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Economy Movement toward Carbon Free Electricity

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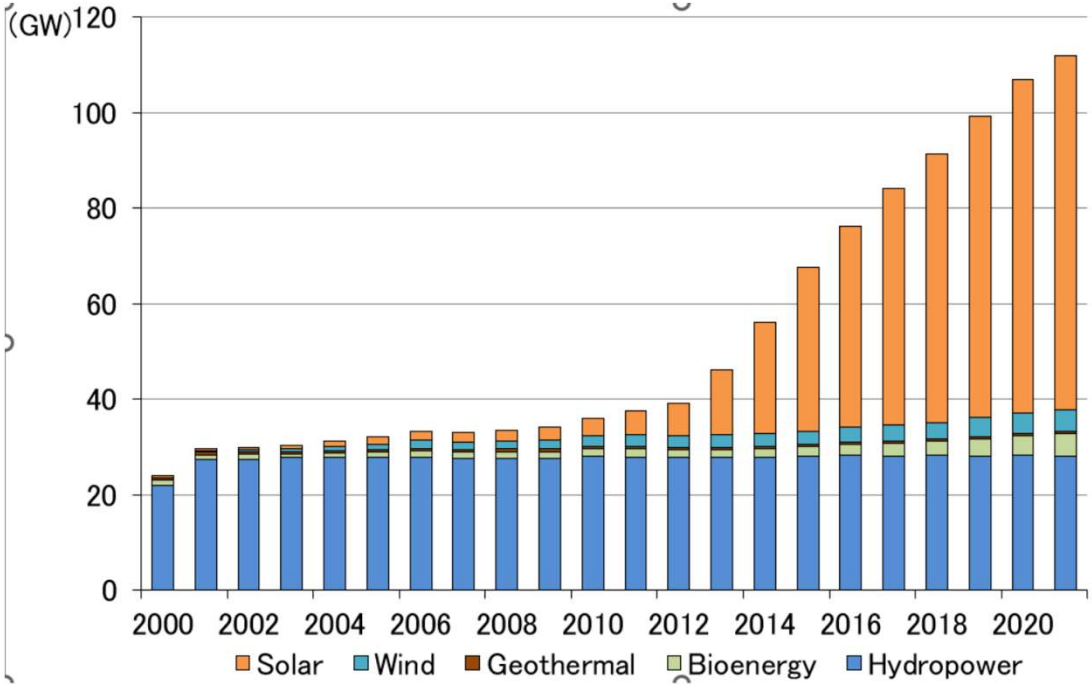
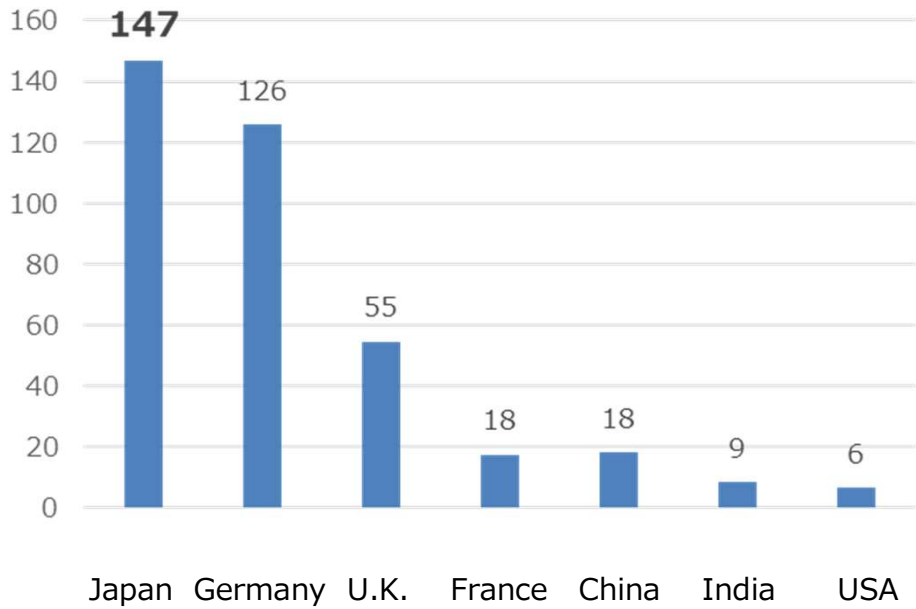
RE Power Generation in Japan

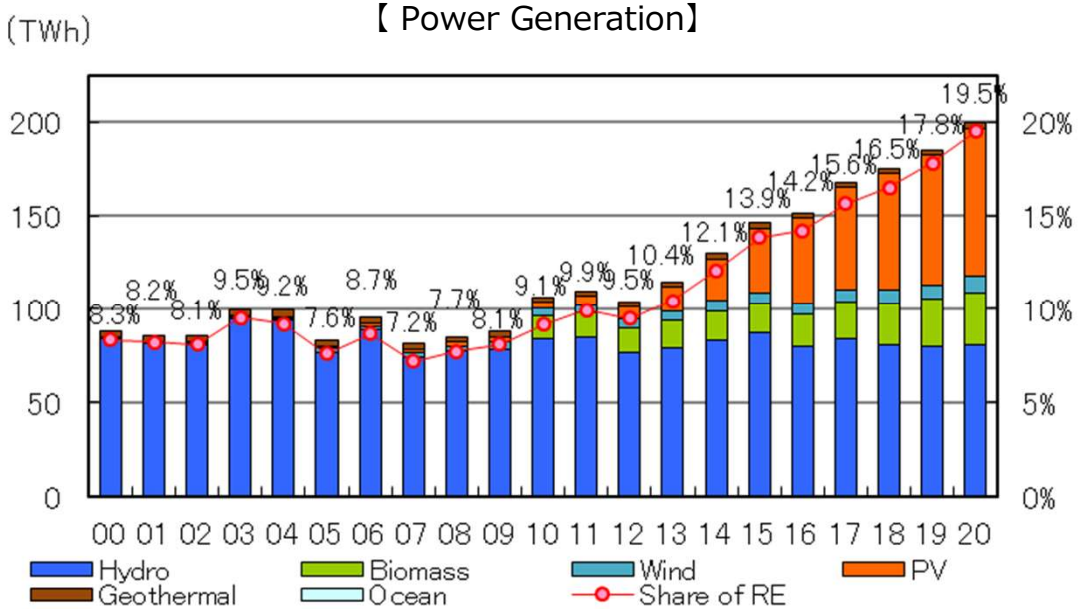
【 Power Capacity 】



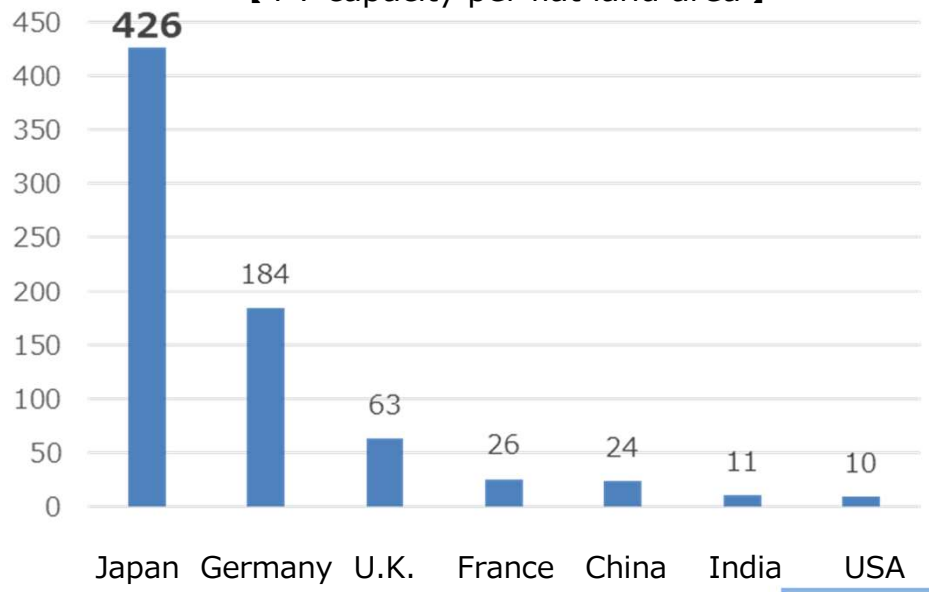
【 PV capacity per land area 】



【 Power Generation】



【 PV capacity per flat land area 】



2050 Carbon-Neutral Declaration and 2030 Climate Goal

- In October 2020, Prime Minister Suga declared that **Japan aim to reduce greenhouse gas emissions to net-zero by 2050,** that is, to realise a carbon-neutral, decarbonised society.
- At the Leaders Summit on Climate in April 2021, Prime Minister Suga announced that **Japan aims to reduce its GHG emissions by 46 percent in FY 2030 from its FY 2013 levels**.

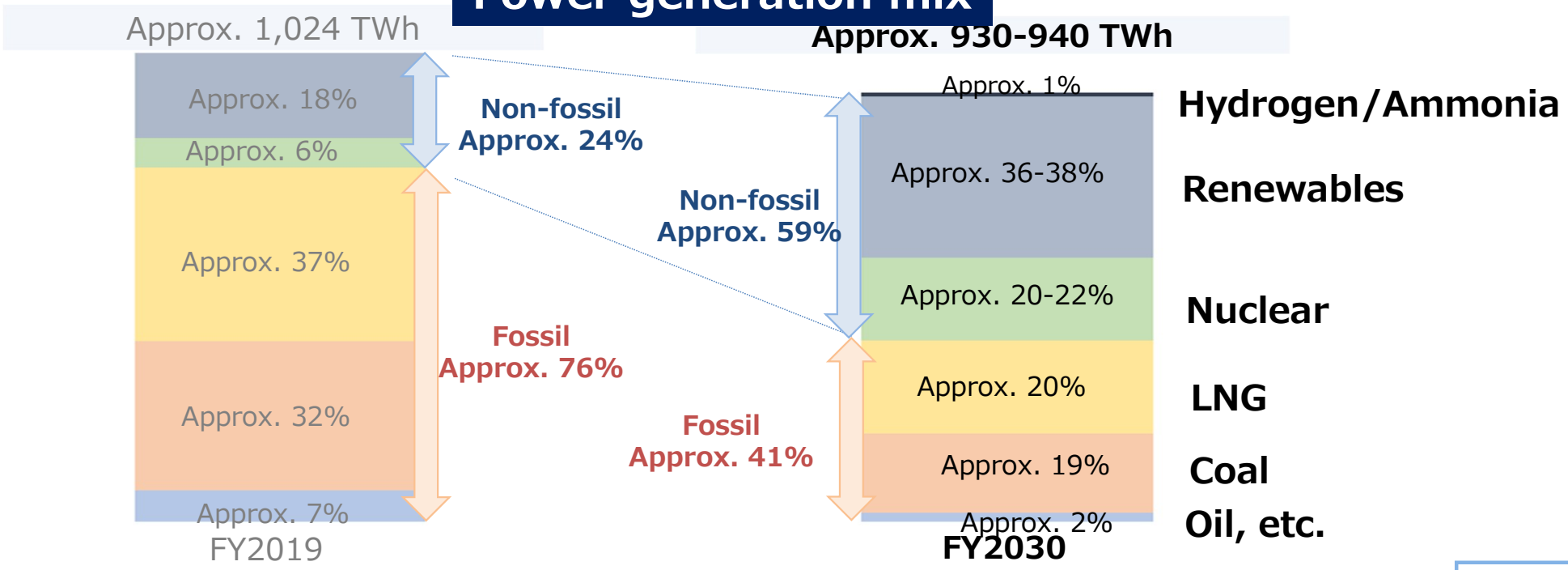
Remarks at Leaders Summit on COP26 (Nov. 2021)

Japan aims to reduce its greenhouse gas emissions by 46 percent in the fiscal year 2030 from its fiscal year 2013 levels, and that **Japan will continue strenuous efforts in its challenge to meet the lofty goal of cutting its emissions by 50 percent in the fiscal year 2030**.

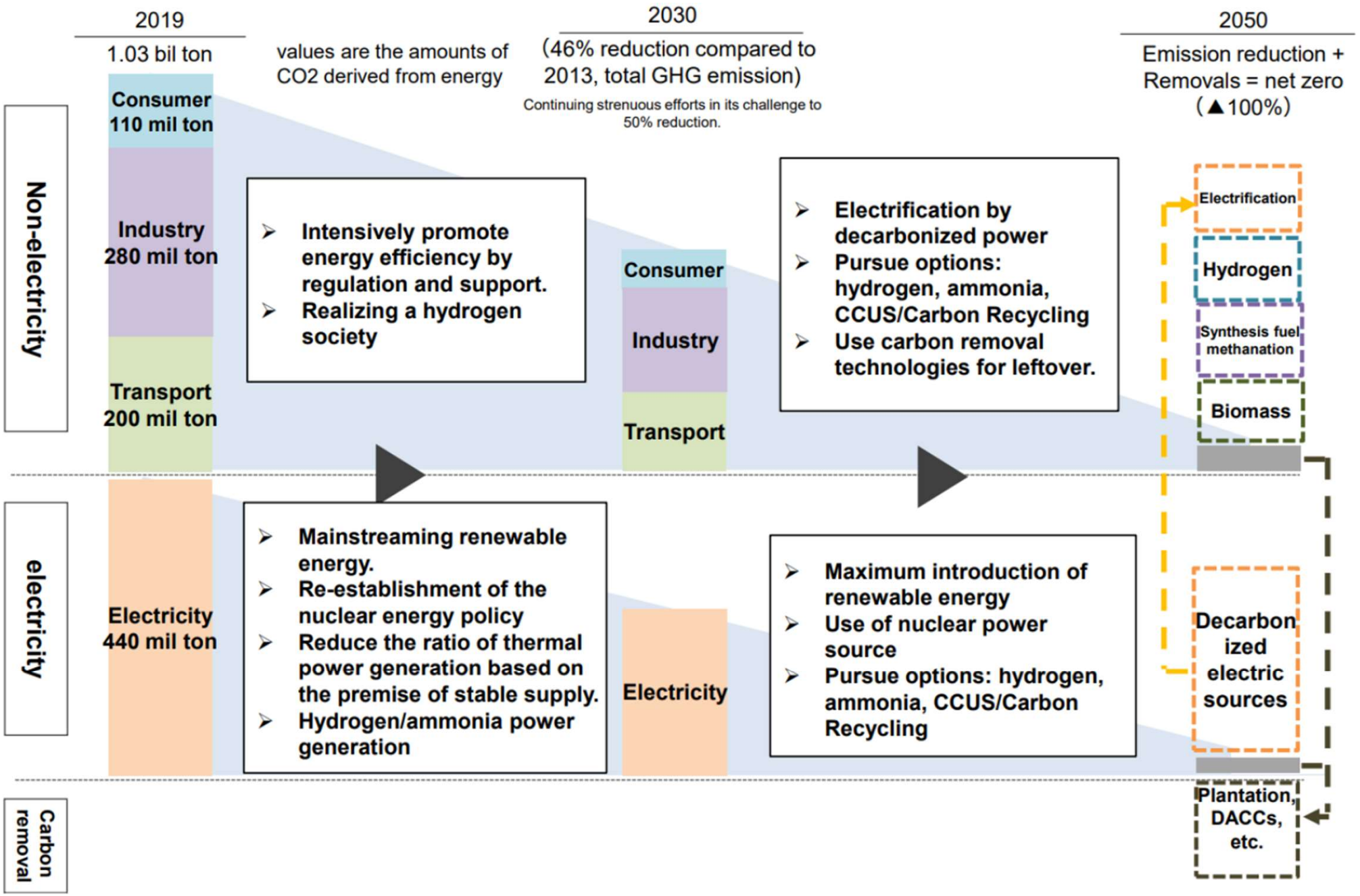
Strategic Energy Plan -Policy responses for 2030-

- **Maximum introduction of renewable energy as a major power source on the top priority on the major premise of S+3E**
- **Further pursuit of greater energy efficiency**
- **Restart nuclear power plants with safety as a top priority**.
- Recognizing that securing a **stable supply of energy is a major principle**, Japan will seek to lower the **thermal power ratio** of its power generation mix **to the extent possible.**
- **Japan plans to pursue innovation** in the thermal power mix, etc. by exploring and using **hydrogen /ammonia - fired power generation and CCUS/Carbon Recycling**.

Power generation mix



Realization of Carbon Neutrality by 2050



Green Growth Strategy

(Formulated on June 18, 2021)

- **Launched in December, 2020, updated in June 2021**
- **14 sectors that are expected to grow toward the year 2050.**
  - Covers Electricity, Industry, Transport, Service/household areas
  - Sets ambitious goals (Roadmaps) to induce companies' investment and fully support the private sector's efforts

Energy

Offshore wind/ solar/ geothermal power

- In 2040, 30-45 GW projects [Offshore wind].
- In 2030, power generation cost of 14 yen/kWh by next-generation solar cells [Solar].

1

Hydrogen/ fuel ammonia

- In 2050, about 20 million tons introduced [Hydrogen]
- 500 billion yen market in Southeast Asia [fuel ammonia].

2

Next-generation heat energy

- In 2050, injecting synthetic methane by 90% into existing infrastructure.

3

Nuclear

- In 2030, carbon-free hydrogen production technology for HTGR established.

4

Transport/Manufacturing

Automobile/battery

- In 2035, electrified vehicles accounting for 100% of new passenger car sales.

5

Semiconductor/ information and communication

- In 2040, semiconductor/information and communication industries achieving carbon neutrality.

6

Shipping

- Before the conventional target year of 2028, realizing the commercial operation of zero-emission ships.

7

Logistics, people flow, and civil engineering infrastructure

- In 2050, carbon-neutral ports realizing decarbonization of ports and construction work.

8

Food, agriculture, forestry and fisheries

- In 2050, zero CO_2 emissions from fossil fuels in agriculture, forestry, and fisheries sectors.

9

Aircraft

- Starting from 2030, installing core technologies such as batteries in stages.

10

Carbon recycling/material

- In 2050, artificial photosynthesis plastics on par with existing products [CR].
- Realizing zero carbon steel[Material].

11

Home/ Office

Housing and building/ next- generation power management

- In 2030, average of new houses and buildings being ZEH and ZEB [housing and buildings].

12

Resource circulation-related

- In 2030, approx. 2 million tons of biomass plastics introduced.

13

Life style-related

- In 2050, a carbon-neutral, resilient, and comfortable life.

14

Japan's Strategies & Policies towards Hydrogen Economy

- The first country to have formulated a national hydrogen strategy
- The Prime Minister set "2050 carbon neutral" declaration.
- Positioned hydrogen as one of the priority areas in the Green Growth Strategy.
- Aim to expand the volume of hydrogen introduction and to achieve cost reduction through the governmental support including Green Innovation fund projects and investments towards green transformation (GX).

Situation and status of strategy formulation

2017
Basic Hydrogen Strategy

2020
PM's 2050 CN Declaration
Green Growth Strategy

2021
Green Innovation Fund
Revised Strategic Energy Plan

2023~
GX investment
Clean Energy Strategy

Targets (Set in the Basic Hydrogen Strategy on Dec. 26, 2017)

☐ **Supply & Demand volume:**
Current (Approx. 2Mt) → 2030 (**Approx. 3Mt**) → 2050 (**Approx. 20Mt**)

☐ **Hydrogen cost:**
Current (JPY100/Nm3) → 2030 (**JPY30/Nm3**) → 2050 (**Less than JPY20/Nm3**)
station retail price (=2.6 $/kg-H2*) (=1.7 $/kg-H2*)

* 1$=130yen

Basic Policy for Realization of GX(Green Transformation)

To rebuild a stable supply of energy, measures including promoting drastic shift to decarbonized power sources will be taken.

- **Renewable Energy**: To expand the introduction of renewable energy, **a grid development plan** has been established. **Investment in the next 10 years will be 8 times** as much as that in the past 10 years.
- **Nuclear power** : **Replacement** of reactors decided to be decommissioned with next generation innovative reactors. **Review of operating period** (40 years + 20-year extension + shutdown period such as inspection)

Government support will be provided for **upfront investment of 20 trillion yen** to achieve carbon neutrality by 2050 while strengthening industrial competitiveness and realizing economic growth, **aiming for more than 150 trillion yen of public and private investment over the next 10 years.**

To promote the GX investment as described above, a **"Growth Oriented Carbon Pricing Concept"** will be embodied and implemented as soon as possible.

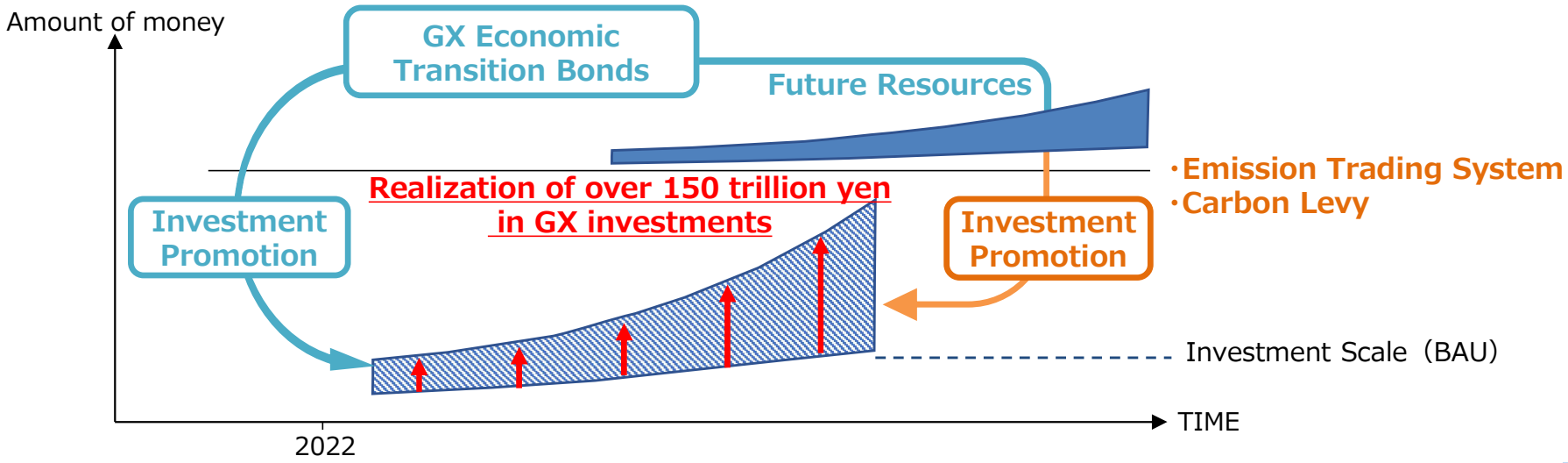
① **Government support for bold upfront investment** by issuing **"GX Economic Transition Bonds"** (20 trillion yen over the next 10 years)

② **Introduction of carbon pricing to give incentives for GX investment**

(1) Full-scale operation of **emissions trading system** in high emission industries [**from FY2026**].
+ Allowance auctioning is phased in gradually to **power generation companies** [**from FY2033**]

(2) Introduction of a **carbon levy** on fossil fuel importers [**from FY2028**]

③ Strengthen financial support through public-private partnership



Government support integrated with regulation for GX investment

- By integrating appropriate regulatory and support measures in accordance with the business risks and environment of each sector, Japan aims to attract private-sector investment and achieve public-private investment of over 150 trillion yen.
- In the midst of the global competition for GX investment, Japan will provide government support of sufficient scale and duration, taking into account trends in investment support in other countries and the results of past government support. 20 trillion yen of support will be reviewed as necessary, based on the progress and effects of projects and so on.

Breakdown of 10-year government support (provisional)				Overall public and private investment over 10 years	
	20 trillion yen			**150 trillion yen**	
Expansion of non-fossil energy	**6~8 trillion yen**	Support for demand expansion of hydrogen and ammonia Research and development of new technologies		**60 trillion yen~**	Massive introduction of renewable energy Nuclear energy (R&D of innovative reactors, etc.) Hydrogen and ammonia
Transformation of industrial structure on both supply and demand sides & Drastic reinforcement of energy saving	**9~12 trillion yen**	Energy conservation and Fuel conversion for structural reform and improving profitability in the Manufacturing Industry Achieve drastic energy savings Nationwide domestic demand measures	Drawing investment by regulation	**80 trillion yen~**	Energy saving and fuel conversion in the manufacturing industry (e.g., steel, chemicals, cement) Digital investment for decarbonization Establishment of battery industry Structural transformation of ship and aircraft industries Next-generation automobiles Zero-emission Housing and buildings
Resource recycling and carbon fixation Technologies etc.	**2~4 trillion yen**	R&D and implementation of new technologies		**10 trillion yen~**	Resource recycling industry Bio manufacturing CCUS, CCS

Act on Promoting Transition to the Decarbonized Growth Economic Structure
(GX Promotion Act)

Provisional Translation

Summary & Background

- ✓ As competition for investment for the realization of "Green Transformation (GX)" accelerates on a global scale, Japan needs more than 150 trillion yen of public and private investments in GX over the next 10 years, in order to simultaneously realize both international commitments such as Carbon Neutrality by 2050 as well as to strengthen industrial competitiveness & economic growth.
- ✓ Based on the "Basic Policy for the Realization of GX" compiled by the GX Implementation Council last December, the Japanese Government will propose a bill to (1) formulate & implement the "GX Promotion Strategy," (2) issue new government bonds, (3) introduce Pro-Growth Carbon Pricing, (4) establish the GX Promotion Agency, and (5) review & evaluate progress of GX.

（1）Formulation & Implementation of the GX Promotion Strategy

- The Government will formulate the "GX Promotion Strategy (Strategy to Promote Transition to the Decarbonized Growth Economic Structure)" to promote GX in a comprehensive and systematic manner. Thereafter, the government will consider any necessary revision of the strategy, by reviewing the progress of the transition to the Decarbonized Growth Economic Structure.【Article 6】

（2）Issuance of new government bonds

- The government will issue GX Economic Transition Bonds for 10 years starting in FY2023 for attracting advanced investment*, in order to realize the "GX Promotion Strategy."【Article 7】

  * The government will support R&D and capital investments that contribute to the decarbonizing and improving profitability of energy and raw materials, amounting to approximately 20 trillion yen over the next 10 years.
- The new government bonds will be redeemed by FY2050 through the GX Surcharge (surcharge on fossil fuel supply) and revenues from GX-ETS Auction on the power generation sector.【Article 8】

（3）Introduction of Pro-Growth Carbon Pricing

- Adding value to GX-related products/businesses by carbon pricing combined with support in advance for GX investment
  → Establishing a mechanism to provide incentives to businesses that invest in GX ahead of the curve

* ①② below will be introduced not immediately, but after a certain progress of GX is made, while reducing the total energy burden over the long term, at a low level initially and to be raised gradually

① GX-Surcharge

- From FY2028, the Minister of Economy, Trade and Industry will introduce the GX-Surcharge on importers of fossil fuels (including those mined domestically) in proportion to the CO2 emissions from imported fossil fuels.【Article 11】

② GX-ETS（Emissions Trading Systems）

- From FY2033, the Minister of Economy, Trade and Industry will allocate a portion of CO2 emission quotas to power generators and collect a charge based on these quotas.【Article 15, 16】
- The specific allocation and unit price of the quotas will be determined through a bidding system (auction).【Article 17】

（4）Establishment of the GX Promotion Agency

- The GX Promotion Agency (Agency for the Promotion of Transition to the Decarbonized Growth Economic Structure) will be established with the approval of the Minister of Economy, Trade and Industry. The agency will conduct the following activities【Article 54】;
  ① Supporting GX investments by private institutions (e.g. debt guarantee)
  ② Collecting "GX Surcharge" and charges on "GX-ETS Auction"

（5）Review & Evaluation

- Reviewing progress of GX, state of CO2 emissions & economies of Japan and the world, and make revisions if necessary
- Taking the necessary legislative measures including the details of ETS within two years after this law is enacted.【Article 11 of the Supplementary Provisions】

Thank you for your attention!