The 7th Strategic Energy Plan

February 2025

Agency of Natural Resources and Energy

1. Progress after the Accident at TEPCO's Fukushima Daiichi Nuclear Power Station

- Almost fourteen years have passed since the Great East Japan Earthquake and the accident at TEPCO's Fukushima Daiichi Nuclear Power Station. **The experiences, reflections and lessons learned from this accident remain** the **starting point for Japan's energy policy**.
- Currently, we are making efforts in both on-site and offsite, including the progress of the **discharge of ALPS treated water into the sea**, **the successful trial retrieval of fuel debris,** and **the Fukushima Innovation Coast Framework**. **Working toward reconstruction and restoration of Fukushima to the end remains the gravest responsibility of and a top priority for the Government of Japan**.

2. Changes in the Situation since the Previous Revision of the Strategic Energy Plan

- Since the previous revision of the Strategic Energy Plan, **the energy situation surrounding Japan has changed significantly as described below**. **In developing and implementing energy policy**, it is **necessary to fully consider such changes in domestic and international circumstances**.
  - Increased economic security demands, following **Russia's aggression against Ukraine** and **soaring tensions in the Middle East**.
  - **Expected increase in electricity demand** due to the **progress of Digital Transformation (DX) and Green Transformation (GX)**.
  - Many countries are **expanding diverse and realistic approaches** while **maintaining ambitious goals** toward realizing carbon neutrality.
  - Many countries are **strengthening industrial policies which ensure that transformation of energy structure toward stable energy supply and decarbonization leads to economic growth**.

3. Underpinnings of Energy Policy (S+3E)

- **We maintain the principle of S+3E** (**Safety**, **Energy Security**, **Economic Efficiency**, and **Environment**), the cornerstone of energy policy.
- **On the premise of safety**, **the first priority is to ensure a stable energy supply**, while **improving economic efficiency** and **environment suitability**.

4. Policy Direction toward 2040

- With **the expected increase in electricity demand due to the progress of DX and GX**, **Japan's industries and economy depend on whether or not we can provide enough decarbonized electricity that matches the demand at competitive prices**. The **Strategic Energy Plan and the GX2040 Vision** are **to be implemented in an integrated manner toward FY2040**.
- Given Japan's unique circumstances, such as a lack of natural resources, mountainous land and being surrounded by deep oceans, from the perspective of **achieving both stable energy supply and decarbonization**, we will **maximize the use of renewable energy as our major power source** and we will aim for **a balanced power generation mix that does not excessively depend on specific power sources or fuel sources.**
- To realize a transition to a resilient energy supply-demand structure that can withstand energy crises, we will promote **thorough energy efficiency improvement** and **fuel switching within the manufacturing**, **while maximizing the use of decarbonized power sources such as renewables and nuclear power, both of which contribute to energy security**.
- In further decarbonizing toward FY2040, it is essential to take a viewpoint that **prioritizes economically rational measures**. **Based on the principle of S+3E**, we will work to **minimize cost increases associated with decarbonization to the greatest extent possible**.

5. Energy Efficiency Improvement and Shift to Non-fossil Fuel Sources

- From the perspective of promoting a transition to a supply-demand structure that can withstand energy crises, **the importance of thorough energy efficiency improvement remains unchanged**. In addition, **electrification and a shift to non-fossil fuel sources will be of unprecedented importance** in promoting emission reduction measures toward 2050. **Economically rational approaches** should be **introduced from the perspective of how much CO2 can be reduced**.
- In response to **the expected increase in electricity demand due to the progress of DX and GX**, the government will **improve the energy efficiency performance of semiconductors and will develop and utilize cutting-edge technologies such as photoelectric fusion**. The government will also improve **the efficiency of data centers** through these efforts. Alongside support for **upgrading factory facilities**, the government will also promote **energy efficiency improvement in households**, including insulating windows and water heaters, through both regulations and support. **We will enhance energy efficiency by reviewing the Top Runner program, the benchmark system, and work together with regional support organizations**.
- With regard to electrification and a shift to non-fossil fuel sources, it is essential that the public and private sectors collaborate in **promoting energy-intensive industries to change their manufacturing processes** in order to **maintain and improve Japan's industrial competitiveness**.

6. Expansion of Decarbonized Power Sources and Grid Development

<General discussion>

- **With the expected increase in electricity demand** due to the progress of DX and GX, **the Japanese economy must not lose growth opportunities** because of obstacles to investment in domestic industrial locations **on the account of a failure to provide enough decarbonized electricity** that matches the demand.
- **Instead of dichotomous discussions on whether to use renewable energy or nuclear power**, it is necessary to **maximize the use of both renewables and nuclear power**.
- The **supply of decarbonized power sources needs to be fundamentally strengthened** by **improving the business environment** to **enhance the predictability of the return on investment in decarbonized power sources and to promote active new investment by operators and also by improving the financing environment** to stably secure the necessary funds for large-scale, long-term investments in power sources and grid development.

<Renewable Energy>

- On the major premise of S+3E, the government will **ensure that renewable energy becomes a major source** for decarbonization of the power sector, and will promote its **maximum introduction** while **harmonizing with local communities** and **managing excessive national burdens** and by strengthening measures through cooperation among relevant ministries and agencies.

6. Expansion of Decarbonized Power Sources and Grid Development

<Renewable Energy（Continued）>

- **Expanding the adoption of domestically produced renewable energies** and **improving the technology self-sufficiency rate** will contribute to **strengthening Japan's industrial competitiveness** in addition to decarbonization. From this perspective, it is necessary to **promote the development and societal implementation of next-generation renewable energy technologies**.
- In introducing renewable energy, there are issues such as (1) **coexistence with local communities**, (2) **mitigating national burdens**, (3) **responding to fluctuating output**, (4) **accelerating innovation and building supply chains**, and (5) **managing end-of-life solar panels**.
- To address these issues, the following measures should be taken: (1) **strengthening of business discipline**, (2) **utilization of the FIP programs and bidding system**, (3) **development of inter-regional interconnection lines and introduction of storage batteries, etc.**, (4) **adoption of perovskite solar cells** (target of 20 GW introduction by 2040), **floating offshore wind power** in the EEZ and other areas, government-led drilling surveys and **one-stop licensing follow-ups** for the expansion of the introduction of **geothermal power generation**, **accelerating the social implementation of next-generation geothermal power, promoting small and medium-sized hydropower led by local governments**, (5) **development of a system to ensure proper waste disposal and recycling measures, and other measures**.
- In introducing renewable energy as a major power source, we will work to integrate renewable energy into the electricity market and minimize integration costs for society as a whole associated with **grid development** and **balancing** power. We also make renewable energy a **long-term stable power source** so that it will continue to be used for the subsequent generation.

6. Expansion of Decarbonized Power Sources and Grid Development（Continued）

<Nuclear Power>

- Nuclear power has features such as excellent **supply stability** and **technological self-sufficiency rate**, **cost levels comparable to other energy sources with little price fluctuation**, and **stable power generation at a constant output**. These characteristics **also meet the needs of new demand from data centers, semiconductor plants and others**, and we will continuously utilize the necessary amount of nuclear power on the premise of ensuring safety and public trust.
- **Policies aim at coexistence with host communities**, **deepening and enhancing communication with various sectors of the public**, and **accelerate back-end processes such as nuclear fuel cycle**, **decommissioning**, and **final disposal**.
- **The private sector and the government will work together to accelerate the restart of nuclear power plants**, including **industry collaboration**, **government-led activities to promote understanding**, and **nuclear disaster prevention measures**, all based on the premise that safety must be ensured.
- **The development and deployment of next-generation advanced reactors** with built-in new safety mechanisms will **be materialized**, as long as they contribute to the maintenance and development of local industries and employment and can be understood by the local community, within the **sites of operators with nuclear power plants that have been determined to be decommissioned**, **taking developments in back-end** such as the completion of the Rokkasho Reprocessing Plant (RRP) into account. Other developments will be considered based on the future situation, including the status of reactors operating in each region and how local understanding has progressed.

6. Expansion of Decarbonized Power Sources and Grid Development (Continued)

<Nuclear Energy (Continued)>

- We will promote **research and development, etc., of next-generation advanced reactors (advanced light water reactors, small modular reactors, fast reactors, high-temperature gas reactors, and nuclear fusion)**, and **maintain and strengthen supply chains and human resources**.

<Thermal power>

- While thermal power generation has the drawback of emitting greenhouse gases, it also plays important roles such as being a **supply source** that meets about 70% of the current supply, **regulating power** that compensates for **output fluctuations due to renewable energy, etc.**, and providing **inertial and synchronous power** that maintains the stability of the grid.
- While the current supply and demand of electricity remains unpredictable, we **will maintain and secure the generation capacity (kW) necessary for a stable supply of** thermal power as a whole, **while reducing the amount of electricity generated (kWh), mainly from inefficient coal-fired power**. Specifically, we will **secure LNG-fired power** as a means of **transition**, promote the **decarbonization of thermal power** by utilizing hydrogen, ammonia, CCUS, etc., and give ongoing consideration to measures such as a **Reserve Power Plants system**.

CCUS:Carbon dioxide Capture, Utilization and Storage

<Construction of a Next Generation Electric Power Network>

- While **ensuring a stable supply of electricity** and **maximizing the use of renewable energy**, the **inter-regional interconnection lines** and **local backbone grids** will be steadily **enhanced** to enable a timely supply of electricity with an eye on future electricity demand. In addition, the flexibility of the fluctuating nature of renewable energy will be ensured through **utilizing storage batteries and demand response (DR)**, and through **advancing the sophistication of the grid and supply-demand operations**.

7. Next Generation Energy Security/Supply System

- **Hydrogen and its derivatives (including ammonia, e-methane, and e-fuels**) are **expected to be utilized in a wide range of fields** and are key energy sources for achieving carbon neutrality. Some countries are beginning to provide support not only for technological development, but also for the acquisition of natural resources and suitable sites for hydrogen production and capital investment. In this context, Japan will also **hone its competitiveness through technological development** and encourage **companies to make proactive capital investments** with an eye to the expansion of the global market. Japan will also **promote the introduction of biofuels**.
- In addition, for public implementation, based on the **Hydrogen Society Promotion Act enacted in May 2024**, we will strongly underpin **the establishment of supply chains** through **support focusing on the price gap** and other measures, and for the further large-scale supply and use of low-carbon hydrogen and its derivatives both in Japan and overseas, we will implement **regulatory and support policies in an integrated manner** to **reduce costs and expand use.**

8. Fossil Resource Availability/Supply System

- Fossil fuels currently make up **most of Japan's energy supply**. To **ensure a stable supply** and promote **practical transitions**, we will work on **resource diplomacy**, **domestic and international resource development**, **diversification of supply sources**, **crisis management**, and **maintenance and strengthening of supply chains**.
- In particular, in order to utilize LNG-fired power as a practical means of transition, it is necessary that public and private sectors work together to **secure long-term contracts for the necessary LNG**. We need to anticipate LNG requirements, assuming cases where technological innovation does not progress and NDC achievement is difficult.

8. Fossil Resource Availability/Supply System（Continued）

- In Japan, where natural disasters are frequent, it is also important to **ensure the stable procurement and supply of petroleum products and LP gas, both of which are portable and storable**, as a last resort, and we will work to **maintain and strengthen the supply network through service stations(SS)**.

9. CCUS/CDR

- CCUS can **achieve decarbonization in areas that are difficult to decarbonize through electrification and a shift to non-fossil sources using hydrogen and its derivatives**. Therefore, CCUS is indispensable for simultaneously achieving energy security, economic growth, and decarbonization. We will **consider support systems to encourage investment** in CCS projects, **develop technologies to reduce costs**, **develop suitable sites**, etc.
- CDR is necessary as a means to offset residual emissions.We will work to improve the environment, create markets, and accelerate technology development.

CDR: Carbon Dioxide Removal

10. Securing Critical Minerals

- Critical minerals such as copper and minor metals are important resources that **support people's lives and economic activities**. They are also **indispensable for responding to the expected increase in electricity due to the progress of DX and GX**. There are various **supply risks** for each ore type, and in order to **ensure a stable supply**, we will work to secure stockpiles and **diversify supply sources**. We also **develop domestically produced marine mineral resources**.

11. Energy System Reform

- System reform has been promoted with the aim of ensuring a stable supply, minimizing rates to the greatest extent possible, and expanding customer choices and business opportunities for service providers. **Further efforts should be made while reviewing past efforts**.
- With regard to electricity system reforms, **we have made some progress**, such as establishing **a mechanism for wide-area electricity supply and distribution, controlling prices through the liberalization of retailing**, and **creating business opportunities**. On the other hand, we still face challenges **such as securing supply capacity in the face of an expected increase in electricity demand due to the progress of DX and GX** and **mitigating the impact of soaring electricity prices due to sharp rises in fuel prices**.
- In order to cope with these challenges and to promote the decarbonization of the electricity system, which is the key to realizing GX, while mitigating the impact on prices, on the basic premise of a stable supply, we will (1) **improve the market and business environment and financing environment** to **secure investment in decarbonized electricity**, (2) **build an electricity network with a view to efficient use of power sources and location of large-scale demand**, and (3) **ensure institutional development and discipline for a stable electricity supply in terms of quantity and price**.

12. International Cooperation and Coordination

- While the **movement toward decarbonization is accelerating** around the world, **the importance of ensuring energy security** has drastically increased due to **heightened geopolitical risks, such as Russia's aggression against Ukraine and growing tensions in the Middle East**.
- In this context, Japan, a country with scarce fossil resources, will continue to **ensure energy security** through **international cooperation utilizing various bilateral and multilateral frameworks**, including comprehensive resource diplomacy, while keeping a close eye on the global energy situation, in order **to simultaneously achieve economic growth and decarbonization**.
- In particular, **Southeast Asia**, similar to Japan, **relies on thermal power plants for the majority of its electricity**, and the manufacturing sector plays a large role in its economy, which means it faces **common challenges with Japan in its efforts to achieve decarbonization**. In this context, through the **AZEC** platform, we will **advance decarbonization in Asia in a practical manner through various pathways, taking into account different national circumstances**, and contribute to **decarbonization of the world as a whole**.

AZEC: Asia Zero Emission Community

13. Communication with Various Sectors of the Public

- Energy is closely related to our daily lives, and it is of **utmost importance for each citizen** to **have a sense of ownership regarding energy policy**.
- It is necessary to **promote understanding among various sectors of the public and enhance interactive communication**. To this end, **the government will ensure information disclosure and transparency**. In particular, the government will **maximize openness and transparency in the policy-making process** through councils and other bodies.
- In order to foster interest in energy and deepen public understanding, **it is also important to provide opportunities to learn basic knowledge about energy in school education**. In addition, **communication with a wide range of people, including young people, will be enhanced**.

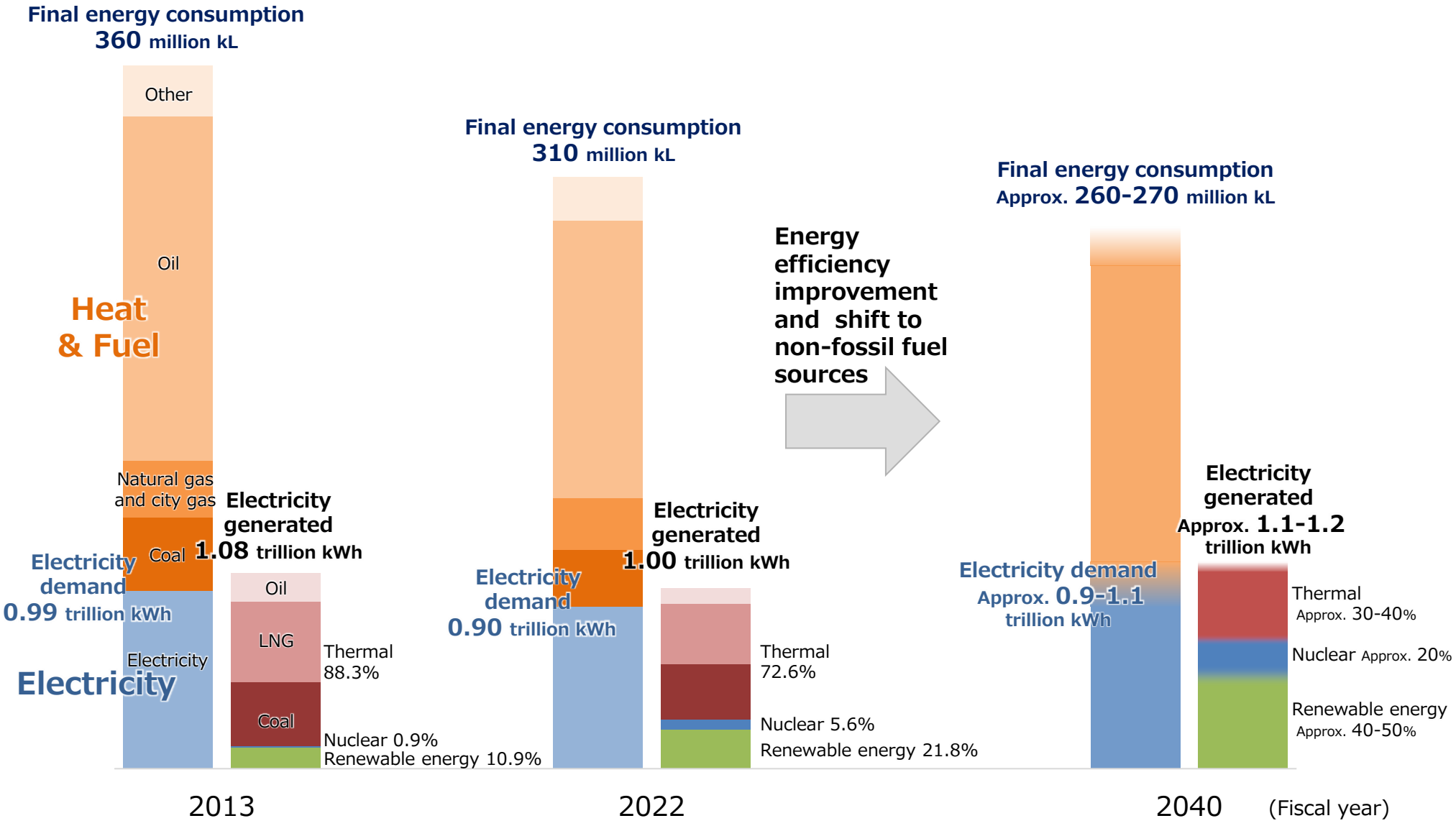
（Reference） Outlook for Energy Supply and Demand in FY2040

- The outlook for energy supply and demand in FY2040 is presented as a **certain range using multiple scenario analysis**, keeping in mind the **existence of various uncertainties**, while also referring to analytical methods used in other countries.

		Fiscal Year 2023 (Preliminary Report)	Fiscal Year 2040 (Outlook)
Energy self-sufficiency rate		**15.2%**	**Approx. 30-40%**
Amount of electricity generated		**985.4 billion kWh**	**Approx. 1.1 to 1.2 trillion kWh**
Power generation mix	**Renewable energy**	**22.9%**	**Approx. 40-50%**
	Solar PV power	9.8%	Approx. 23% to 29%
	Wind power	1.1%	Approx. 4-8%
	Hydropower	7.6%	Approx. 8-10%
	Geothermal power	0.3%	Approx. 1-2%
	Biomass	4.1%	Approx. 5-6%
	Nuclear power	**8.5%**	**Approx. 20%**
	Thermal power	**68.6%**	**Approx. 30-40%**
Final energy consumption		**300 million kL**	**Approx. 260 to 270 million kL**
GHG reduction rate (compared to FY2013)		**22.9% (%)** **(Actual results in FY2022)**	**73%**

(Reference) In this outlook, in addition to the case where a 73% reduction is achieved in FY2040, an alternative scenario where the 73% reduction is not achieved (61% reduction) is also presented as a reference value. In the case of the 73% reduction, the primary energy supply of natural gas in FY2040 is estimated to be 53-61 million tons, but in the alternative scenario, it is estimated to be 74 million tons.

(Reference) Outlook for Energy Supply and Demand (Image)



The left graph shows the final energy consumption and the right graph shows the electricity generated. Electricity demand is the amount of electricity generated minus the amount of transmission and distribution losses and the amount of on-site electricity consumption.