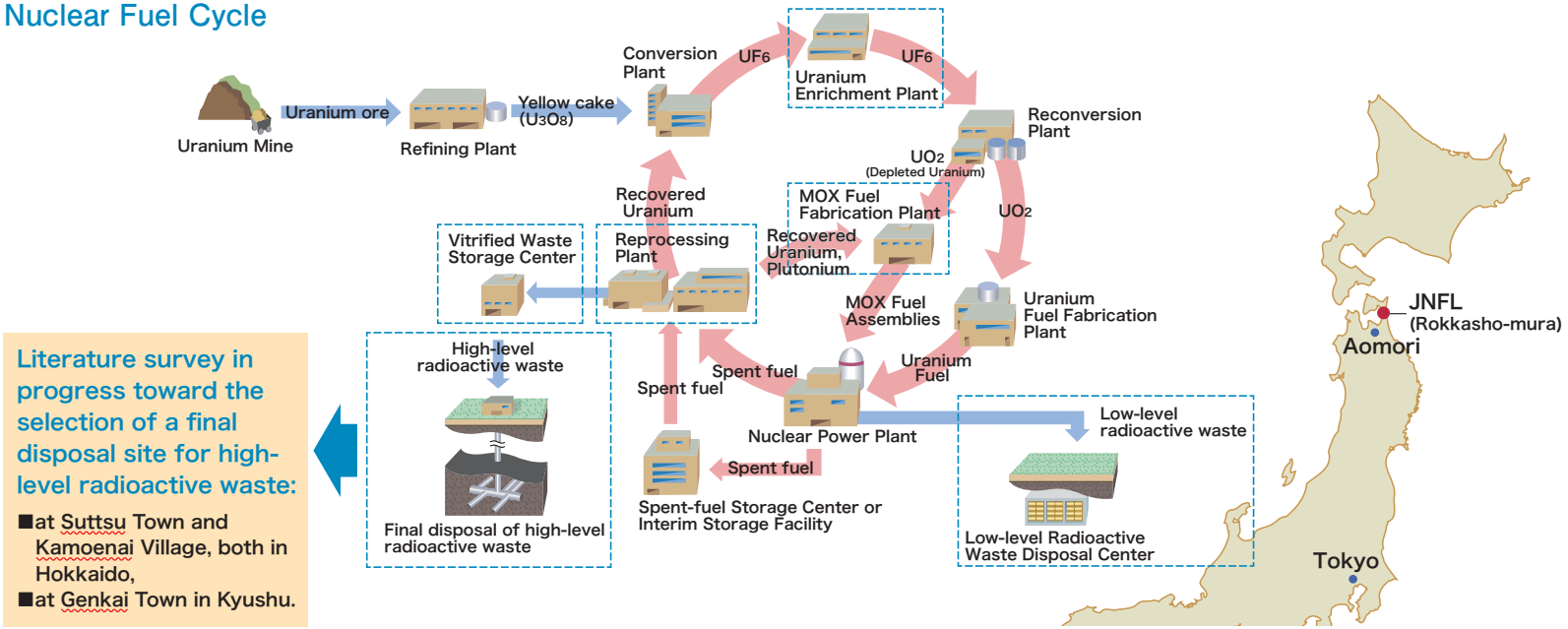
Japan's Nuclear Fuel Cycle

JEPIC

Outline of JNFL's Nuclear Fuel Cycle Facilities (as of August, 2024)

Facility	Reprocessing Plant	MOX fuel fabrication plant	Vitrified waste storage center	Uranium enrichment plant	Low-level radioactive waste disposal center
Site	Iyasakatai, Rokkasho, Kamikita-gun, Aomori Prefecture			Ooishitai, Rokkasho, Kamikita-gun, Aomori Prefecture	
Capacity	Maximum capacity: 800 ton-U/year Storage capacity for spent fuel: 3,000 ton-U	Maximum capacity: 130 ton-HM/year (*)	Storage capacity for wastes returned from overseas plants: 2,880 canisters of vitrified waste	Design capacity 1,500 ton-SWU/year (*)	Planned to be expanded to 600,000m³ (equivalent to 3 million of waste drums)
Current Status	Under construction	Under construction	Cumulative number of received canisters:1,830	In operation using the new centrifuge	Cumulative number of received drums: about 334,235
Schedule	Start of construction: 1993 Completion of construction: The earliest possible date in **FY2026 (planned)**	Start of construction: 2010 Completion of construction: **FY2027 (planned)**	Start of construction: 1992 Start of storage: 1995	Start of construction: 1988 Start of operation: 1992	Start of construction: 1990 Start of operation: 1992

Nuclear Fuel Cycle



Literature survey in progress toward the selection of a final disposal site for high-level radioactive waste:

- at Suttsu Town and Kamoenai Village, both in Hokkaido,
- at Genkai Town in Kyushu.

Source: FEPC, ELECTRICITY REVIEW JAPAN 2024
Note: Reflects the status as of 2025

Copyright © 2025 JEPIC. All rights reserved

Next-Generation Advanced Reactors

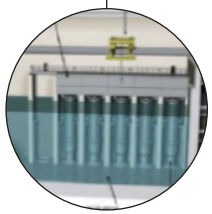
JEPIC

■ The GX Promotion Strategy plans to develop and construct next-generation advanced reactors with new safety mechanisms.

SMR

A reactor with an output of 300 MW or less

*Commercial operation in 2040s



HTGR

A reactor that generates high-temperature heat of up to 950°C

*Demonstration reactor's operation in 2030s

Advanced LWR

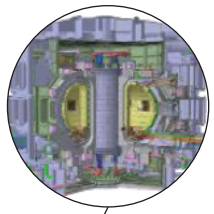
An LWR based on the conventional LWR (PWR and BWR) but with enhanced safety

*Commercial operation in 2030s

Fast reactor

A reactor in which high-speed neutrons sustain the nuclear fission chain reaction

*Demonstration reactor's operation in 2040s



Nuclear Fusion

A reactor in which heat is generated by nuclear fusion reactions, not nuclear fission

*Fabrication & construction in 2030s and 2040s

Source, METI, Efforts towards Practical Application of Next-Generation Advanced Reactors in Japan 2024

Copyright © 2025 JEPIC. All rights reserved

Renewable Energy

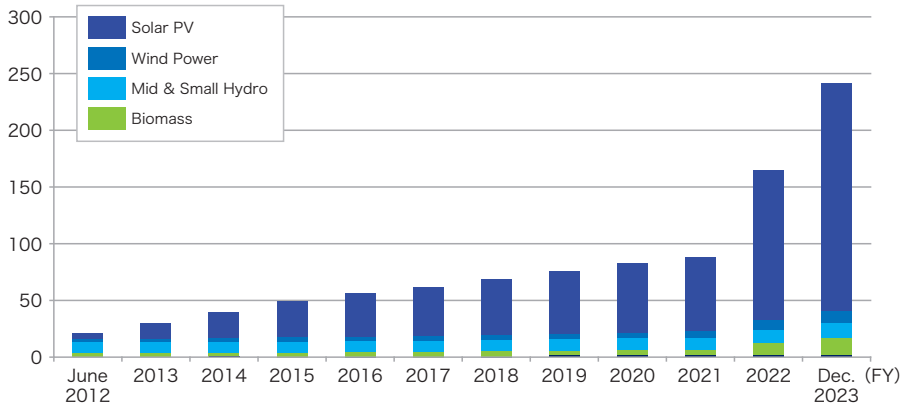
Copyright © 2025 JEPIC. All rights reserved

Installed Capacity of Renewable Energy

JEPIC

- Since the FIT(from July 2012) scheme was introduced, the installed capacity of Renewable Energy (RE) has increased rapidly.
- But at the same time, RE surcharge rate is also getting more expensive.
- In 2022, the electricity market price soared reflecting the fossil fuel price hike. As avoidable cost was linked to the market price, the renewable energy surcharge for 2023 was temporarily decreased.
- The surcharge for ordinary households in 2024 is approx.*$110/year (*16,752 JPY/year)

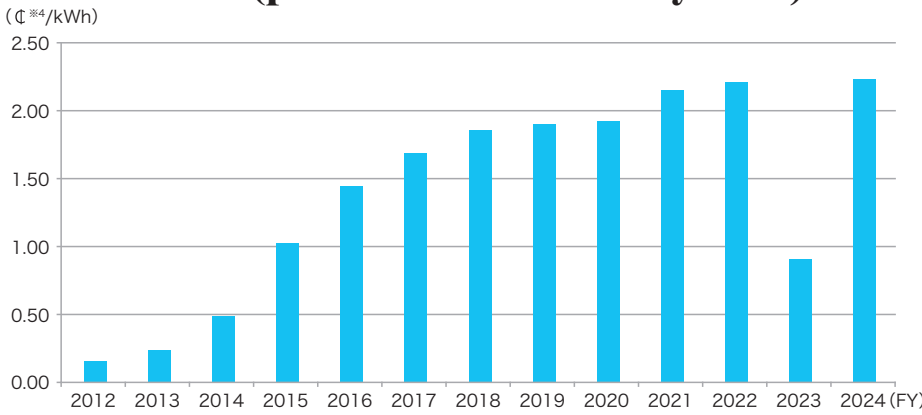
Installed Capacity of RE ※1



※1 Limited to FIT/FIP certification.
※2 There was a rush installation of FIT before the start of FIP(from April 2022).

Source: METI, FIT/FIP installation capacity, 2024

Renewable Energy Surcharge ※3 (per unit of electricity sold)



※3 The Surcharge = $\frac{\text{(purchase cost – Avoidable cost) + Administrative Expenses}}{\text{Predict amount of Electricity demand}}$

※4 $1 = 150 yen

Source: METI, Renewable Energy Surcharge, 2024

Copyright © 2025 JEPIC. All rights reserved

The FIT and FIP Schemes

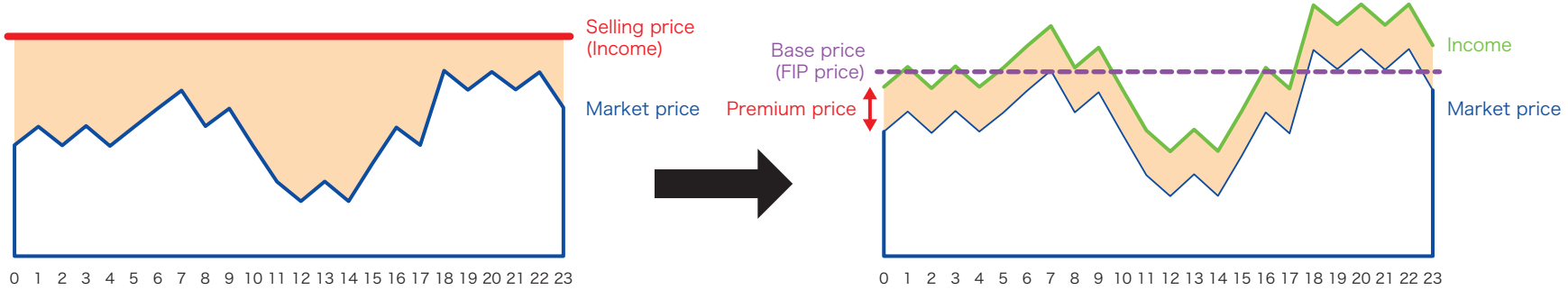
JEPIC

FIT (Feed-in Tariff): 2012~

- **Mandatory purchase by utilities:**
  Electric utilities are obligated to purchase renewable electricity at a fixed price for a specified period.
- **Stable revenue for producers:**
  Power producers receive a guaranteed income regardless of market fluctuations.
- **Lack of market incentive:**
  There is no motivation to sell more during peak demand periods since the selling price is fixed.

FIP (Feed-in Premium): 2022~

- **No mandatory purchase:**
  Power producers must find their own buyers or sell electricity on the power market.
- **Premium added to market price:**
  In addition to the market price or negotiated sale price, a fixed or market-linked premium is provided.
- **Encourages market-oriented behavior:**
  Producers are incentivized to sell more during high-price periods, promoting better supply-demand balancing.



Source: METI, The FIT/FIP schemes, 2021

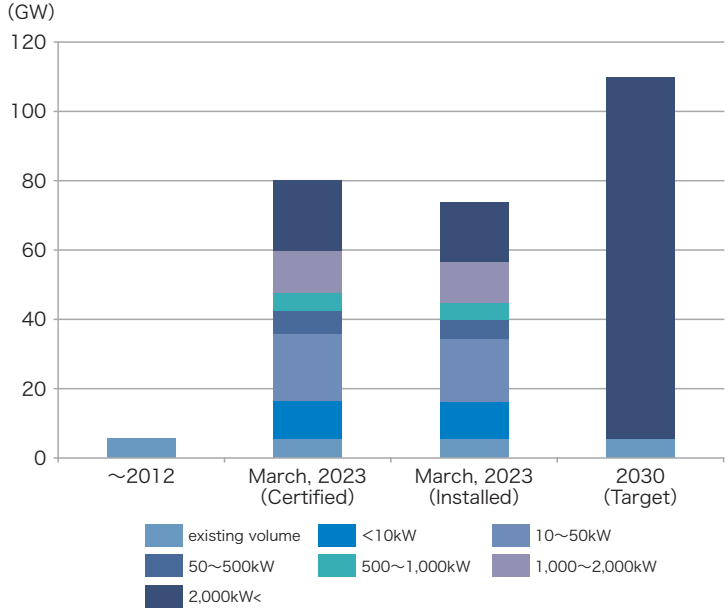
Copyright © 2025 JEPIC. All rights reserved

Solar Power

JEPIC

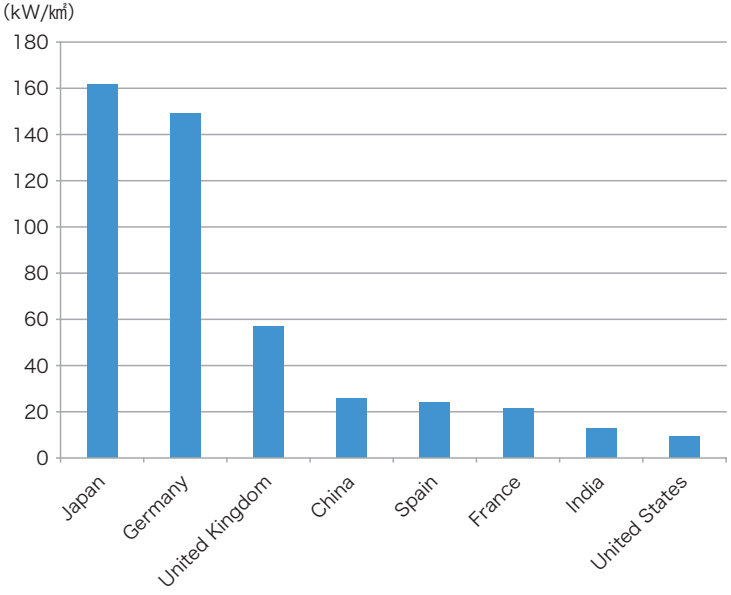
- As of Mach 2023, the installed solar power capacity in Japan has reached 70 GW (80 GW including FIT/FIP certified yet).
- Japan ranks first among major countries in terms of installation per land area.
- However, the introduction of large-scale solar power is slowing down due to a decrease in suitable sites and a decline in FIT/FIP prices.
- Based on the 7th Strategic Energy Plan, the government aims to achieve the adoption of 20 GW of perovskite solar cells by 2040.

Solar Power Installation (FIT/FIP)



Source: METI, Solar Power Installation (FIT/FIP) , 2024

Solar power capacity per land area



Source: METI, Solar Power Capacity, 2020

Copyright © 2025 JEPIC. All rights reserved

Fixed-bottom Offshore Wind

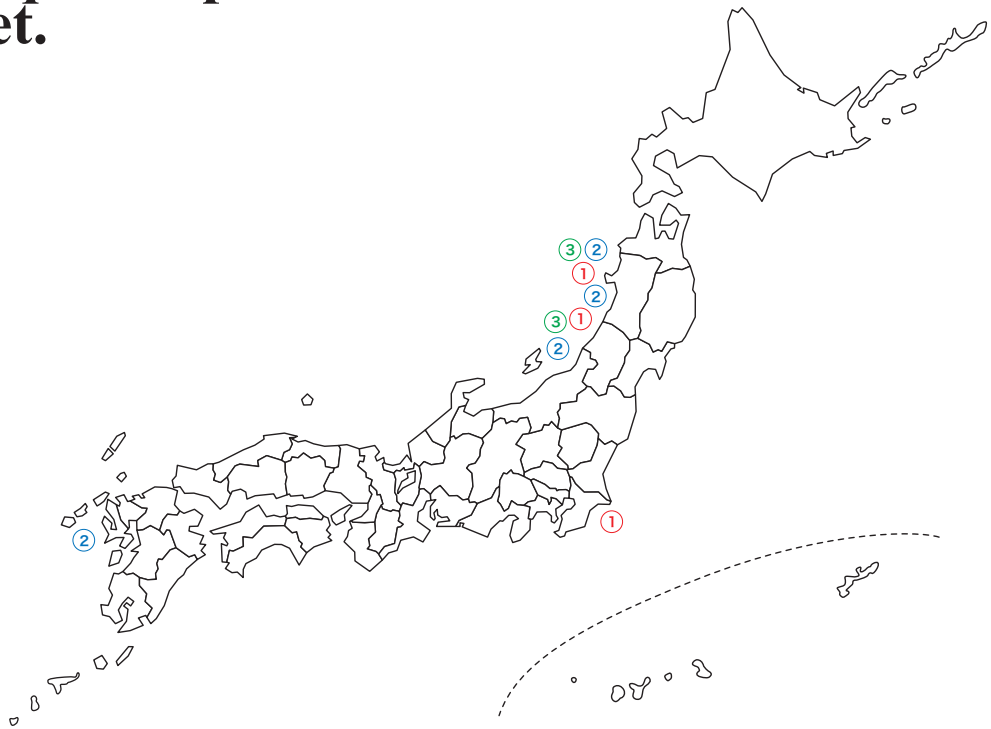
JEPIC

- Installed capacity has reached 250 MW as of 2025.
- The government targets: 10 GW (2030), 30–45 GW (2045)
- Three rounds of sea area auctions have been held in territorial waters and internal seas.
- From the second round, low-price bids without subsidies were submitted.
- Introduction of the FIP scheme and setting of minimum bid prices led to increased competition and required producers to secure revenues via PPAs and the capacity market.

Auction Results Summary

	1st round①	2nd round②	3rd round③
Total Scale	1,688.4MW	1,779MW	1,065MW
Supply Price	$79.93 ～109.93 / MWh	$0.2 ～147.87 / MWh	$0.2 / MWh
FIT/FIP	FIT	FIP	FIP
COD	2028.9 ～ 2030.12	2028.6 ～ 2029.8	2030.6

Source: METI, Press Release, 2021~2024

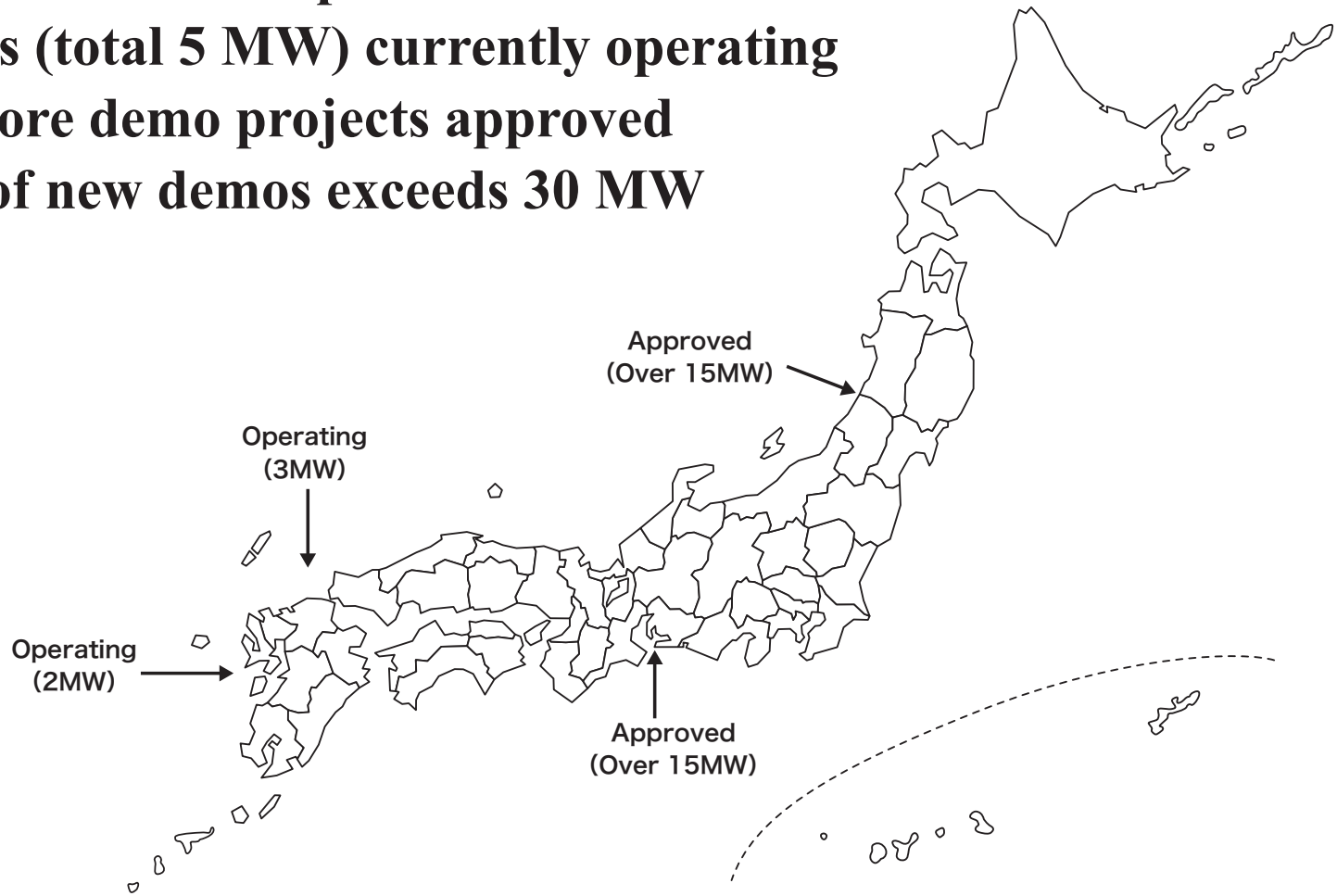


Copyright © 2025 JEPIC. All rights reserved

Floating Offshore Wind

JEPIC

- In 2021, a public-private council set out “ Roadmap for Technology Development to improve the Industrial Competitiveness of Offshore Wind Energy”.
- No commercial turbines in operation as of 2025
- 2 demo turbines (total 5 MW) currently operating
- June 2024: 2 more demo projects approved
- Total capacity of new demos exceeds 30 MW



Copyright © 2025 JEPIC. All rights reserved

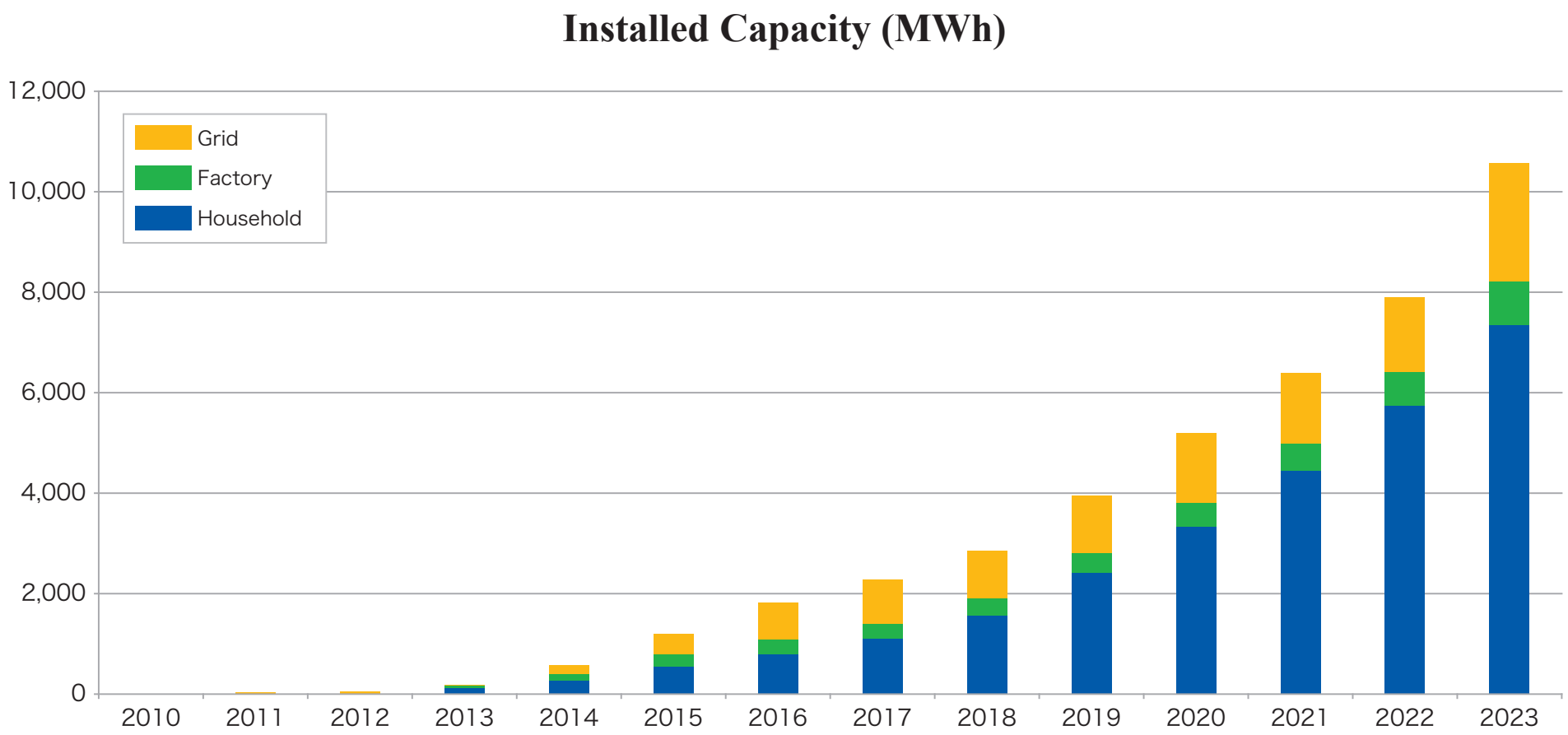
Battery Storage

Copyright © 2025 JEPIC. All rights reserved

Battery Storage

JEPIC

■ **As of 2025 Jan, installed capacity of battery storage is over 321 MW / 10,000 MWh.**



Source: METI, "Summary of the Results of the Study Group on Expanding the Use of Energy Storage Systems for Stationary Use in FY2024 (Draft)", 2025

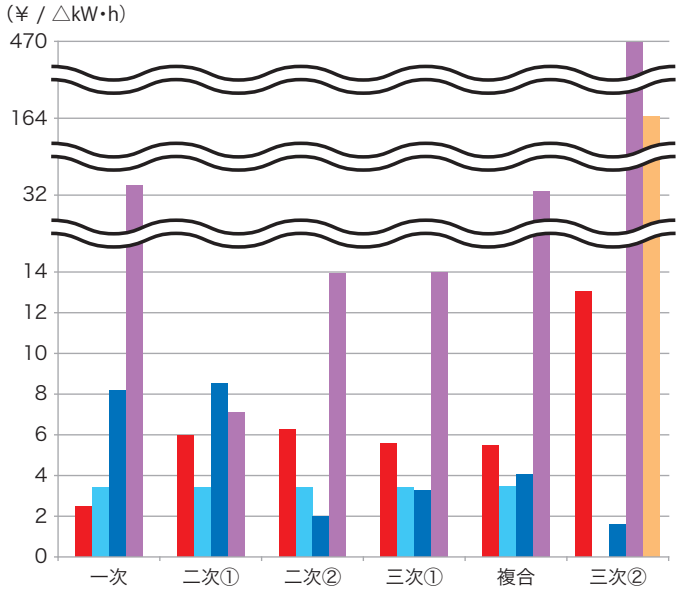
Copyright © 2025 JEPIC. All rights reserved

Battery Storage

JEPIC

- To clarify the legal status of grid-connected storage batteries, the Electricity Business Act was revised in 2022 to classify storage batteries with a capacity of 10,000 kW or more as “power generation.” At the same time, the revision aimed to establish an environment in which storage batteries can be connected to the grid upon request.
- In the balancing market, batteries have commanded significantly higher prices than other resources. For instance, while the average clearing price for primary reserve was ¥4.38, it reached ¥32.57 for storage batteries — nearly eight times higher.

Clearing Price by Resource (JPYΔkW･h)



	一次	二次①	二次②	三次①	複合	三次②
火力	2.49	5.96	6.28	5.59	5.47	**13.15**
一般水力	3.39	3.42	3.39	3.39	3.39	—
揚水	8.28	8.58	1.92	3.23	4.04	1.55
蓄電池	**32.57**	7.25	14.00	14.00	**32.30**	**469.78**
VPP/DR	—	—	—	—	—	**163.91**
全体	4.38	6.18	5.00	4.95	5.22	9.44
(参考) 上限価格	39.02	39.02	14.42 (単一)	14.42 (単一)	39.02	なし

Source: METI “Current Status and Issues of Grid Storage Batteries”, 2024

Copyright © 2025 JEPIC. All rights reserved

Hydrogen & Ammonia

Copyright © 2025 JEPIC. All rights reserved

Key Concept

JEPIC

■ Highlight of Basic Hydrogen Strategy (issued in 2017 and updated in 2023)

- To scope of strategy includes hydrogen and its derivatives (ammonia, synthetic methane, synthetic fuels, etc.), taking into consideration of the challenges and timelines surrounding these products.

■ Defining of "Low-Carbon" Hydrogen(H_2) and Ammonia(NH_3)

- H_2 : "Well-to-gate"(WTG) emissions are 3.4kg-CO_2e/kg-H_2 or less
- NH_3 : "Well-to-gate"(WTG) emissions are 0.87kg-CO_2e/kg-NH_3 or less

■ Hydrogen Targets

Targets	Current (2021)	2030	2040	2050
Supply	2 mil. (tonnes/year)	3 mil. (tonnes/year)	12 mil. (tonnes/year)	20 mil. (tonnes/year)
Cost(1)	JPY100/Nm^3 ($7.59/H2-kg)	JPY30/Nm^3 ($2.31/H2-kg)	Not specified	JPY20/Nm^3 ($1.54/H2-kg)

(1) CIF cost: Cost, insurance and freight

■ Hydrogen Use in Power Sector

- Toward 2030, it is planned to implement various technological options from conventional co-firing to mono-fuel combustion in Hydrogen and Ammonia.
- Japanese Government intends to use H_2/NH_3 to make up 1% of generation mix by 2030.

Copyright © 2025 JEPIC. All rights reserved

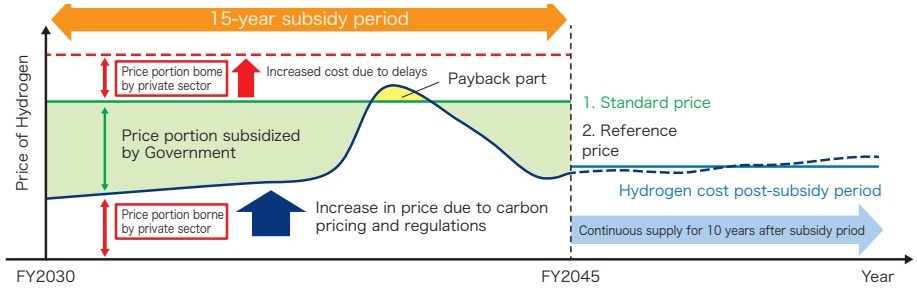
Support for Supply Chain Development

JEPIC

Hydrogen Society Promotion Act stipulates financial support measures for approved business case.

Contract for Differences Schemes (Cost Allocations)

- A supply side subsidies structured on the basis of a “contract for differences”, providing support **for the price gap** for a term of **up to 15 years.**
- Total budget : JPY 3 trillion (c. $20 billion) over the scheme’s 15-year term.
- Suitability for energy policy (S+3E) and GX policy, as well as feasibility will be assessed.
- Selection of the projects will start around the latter half of FY2025.

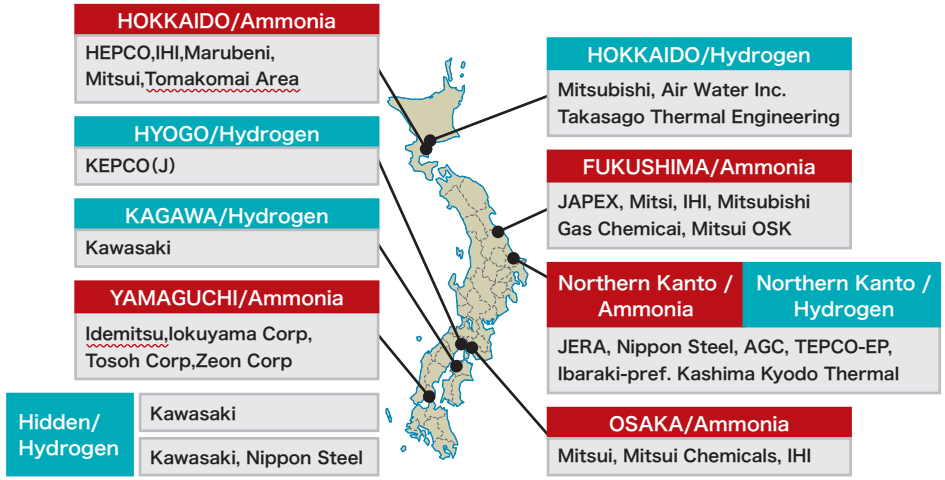


Source: Agency for National Resources and Energy, METI (2024)

Cluster Support Schemes (Infrastructure Development)

- Over the next decade, the government will develop three large scale H2/NH3 clusters, mainly in metropolitan regions, and about five medium-scale clusters.
- FY2024 budget : JPY 15 billion (c. €10 million).

Public offering result (31, May 2024,METI) on feasibility study

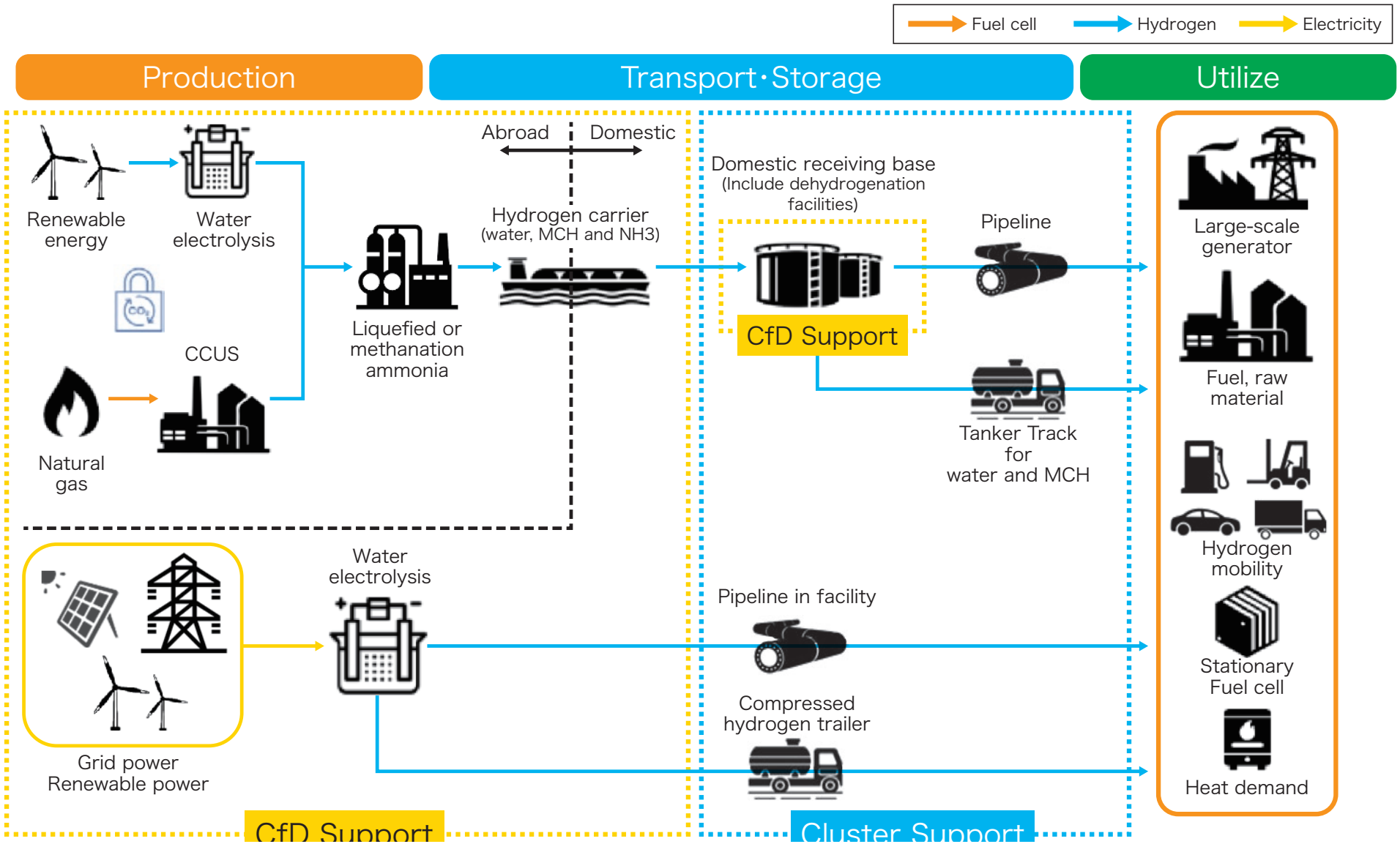


Source: Agency for Natural Resources and Energy, METI

Copyright © 2025 JEPIC. All rights reserved

Scope of Supply Chain

JEPIC



Source: METI, Japanese Resources and Energy Agency

Copyright © 2025 JEPIC. All rights reserved

Carbon Capture & Storage

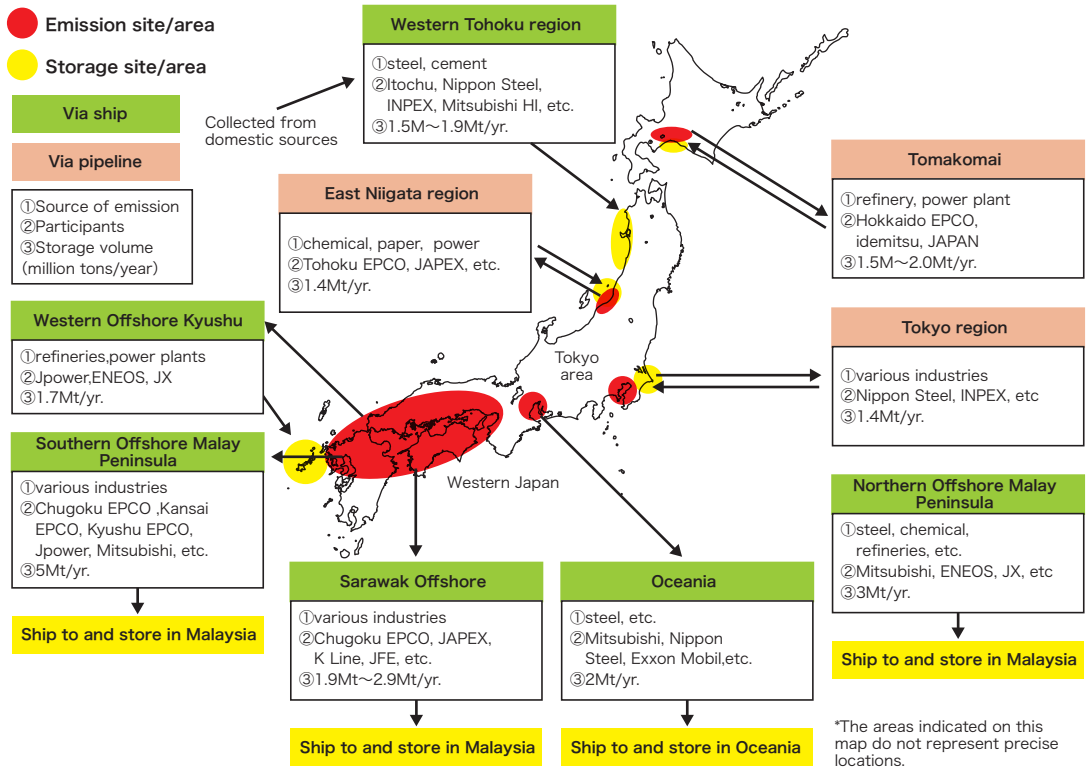
Copyright © 2025 JEPIC. All rights reserved

Carbon Capture & Storage (CCS)

JEPIC

- Japan has a 6-12 Mt per year of CO2 storage goal by 2030.
- To achieve this goal, 9 CCS Projects were awarded for support in 2024.
- These are proceeding to FIDs by FY2026, CODs by FY2030.
- The CCS Business Act (2024) introduced licensing system for storage, drilling, etc.

9 Advanced CCS Projects



Source: METI (Ministry of Economy, Trade and Industry)

Copyright © 2025 JEPIC. All rights reserved

Resilience

Copyright © 2025 JEPIC. All rights reserved

Major Natural Disasters in Japan

JEPIC

■ Great East Japan Earthquake (Mar 11, 2011)

- Magnitude 9.0 quake and large tsunami caused extensive damage, including the Fukushima nuclear accident. 19,747 deaths and 2,556 missing reported. Power outages affected ~4.66 million households (Tohoku Electric) and ~4.05 million (TEPCO).

■ Typhoon Faxai (No.15) (Sep 2019)

- Landed near Chiba with 960 hPa pressure and max wind speed of 58 m/s. Destroyed 2 transmission towers, ~2,000 utility poles. Caused power outages for up to 930,000 households, lasting over 2 weeks in some areas.

■ Noto Peninsula Earthquake (Jan 1, 2024)

- Magnitude 7.6 quake left 515 dead. Isolated many communities due to geography and road damage. ~40,000 households lost power; 90% restored after about one month.

Transmission Tower Collapsed by Typhoon Faxai

Source: METI

Severed Noto Satoyama Kaidō

Source: Ishikawa Prefecture

Copyright © 2025 JEPIC. All rights reserved

Measures to Cope with Natural Disasters

JEPIC

■ Push-Type Assistance Dispatch System

- Utilities proactively set up support systems for neighboring disaster-affected areas before receiving any official request, enabling faster recovery.

■ Electric Utilities' Disaster Response Coordination Plan

- Utilities standardized recovery methods and tool specifications, and built information-sharing systems. They also conduct joint training exercises on a regular basis.

■ Mutual Aid System for Disaster Recovery Costs

- Utilities pre-accumulate funds to cover costs such as temporary restoration and dispatch of power supply vehicles during disasters.

■ Emerging Technologies for Disaster Recovery

- Technologies such as EVs, V2G and drones are key new tools for disaster recovery.

HELPING OUT An electric Mitsubishi i-MiEV in a tsunami-wrecked area of Iwate Prefecture.

Source: The New York Times (2011)

Copyright © 2025 JEPIC. All rights reserved

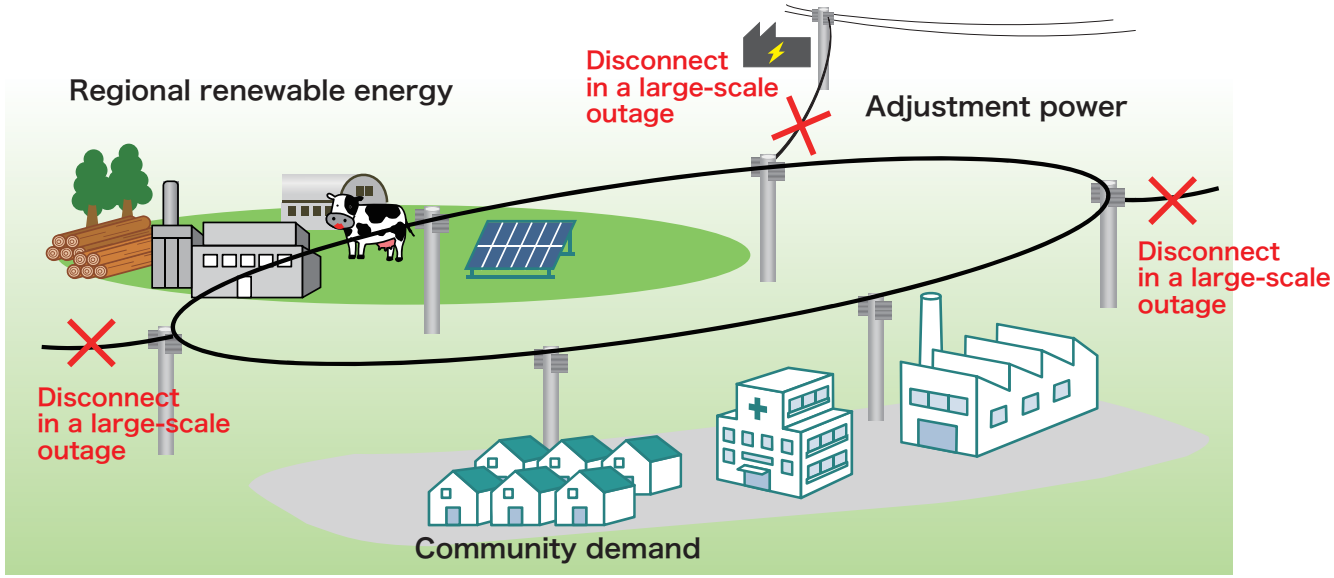
Microgrid

Copyright © 2025 JEPIC. All rights reserved

Microgrid and License for Distribution Business

JEPIC

- In order to promote the utilization of local distributed energy resources and to enhance resilience against natural disasters, it is important to build a distributed grid (Community Microgrid).
- Under the amendment to the Electricity Business Act, a new system has been introduced that enables entities, other than general transmission and distribution utilities, to operate distribution networks within local communities.
- However, there are various hurdles to making a profit from the distribution business. Therefore, no entity has obtained a distribution business license as of June 2025, since the system was launched in 2022.



Source: METI

Copyright © 2025 JEPIC. All rights reserved

Energy Efficiency & Heat Pump

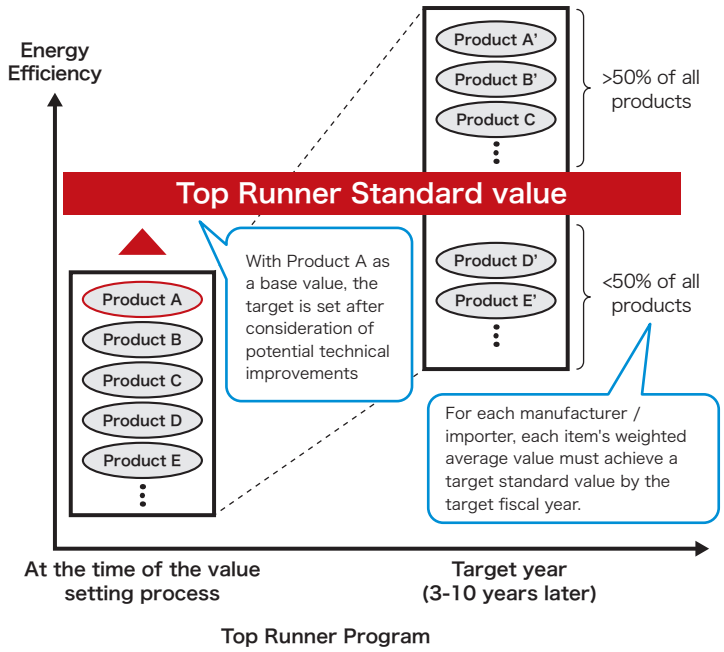
Copyright © 2025 JEPIC. All rights reserved

Efficiency Improvement Policy

JEPIC

■ Top Runner Program

- Efficiency standards for machinery, equipment and materials
- 32 items are in scope (as of March 2023).
  Air Conditioners, Electric Refrigerators, Electric Freezers, Gas Water Heaters, Oil Water Heaters, Vending Machines, Electric (HP) Water Heaters, Showcases, etc



Top Runner Program

■ The uniform energy efficiency labels

▶ Energy efficiency labeling

- The evaluation metric of a 41-point scale (1.0, 1.1, …, 5.0) are now being used in retail outlets.
- The items mentioned above (except for vending machines and showcases) are covered as of March 2023.

Source: Top Runner Program: Ministry of Economy, Trade and Industry Policy - Energy (JP)
The uniform energy efficiency labels: “Japan’s ENERGY 2020”, METI

Copyright © 2025 JEPIC. All rights reserved

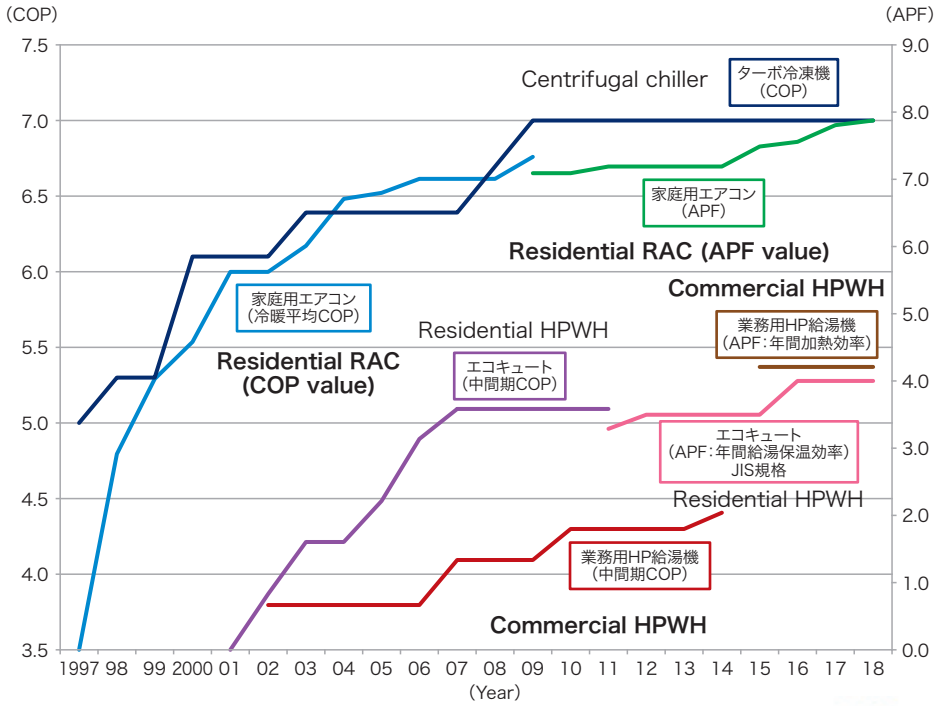
Efficiency Improvement Policy

JEPIC

Awards

- **Efficiency has improved due to energy efficiency policies.**
- **Awards are another driver for efficiency improvement**

  - Energy Conservation Grand Prize Award (Since 1990)
  - Minister of the Environment's Award for Climate Action (Since 1998)



Efficiency improvement of HPs

www.heatpumpingtechnologies.org

Source:
Efficiency improvement of HPs: Heat Pump and Thermal Storage Technology Center of Japan (HPTCJ)Policy - Awards (JP)
Energy Conservation Grand Prize Award: The Energy Conservation Center, Japan (ECCJ)- Minister of the Environment's Award for Climate action: MOEJ

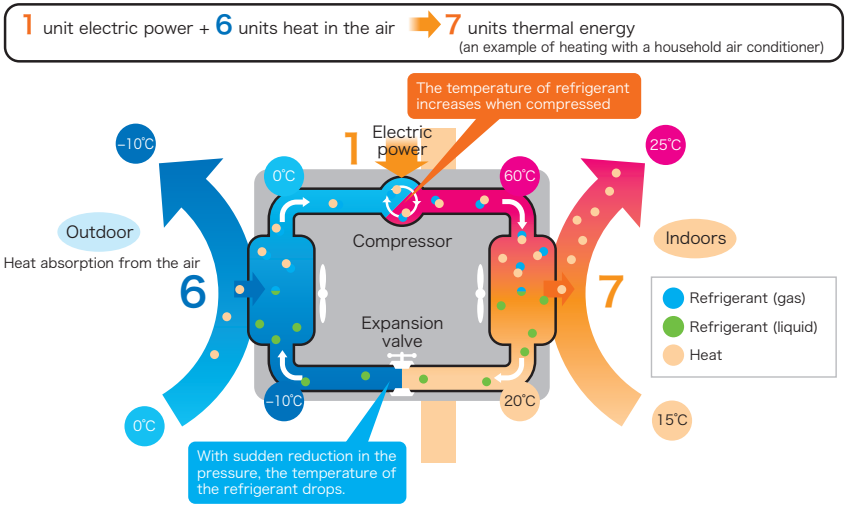
Copyright © 2025 JEPIC. All rights reserved

Heat Pump

JEPIC

■ Efficient heat supply by Heat Pump

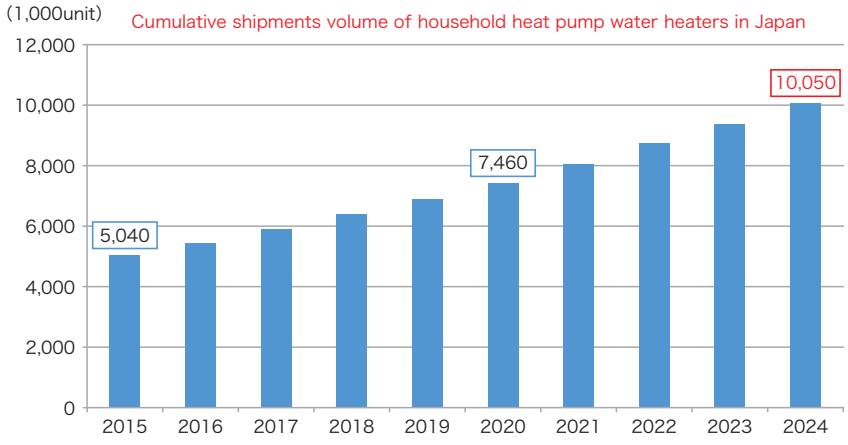
- Heat pumps extract the ambient heat, amplify the heat by compressor and transfer to the destination.
- The energy output is normally several times greater than that required to power the heat



■ Expansion of the use of “EcoCute”

Residential natural refrigerant heat pump water heater

- Electric Power Companies of Japan (FEPC) and Heat Pump & Thermal Storage Center are working to expand the use of EcoCute.
- Utilizing EcoCute with a time-of-use rate can encourage shifting electricity consumption away from peak demand periods.
- The cumulative number of EcoCute units shipped has exceeded 10 million units in March 2025, thanks to the recent policy support.



Source: Heat Pump & Thermal Storage Technology center of Japan (HPTCJ)

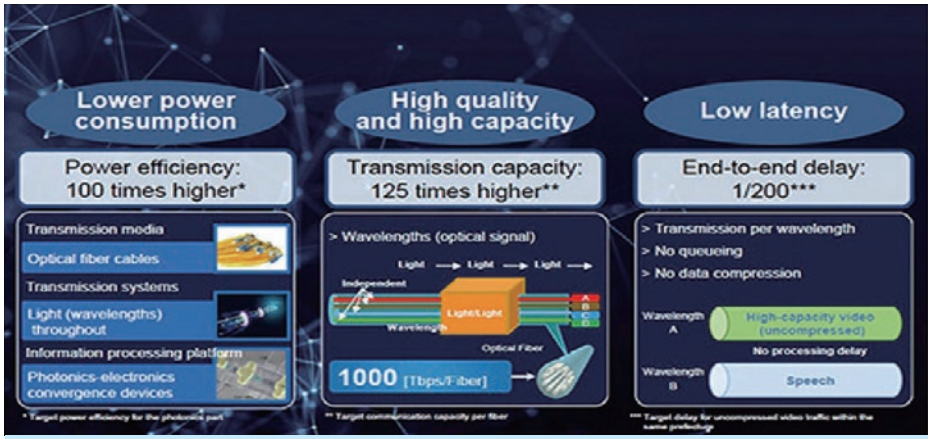
Copyright © 2025 JEPIC. All rights reserved

Energy-Saving Technologies for Data Centers and Semiconductors

JEPIC

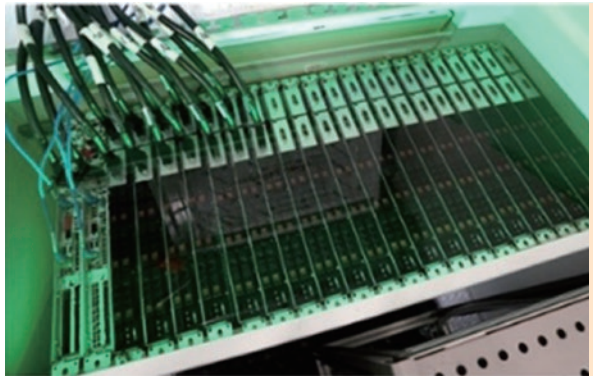
【Data Centers】

＜Optical-Electrical Fusion＞



➤ By replacing electrical wiring with optical interconnects, energy savings, higher data capacity, and lower latency can be achieved.

＜Immersion Cooling＞



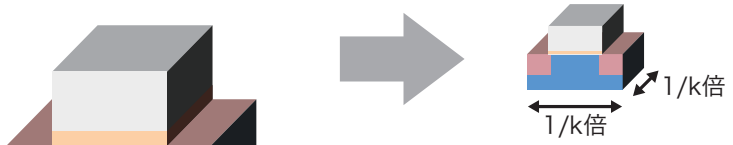
➤ Servers are fully immersed in a tank filled with coolant for cooling.

➤ Achieves high cooling performance and improved energy efficiency.

Source:METI, NTT, KDDI

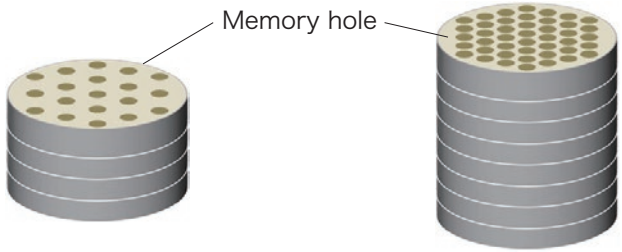
【Semiconductors】

＜Miniaturization＞



➤ When both the gate width and length of a semiconductor are reduced to 1/k, the power consumption decreases to $1/k^2$

＜High-Density Design＞



➤ By increasing integration density, improving information transmission and processing speed, enhancing energy efficiency.

Copyright © 2025 JEPIC. All rights reserved

Statistical Data

Copyright © 2025 JEPIC. All rights reserved

Electric Power Generation*

JEPIC

[TWh]

FY	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Hydroelectric	**84.9**	**86.9**	**91.4**	**84.6**	**90.1**	**87.4**	**86.3**	**86.3**	**87.6**	**85.0**	**84.1**
Electric Utilities	68.6	70.3	74.9	81.9	87.9	85.0	84.3	84.5	85.8	83.2	82.4
Industry-owned	16.3	16.7	16.5	2.7	2.3	2.4	2.0	1.8	1.8	1.8	1.7
Thermal**	**987.3**	**955.4**	**908.8**	**877.0**	**861.4**	**823.6**	**792.9**	**790.0**	**776.0**	**757.4**	**716.7**
Electric Utilities	743.1	717.8	675.7	794.4	777.5	726.2	696.2	697.9	681.4	664.7	629.0
Industry-owned	244.2	237.6	233.1	82.6	83.9	97.4	96.7	92.1	94.6	92.7	87.7
Nuclear	**9.3**	**-**	**9.4**	**17.3**	**31.3**	**62.1**	**61.0**	**37.0**	**67.8**	**53.5**	**80.3**
Electric Utilities	9.3	-	9.4	17.3	31.3	62.1	61.0	37.0	67.8	53.5	80.3
Industry-owned	-	-	-	-	-	-	-	-	-	-	-
Wind Power	**5.2**	**5.0**	**5.2**	**5.5**	**6.1**	**6.5**	**6.9**	**8.3**	**8.2**	**8.2**	**9.2**
Electric Utilities	0.2	0.0	0.1	5.0	5.5	5.9	6.3	7.6	7.4	7.4	8.4
Industry-owned	5.0	5.0	5.1	0.5	0.6	0.6	0.6	0.7	0.8	0.8	0.8
Solar	**1.2**	**3.8**	**6.8**	**11.1**	**15.9**	**18.5**	**21.4**	**25.0**	**27.9**	**31.3**	**33.1**
Electric Utilities	0.1	0.1	0.1	6.5	8.7	10.8	13.2	16.2	19.0	21.8	23.8
Industry-owned	1.1	3.7	6.7	4.6	7.2	7.7	8.2	8.8	8.9	9.5	9.3
Geothermal	**2.6**	**2.6**	**2.6**	**2.2**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**	**2.0**	**2.2**
Electric Utilities	2.4	2.4	2.4	2.1	2.0	2.0	2.0	2.0	2.0	1.9	2.1
Industry-owned	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Others	**-**	**-**	**-**	**0.3**	**0.3**	**0.2**	**0.2**	**0.2**	**0.2**	**0.2**	**0.3**
Electric Utilities	-	-	-	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.3
Industry-owned	-	-	-	-	-	-	-	-	-	-	-
Total	**1,090.5**	**1,053.7**	**1,024.2**	**997.9**	**1,007.3**	**1,004.8**	**970.8**	**949.0**	**970.0**	**937.6**	**925.9**
Electric Utilities	823.7	790.6	762.6	907.6	913.2	892.2	863.2	854.4	863.5	832.7	826.3
Industry-owned	266.8	263.2	261.6	90.4	94.1	108.2	107.6	103.6	106.5	104.9	99.6

*Figures for industry-owned generation represent the total amount generated by power plants with a generating capacity of 1,000kW or above.
*In conjunction with the launch of the licensing system in fiscal 2016, certain utilities' electricity generated that had been counted under "Industry-owned" up through fiscal 2015 has been counted under "Electric Utilities" since fiscal 2016.
**Including biomass and waste-to-energy.

Source: METI, "Electric Power Generated" (2024) and "Electric Power Generated for Self-consumption" (2024)

Copyright © 2025 JEPIC. All rights reserved

Electric Power Consumption

JEPIC

[TWh]

FY		2012	2013	2014	2015	2016	2017
Low Voltage	Residential	286.2	284.3	273.1	266.9	272.9	280.4
	Commercial and Industrial	43.7	42.8	40.5	39.2	37.9	38.4
Specified-Scale Demand*	High Voltage	541.0	544.4	537.8	531.5	308.3	310.6
	Extra-High Voltage					231.4	233.8
Specified Supply**		0.0	0.0	0.0	0.0	6.0	6.1
Self-Consumption		4.4	4.5	3.9	4.0	43.2	45.1
Supplied by Electric Utilities		**875.3**	**876.0**	**855.4**	**841.5**	**899.8**	**914.4**
Power Generated and Consumed by Privately-owend Power Facilities		116.3	116.6	114.1	113.8	70.8	70.0
Total Consumption		**991.6**	**992.6**	**969.4**	**955.3**	**970.6**	**984.3**
Others (Last Resort Supply and Isolated Area Supply)		-	-	-	-	2.3	2.3

FY		2018	2019	2020	2021	2022	2023
Low Voltage	Residential	271.4	267.7	278.0	278.1	270.3	266.8
	Commercial and Industrial	37.1	35.7	35.4	34.8	34.2	33.5
Specified-Scale Demand*	High Voltage	307.8	302.8	290.3	296.5	283.5	285.6
	Extra-High Voltage	236.3	229.9	214.9	225.5	218.7	216.9
Specified Supply**		6.3	6.2	5.5	6.1	6.2	6.1
Self-Consumption		37.4	34.9	36.8	38.1	38.1	34.1
Supplied by Electric Utilities		**896.2**	**877.1**	**863.2**	**881.6**	**851.0**	**849.6**
Power Generated and Consumed by Privately-owend Power Facilities		77.2	75.6	66.3	68.4	68.9	65.2
Total Consumption		**973.4**	**952.7**	**929.5**	**950.0**	**919.9**	**914.8**
Others (Last Resort Supply and Isolated Area Supply)		2.3	2.2	2.4	2.4	15.6	6.6

*Contracted demand of 50 kW or above (in principle) received from general electricity utilities or specified-scale electricity suppliers.
**System that permits an electricity supplier to directly supply electricity to a consumer with which it shares a close relationship in manufacturing processes, capital, etc., without having to register as an electricity retailer.

Source: METI, "Electric Power Generated" (2024) and "Electric Power Generated for Self-consumption" (2024)

Copyright © 2025 JEPIC. All rights reserved

Installed Generating Capacity*

JEPIC

[MW]

FY	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Hydroelectric	**48,932**	**49,597**	**50,035**	**50,058**	**50,014**	**50,037**	**50,033**	**50,033**	**49,924**	**50,007**	**50,066**
Electric Utilities	44,676	45,403	45,786	49,521	49,562	49,582	49,635	49,635	49,528	49,612	49,667
Industry-owned	4,256	4,194	4,248	536	452	455	398	398	396	395	399
Thermal**	**191,258**	**193,356**	**190,805**	**193,910**	**193,462**	**193,026**	**189,784**	**191,758**	**188,247**	**187,937**	**179,496**
Electric Utilities	141,901	143,777	143,040	174,392	173,261	171,469	168,760	170,260	167,474	166,379	158,680
Industry-owned	49,357	49,579	47,765	19,517	20,201	21,557	21,024	21,498	20,773	21,558	20,816
Nuclear	**44,264**	**44,264**	**42,048**	**41,482**	**39,132**	**38,042**	**33,083**	**33,083**	**33,083**	**33,083**	**33,083**
Electric Utilities	44,264	44,264	42,048	41,482	39,132	38,042	33,083	33,083	33,083	33,083	33,083
Industry-owned	-	-	-	-	-	-	-	-	-	-	-
Wind Power	**2,646**	**2,750**	**2,808**	**3,203**	**3,483**	**3,498**	**3,951**	**4,119**	**4,254**	**4,411**	**5,369**
Electric Utilities	82	30	50	2,893	3,091	3,165	3,580	3,750	3,862	4,025	4,954
Industry-owned	2,563	2,720	2,758	310	391	332	371	369	392	386	415
Solar	**1,559**	**4,085**	**5,624**	**9,110**	**12,592**	**14,974**	**16,522**	**19,028**	**21,034**	**23,146**	**25,393**
Electric Utilities	67	81	87	5,655	7,318	8,922	10,549	12,408	14,124	16,152	18,140
Industry-owned	1,492	4,005	5,536	3,455	5,274	6,052	5,973	6,620	6,910	6,994	7,253
Geothermal	**512**	**508**	**517**	**526**	**471**	**473**	**481**	**487**	**487**	**437**	**456**
Electric Utilities	477	473	473	511	466	463	463	469	469	419	425
Industry-owned	35	35	43	15	5	11	18	18	18	18	31
Others	**-**	**-**	**-**	**64**	**54**	**43**	**43**	**43**	**60**	**60**	**336**
Electric Utilities	-	-	-	64	54	43	43	43	60	60	323
Industry-owned	-	-	-	0	0	0	0	0	0	0	13
Total	**289,171**	**294,560**	**291,836**	**298,352**	**299,209**	**300,093**	**293,897**	**298,550**	**297,088**	**299,081**	**294,199**
Electric Utilities	231,468	234,028	231,484	274,519	272,885	271,685	266,112	269,648	268,599	269,730	265,272
Industry-owned	57,703	60,532	60,352	23,834	26,324	28,407	27,785	28,903	28,489	29,351	28,927

* Figures represent the total amount generated by power plants with a generating capacity of 1,000 kW or above.
* In conjunction with the launch of the licensing system in fiscal 2016, certain utilities' power generation facilities that had been counted under "Industry-owned" up through fiscal 2015 have been counted under "Electric Utilities" since fiscal 2016.*

** Including biomass and waste-to-energy.

Source: FEPC (2011–2015); METI, "Number and Output of Electricity Utility Power Plants" (2024)

Copyright © 2025 JEPIC. All rights reserved

Transmission, Substations and Distribution

JEPIC

(As of March 2023)

Voltage (kV)	Transmission Lines [km]				Substations	
	Route length		Circuit length		Number	Output Capacity [MVA]
	Overhead	Underground	Overhead	Underground		
500	8,168	113	15,850	201	85	231,150
275	7,452	612	14,720	1,534	163	178,558
220	2,542	52	4,881	116	70	45,050
187	2,756	15	5,366	35	49	19,235
110-154	15,426	1,065	28,015	1,972	758	161,995
66-77	38,389	7,544	68,623	13,587	4,658	229,809
≦55	13,843	6,133	15,019	10,141	1,332	10,229
Total	**88,576**	**15,534**	**152,474**	**27,586**	**7,115**	**876,026**

Distribution Lines [km]				Distribution Lines [km]	
Route length		Circuit length		Output Capacity [MVA]	
Overhead	Underground	Overhead	Underground	Overhead	Underground
1,294,979	46,230	4,063,208	75,614	357,855	39,144

Source: FEPC, "Electricity Statistics Information: Transmission facility, Substation facility, Distribution facility" (2024)

Copyright © 2025 JEPIC. All rights reserved

Peak Load, Supply Capability, Annual Electricity Demand, Reserve Margin and Load Factor

JEPIC

(As of March 2023)

FY	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Peak Load (GW)	161.6	154.3	164.5	155.9	155.5	164.8	164.6	166.5	164.6	166.1	160.9
Supply Capability (GW)	179.5	179.8	183.5	177.6	177.2	187.5	185.8	186.1	188.0	185.6	182.7
Annual Electricity Demand (TWh)	917.5	898.9	888.2	890.5	900.9	896.5	878.4	867.8	885.2	870.0	862.6
Reserve* (GW)	17.9	25.6	18.9	21.8	21.7	22.7	21.2	19.6	23.4	19.5	21.8
Reserve Margin* (%)	11.1	16.6	11.5	14.0	13.9	13.8	12.9	11.8	14.2	11.7	13.5
Load Factor** (%)	64.8	66.5	61.6	65.8	66.0	62.1	60.7	59.5	61.4	59.8	61.2

* Reserve = Supply Capability – Peak Load　　Reserve Margin = Reserve / Peak Load × 100
* Figures for 2015 onward are for summer only.
** Load Factor = Annual Electricity Demand / (Peak Load × 365(366) × 24 hours) × 100

Source: Japan Electric Power Survey Committee (2011–2014), OCCTO (2016–2023)

Copyright © 2025 JEPIC. All rights reserved

JEPIC

Head Office
15-33, Shibaura 4-chome Minato-ku,
Tokyo 108-0023, Japan
https://www.jepic.or.jp/en

European Office
10, rue la Fayette, 75009 Paris, France
Tel: +33 (l) 42.86.90.11

Beijing Office
Chang Fu Gong Office Building 40l, Jia-26,
Jianguomenwai Dajie, Chaoyang-qu, Beijing 100022,
The People's Republic of China
Tel: +86 (10) 6513-9885

JEPIC-USA
1120 Connecticut Avenue, N.W., Suite 1070,
Washington, D.C.20036, U.S.A
Tel: +1 (202) 955-5610

DISCLAIMER

This publicaiton was prepared by the Japan Electric Power Information Center (JEPIC), based on publically available informaiton. Whlie we presume this informaiton to be accurate and reliable, we provide no guarantee as to the accuracy of the data or informaiton contained herein. JEPIC shall therefore assume no legal responsibility for any trouble, loss, or damages resulting from any actions taken based on the content of this publication.

Copyright © 2025 JEPIC. All rights reserved