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# Japan Climate Transition Bond Framework

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November 2023

Cabinet Secretariat / Financial Services Agency /  
Ministry of Finance / Ministry of Economy, Trade and Industry /  
Ministry of the Environment

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# 1

## Introduction



Actions for climate change issues have already become a common challenge for all humankind amidst the prevalence of extreme global weather conditions and an increase in natural disasters. In the midst of the heightened movement towards decarbonization globally, with more countries and regions declaring carbon neutral targets, Japan declared its international pledge to achieve 46% reduction of greenhouse gas (GHG) emissions by fiscal year (FY) 2030 compared to FY 2013 and will continue strenuous efforts in its challenge to meet the lofty goal of cutting its emission by 50%, aligned with achieving net zero by 2050, its national target of GHG emissions reduction. Also, Japan has expressed a strong determination to address climate change at the national level by positioning the goals of the Paris Agreement and the “2050 Carbon Neutrality Declaration” as fundamental principles of relevant legislature. Japan has long been advocating for the resolution of environmental issues, with notable milestones such as the adoption of the Kyoto Protocol in 1997 and hosting the “G7 Ministers’ Meeting on Climate, Energy and Environment” in Sapporo as the chair country during the G7 2023. Japan has been leading the international community in accelerating climate change mitigation efforts, including the formulation of agreements to promote global action. Moving forward, Japan will continue to work towards fulfilling international commitments in alignment with the Paris Agreement. To grow vigorously towards the ambitious targets for FY 2030 by fostering a virtuous cycle of the economy and the environment, Japan will promote measures in every possible field such as thorough energy-saving practices, maximum deployment of renewable energy and decarbonization in the public sector and local communities.

However, the Russian invasion of Ukraine in February 2022 has drastically changed the world’s energy situation. Due to the prominent global inflation within the energy industry, Japan faces electric power crunch and higher energy prices,

that is leading the country towards potentially one of the most serious energy crises since the oil shock of 1973. Needless to say, stable energy supply is the core of the lives of the people and corporate activities. Through this crisis, Japan recognized again its vulnerability of its energy supply system and the challenges on energy securities.

For Japan, a country which has experienced a number of energy supply shortages, Green Transformation (GX), which aims to transform the structure of industry and society from being the fossil fuel-centric continuing since the Industrial Revolution to become clean energy-centric, would drive the biggest shift in industrial and energy policies since World War II. Western governments have already accelerated their efforts towards decarbonization further since Russia’s invasion of Ukraine by supporting investments in sectors such as electric power, industry, transportation, households, etc., that contribute to decarbonization and accelerate efforts on early transition towards a decarbonized society. The European Union (EU), formulated its support plan which aims to achieve circa.140 trillion yen investments from public and private sectors in the next 10 years. Part of EU countries also formulated an additional several trillion yen-scaled measures. The US formulated the Inflation Reduction Act<sup>1</sup> in August 2022 which commits circa.50 trillion yen of support in the next decade in addition to the Bipartisan Build Back Better Act<sup>2</sup>. As the EU and the US have accelerated decarbonization support and new initiative on markets and regulations, the world is entering a new era that decarbonization investments towards GX will determine the competitiveness of corporations and countries.

Surrounded by the sea and with scarce resources, Japan has led the research and development on decarbonization technologies where Japanese firms have their technological strengths across many fields. Accelerating GX by utilizing these technological areas as much as possible will lead to a stable energy supply and has potential to be a

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1 The law enacted in August 2022 in the United States aims to simultaneously curb excessive inflation and expedite energy security and climate change mitigation efforts quickly.

2 The law enacted in November 2021 in the United States incorporates a policy of \$1 trillion in public investment.

driving force to help putting the Japanese economy back towards a path of growth. Utilizing the cumulated wisdom in private sector, the nation aims to contribute to achieving carbon neutrality worldwide and also need to achieve economic growth through creating new demand and a market in decarbonization that strengthens the competitiveness of Japanese industry once again.

Through GX realization, Japan aims to achieve its international commitment, i.e., 46% reduction of GHG emissions by FY 2030 compared to FY 2013 and carbon neutrality by 2050, and a society where all people, including future generations, can live with hope while transforming energy supply-demand structures that leads to stable and reasonable energy while revolutionizing our economy and society structure.



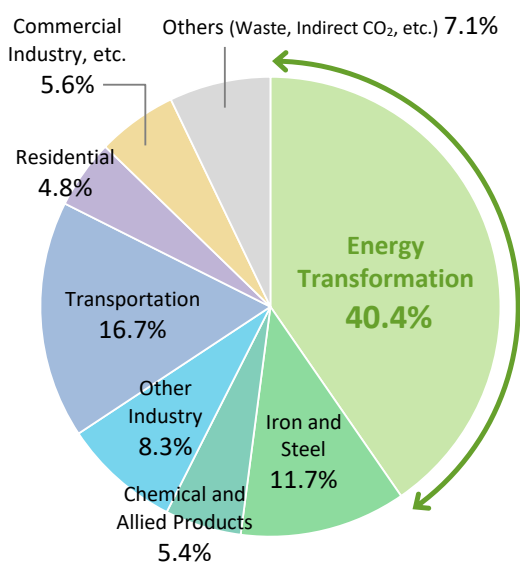
## 1.1 Features and status of Japan as an issuer

In aiming for a society of decarbonization, having an ambitious vision is important, but it is equally important to consider the surrounding circumstances of each country and implement practical measures. Japan has geographical characteristics such as being surrounded by sea on all sides, lacking international interconnections and pipelines, not being rich in fossil resources, and having limited shallow seas and flat land area other than forests. As a result, reliable energy technologies have been developed, forming the basis for a supply chain. The energy infrastructure (including power transmission lines, gas pipelines, and gasoline stations) is already well-established nationwide and energy efficiency is extremely high, especially in energy-intensive industries. On the other hand, the planned power outages and fuel supply disruptions following the Great East Japan Earthquake in March 2011 and the large-scale power outages caused by the Hokkaido Eastern Iburi earthquake in September 2018 rediscovered

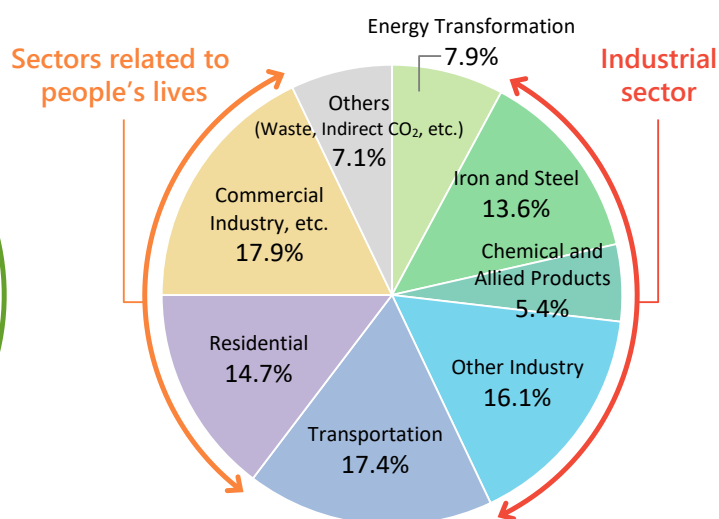
the vulnerability of the existing energy infrastructure and its risks to people's lives and economic activities. Also, Japan's energy self-sufficiency rate was 13.3% in FY 2021 in which the country has largely depended on imported oil, coal and Liquefied Natural Gas since the Great East Japan Earthquake in 2011.

In order to achieve GX, it is necessary to address sectors with high emissions. Efforts in emission reduction is essential not only in the energy transformation sector such as power generation, but also industrial sectors like steel and chemical that contribute significantly to post-distribution emissions, as well as sectors closely related to people's daily lives such as households, transportation, commercial and educational facilities. Also, among the technologies that contribute to reducing emission in each sector effectively and efficiently, priority would be given to the technologies particularly effective for enhancing industrial competitiveness and economic growth.

**Breakdown of emissions before electricity and heat distribution**



**Breakdown of emissions after electricity and heat distribution**



Source: Japan National Institute for Environmental Studies (based on emissions in the fiscal year 2021)

In these circumstances, renewable energy introduction has been largely increasing by the Feed-in Tariff system (FIT system)<sup>3</sup> started in July 2012. Solar power generation in particular has increased to 8.3% in FY 2021 from 0.4% in FY 2011. From a renewable energy perspective, it has increased to 20.3% from 10.4%. According to an international agency's analysis, Japan is placed 6<sup>th</sup> in the world for the amount of renewable energy introduced, and ranked 3<sup>rd</sup> for solar power. Solar power has grown fourfold in the past 8 years, placing among the top tier in terms of growth pace in the world. Japan's solar power per area of land is the largest scale in major countries. However, as mentioned earlier, considering the geographical constraints, features in renewable energy and necessity of stable procurement to reduce damage in disaster, further efforts are essential. In addition to existing initiatives, Japan will promote decarbonization of electricity through maximizing the adoption of renewable energy, developing interconnector lines to facilitate inter-regional power transmission and utilizing nuclear power and zero-emission thermal power. Furthermore, Japan also plan to introduce energy-saving technologies that have been the focus of our efforts for many years and reduce GHG emissions from heat demand in manufacturing and process-related emissions where there are currently no viable alternatives for decarbonization.

The Government of Japan believes the creation of these new technologies will also make a significant contribution to emission reduction in Asia where over a half of the world's emission originate.

## 1.2 Japan's efforts on sustainable finance

The Government of Japan has been proactively building an enabling environment on sustainable finance towards the promotion of efforts to address climate change issues through finance. Specifically, based on the recommendations of the High Level Meeting on ESG Finance compiled in 2018, Japan has established the "The High-Level Panel on ESG Finance" as a platform for collaboration and discussions among top leaders in the financial and investment sectors, the academia and related government agencies. The panel is held annually to facilitate discussions aimed at promoting ESG finance in the country. Also, Japan also formulated the Green Bond Guidelines following international principles in March 2017 for the promotion of domestic green finance. Furthermore, Japan revised the guidelines and formulated the Green Loan and Sustainability Linked Loan Guidelines in March 2020.

In addition, following developments such as the International Capital Markets Association (ICMA)'s revision of its Green Bond Principles in June 2021 and 2022, the Loan Market Association's revision of its Sustainability Linked Loan Principles in May 2020 and 2021, March 2022 and February 2023, international trends in discussion to address the so-called "greenwashing" and various domestic development of measures, Japan set the "Committee on Green Finance" and formulated the "Green Bond and Sustainability Linked Bond Guidelines 2022" and the "Green Loan and Sustainability Linked Loan Guidelines 2022" in July 2022 with the aim to develop our sustainable finance market further soundly and appropriately.

In addition to further promotion of green investment in areas such as renewable energy, it is also important to promote the transition in decarbonization such as low carbon initiatives in hard-to-abate sectors (the industrial and energy conversion sectors where there are no alternative measures for decarbonization technically and economically at this moment) from the viewpoint

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<sup>3</sup> The system in which the government guarantees that electric power companies will purchase electricity generated from renewable energy at a fixed price for a certain period.

of steady reduction of GHG emissions around the world to achieve the Paris Agreement's goal.

For this reason, there is a need to actively provide financing for energy efficiency and other initiatives for the decarbonization of hard-to-abate sectors and for initiatives that contribute to its decarbonization transition, such as long-term research and development.

Singapore, Australia, Canada and other countries are proceeding with initiatives that take into account the characteristics specific to their respective region. Giving due consideration to the developments of these countries, with the aim to share a globally uniform approach, ICMA published the "Climate Transition Finance Handbook" in December 2020.

In Japan, in line with the handbook, the Financial Services Agency (FSA), the Ministry of Economy, Trade and Industry (METI) and the Ministry of the Environment (MOE) announced the "Basic Guidelines on Climate Transition Finance"<sup>4</sup> in May 2021. The guidelines and sector specific roadmaps, which are described later, led to the market growth of transition finance in the private sector (JPY 1 trillion as of March 2023<sup>5</sup>). Building this enabling environment contributed to securing the credibility on the 'transition finance' label and started to establish this as funding measure towards climate transition especially in hard-to-abate sectors.

Furthermore, at the G7 Hiroshima Summit in May 2023, where Japan held a Presidency, the leaders "highlight[ed] that transition finance [...] has a significant role in advancing the decarbonization of the economy as a whole", representing the importance of transition finance increasing globally. Japan will deepen its relationship with other Asian countries to disseminate the transition in Asia where highly depends on fossil fuel like Japan.



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4 [Basic Guidelines on Climate Transition Finance](#)

5 Based on information from the Ministry of the Environment's "Green Finance Portal", the Ministry of Economy, Trade and Industry's "Transition Finance" and other publicly available sources. This also includes undisclosed loan amounts obtained through interviews and other means



## 1.3 Formulation of Japan Climate Transition Bond Framework

### 1.3.1 Concept of GX

According to the International Energy Agency (IEA)<sup>6</sup>, roughly half of CO<sub>2</sub> emission cannot be reduced by existing technologies. The IEA highlights the importance of innovation support through sovereign (i.e., national governments and government agencies) bonds from the viewpoint of utilizing national credit, as there is a risk private firms cannot resolve entirely on their own.

In these circumstances, Japan is in a leading position on new technologies and business development to solve challenges such as the limitation of available renewable energy, heat demand and demand of raw material within the industrial sector. Funding these technologies and businesses will lead to innovation and significantly contribute to decarbonization in areas where existing technologies are not sufficient.

In addition, keeping in mind of geopolitical risks such as the Ukraine crisis, middle-to-long term steady decarbonization by securing energy supply and security is necessary. Furthermore, considering Japan's high manufacturing industry ratio and low job mobility, just transition<sup>7</sup> is an important challenge where it is essential to promote a comprehensive policy package such as design of carbon pricing (CP) with predictability and consideration at GX Implementation Council<sup>8</sup> with experts from labor and economic community.

### 1.3.2 Concept of GX Economy Transition Bond

Firstly, Japan's GX Economy Transition Bond will support those who proactively challenge decarbonization (support for first movers) with future CP scheme as its redemption resource. Future CP introduction has been legally designated by "Act for Promoting a Smooth Transition to a Decarbonized Growth-Oriented Industrial Structure" (GX Promotion Act). Therefore, entities who emit CO<sub>2</sub> are incentivized to change their activity to avoid the future CP burden by making early decarbonization investments.

Secondly, as one of its purposes, the GX Economy Transition Bond includes projects which aims to transition towards decarbonization. By including these projects in its use of proceeds, it aims to encourage transition investments from private firms and promote transition finance from private financial institutions.

Thirdly, by issuing the GX Economy Transition Bond as individual securities (Japan Climate Transition Bond), Japan will establish the structure to implement measures towards steady decarbonization through conversation with investors and markets and periodical reporting, etc.

As described above, Japan formulated the Climate Transition Bond Framework (the Framework) to raise the necessary funds for promoting GX in Japan. Issuing climate transition bonds based on the Framework, Japan will implement 20 trillion yen scale of bold upfront investment to increase policy predictability and will achieve GX with public-private cooperation.

In addition, Japan expect the Framework will be one of the milestones of transition finance and a catalyst for further transition finance promotion and funding by private sectors.

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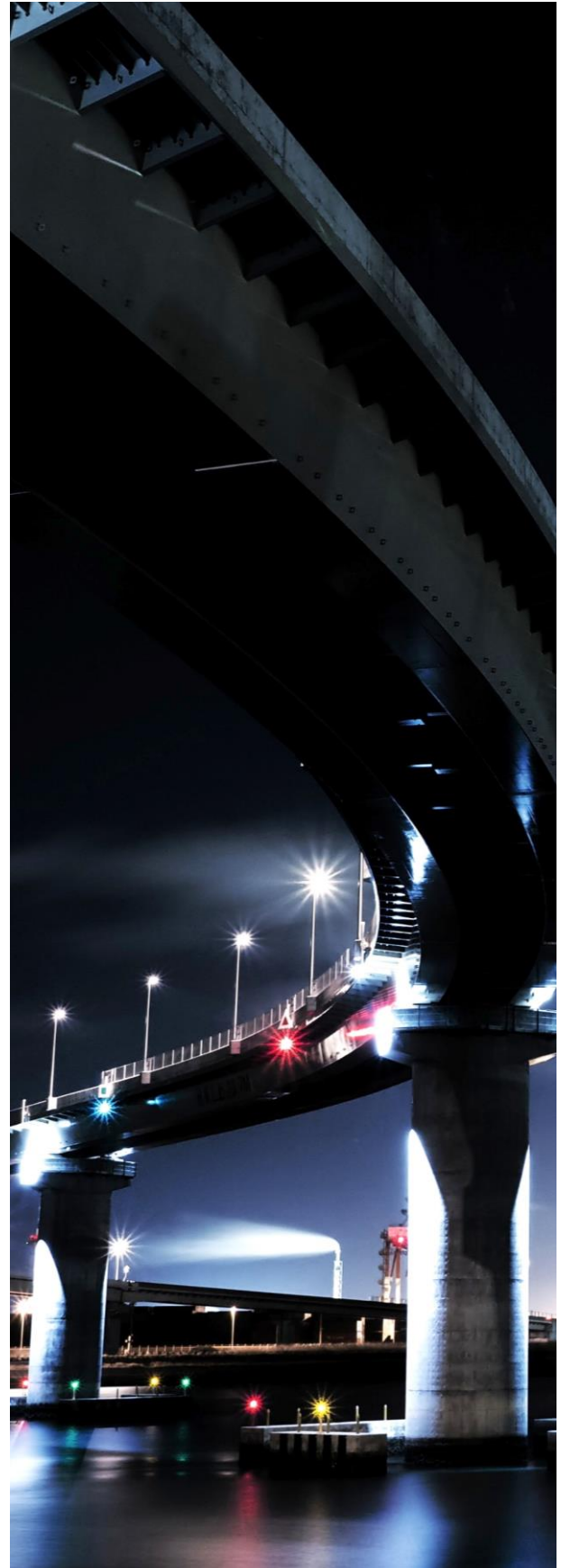
6 The International Energy Agency (IEA) was established in 1974 as an autonomous agency within the framework of the Organization for Economic Co-operation and Development (OECD).

7 Support for industries, workers, and regions that will face a relatively large burden as a result of implementing climate change measures.

8 The meeting held in the Cabinet Secretariat to achieve the overall transformation of the economic and social system, known as GX. The Prime Minister serves as the chairperson of the meeting.

The Framework is aligned with the principles and guidelines below.

- Green Bond and Sustainability Linked Bond Guidelines 2022 (MOE)
- Green Bond Principles 2021 (ICMA)
- Climate Transition Finance Handbook (ICMA)<sup>9</sup>
- Basic Guidelines on Climate Transition Finance (FSA, METI and MOE)



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<sup>9</sup> On page 3 of the [Climate Transition Finance Handbook](#) issued by the International Capital Market Association (ICMA), it defines bonds with specified use of proceeds as being aligned with Green Bond Principles.

# 2

## Disclosure based on the four key elements of Climate Transition Finance Handbook



## 2.1 Issuer's climate transition strategy and governance

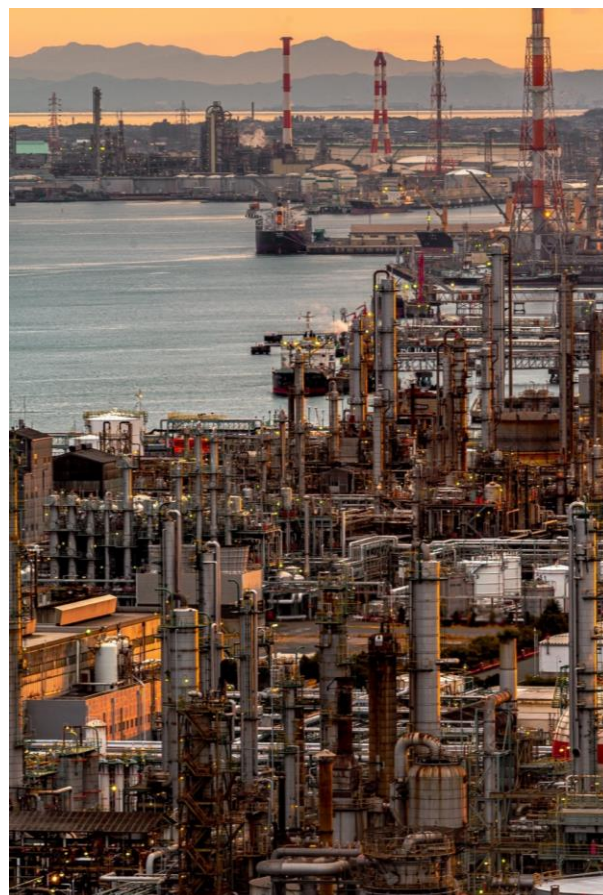
### Climate transition strategy of Japan

#### 2.1.1 Japan's strategies for realizing Carbon Neutrality by 2050 and 46% GHG reduction in FY 2030

In October 2020, the Government of Japan declared its commitment to achieve net zero by 2050 in line with the Paris Agreement (to hold the increase in the global temperature to well below 2°C above and pursuing efforts to limit the temperature increase to 1.5°C). The Act on Promotion of Global Warming Countermeasures was amended to establish a legislative framework in the following year.

Moreover, in April 2021, Japan stated its intention to reduce its GHG emissions by 46% in FY 2030 (compared to FY 2013 levels) and continue strenuous efforts in its challenge to meet their aspirational goal of cutting emission by 50%. In October 2021, based on the new GHG emission reduction goal, the "Plan for Global Warming Countermeasures"<sup>10</sup> was amended. This plan covers all greenhouse gases including those other than CO<sub>2</sub> and outlines countermeasures and policies that support the new targets for the FY 2030. Additionally, the "Long-term Strategy under the Paris Agreement" was also amended to show basic concepts and the vision for carbon neutrality by 2050. Japan's NDC (Nationally Determined Contributions)<sup>11</sup> was decided and submitted to UNFCCC. In order to show the roadmap for achieving new GHG emission reduction goal, the Sixth Strategic Energy Plan<sup>12</sup> was approved by the cabinet in October 2021. Furthermore, by proposing GX, the industrial and social structure

will be transformed from fossil fuel-centered since the Industrial Revolution towards a clean energy-centered structure. Since 2022, the GX Implementation Council, chaired by the Prime Minister has been held to facilitate discussions with experts, and the "Basic Policy for the Realization of GX" was established in February 2023. In the 211<sup>th</sup> Ordinary Session of the Diet, the "GX Promotion Act" and the "GX Decarbonization Electricity Act"<sup>13</sup> were established and the "Pro-Growth Carbon Pricing Concept" was materialized. In July 2023, to implement decarbonization policies, "The Strategy for Promoting Structural Transition based on Decarbonization (GX Promotion Strategy)" was approved by the cabinet based on GX Promotion Act.



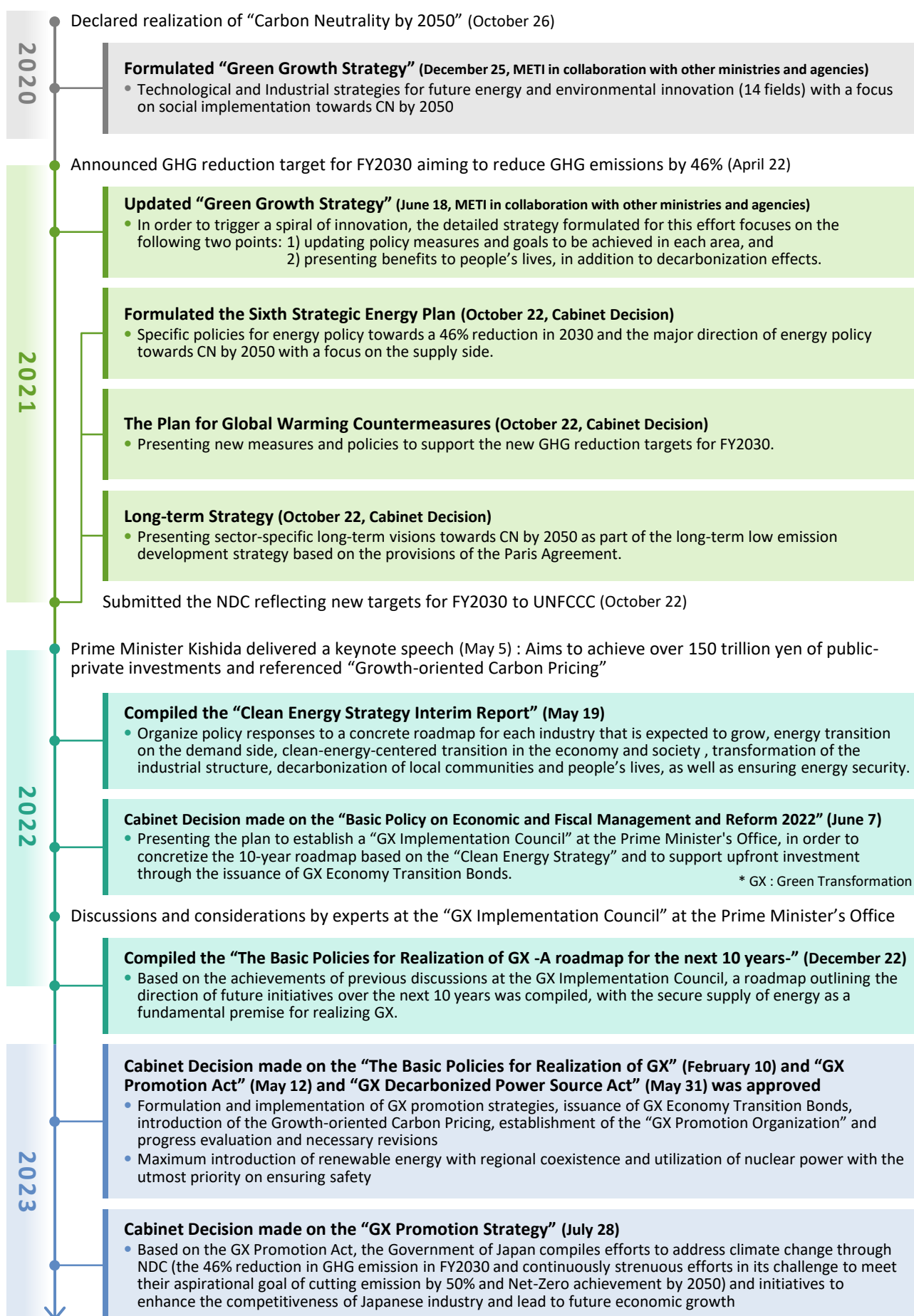
<sup>10</sup> The government's comprehensive plan based on the Act on Promotion of Global Warming Countermeasures was decided by the Cabinet on May 13, 2016, and was revised for the first time in five years in October 2021. It outlines the measures and policies that support the FY 2030 targets and provides a roadmap towards achieving the new goal.

<sup>11</sup> Abbreviation of Nationally Determined Contribution. Under the Paris Agreement (adopted in December 2015, effective from November 2016), all countries are obligated to submit and update their greenhouse gas emission reduction targets every five years as their "nationally determined contributions".

<sup>12</sup> The plan stipulated in the Energy Policy Basic Act enacted in 2022. The Sixth Strategic Energy Plan was decided by the Cabinet in October 2021.

<sup>13</sup> The law named "Act for Partial Revision of the Electricity Business Act and Other Acts for Establishing Electricity Supply Systems for Realizing a Decarbonized Society".

## Strategies towards achieving carbon neutrality (CN) in 2050 and a 46% reduction in GHG emission by 2030



## 2.1.2 Strategic Energy Plan

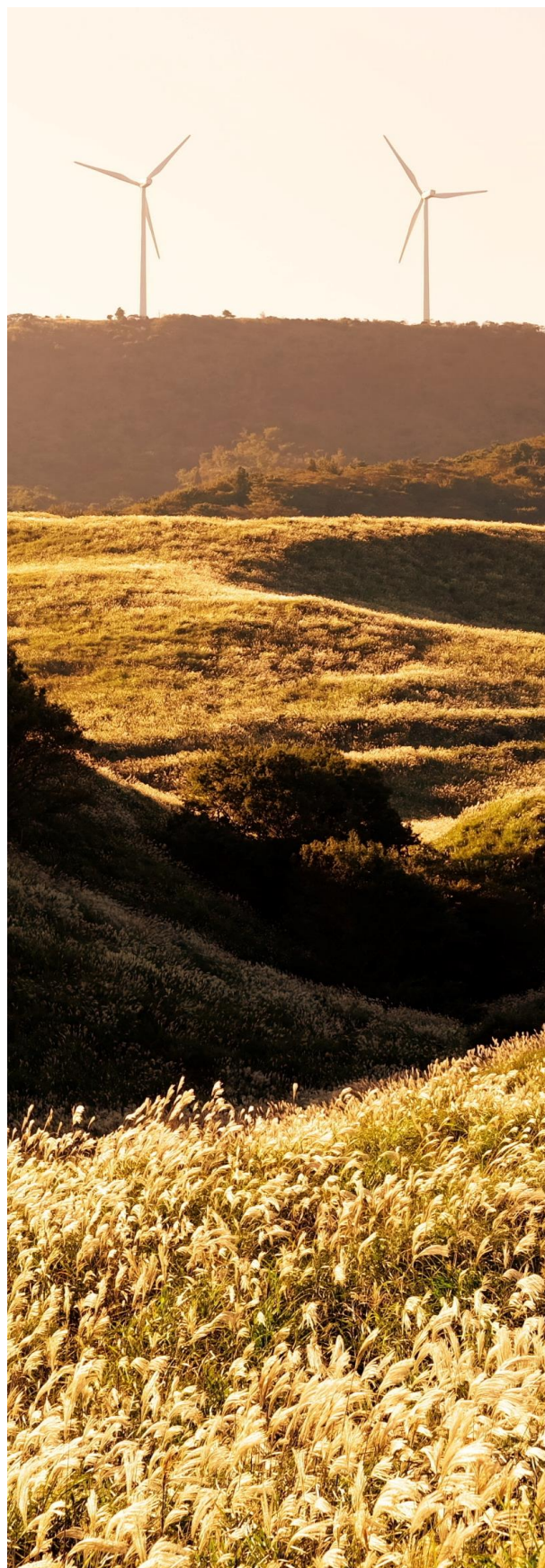
Based on following two perspectives, addressing climate change and overcoming issues in the energy supply-demand structure, the Sixth Strategic Energy Plan was formulated in October 2021. The Plan consists of a long-term outlook towards achieving carbon neutrality by 2050 and policy measures for 2030. It outlines the path for future energy policies.

The GHG emission reduction targets for FY 2030 are ambitious and aligned with the goal of carbon neutrality by 2050. All the various measures and technological developments in the energy sector that will be pursued towards 2030 will contribute to achieving carbon neutrality by 2050.

To achieve the ambitious reduction targets for FY 2030, existing technologies will be maximized. Additionally, towards carbon neutrality by 2050, these efforts will be expanded and deepened to advance decarbonization of energy and to develop and disseminate decarbonization technologies that are not currently implemented in society.

However, it is unrealistic to accurately predict the success or failure of various technological developments and innovations towards 2050. It is necessary to continuously determine the priorities of policies and technological developments based on the latest information while setting the ambitious goal of achieving carbon neutrality by 2050.

It is fundamentally essential to ensure safety while pursuing a stable and affordable energy supply when aiming for carbon neutrality by 2050, where implementing decarbonization measures without excluding various opportunities that engage in technological development for innovation. Based on the principle of S + 3E<sup>14</sup>, the basic strategy of future energy policies will be based on the idea of utilizing all available technologies, with the aim to achieve the reduction targets for FY 2030 and the ambitious goal of carbon neutrality by 2050.



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14 S + 3E stands for Safety, Energy security, Economic Efficiency, and Environment, S + 3E is the principle of energy policy in Japan.

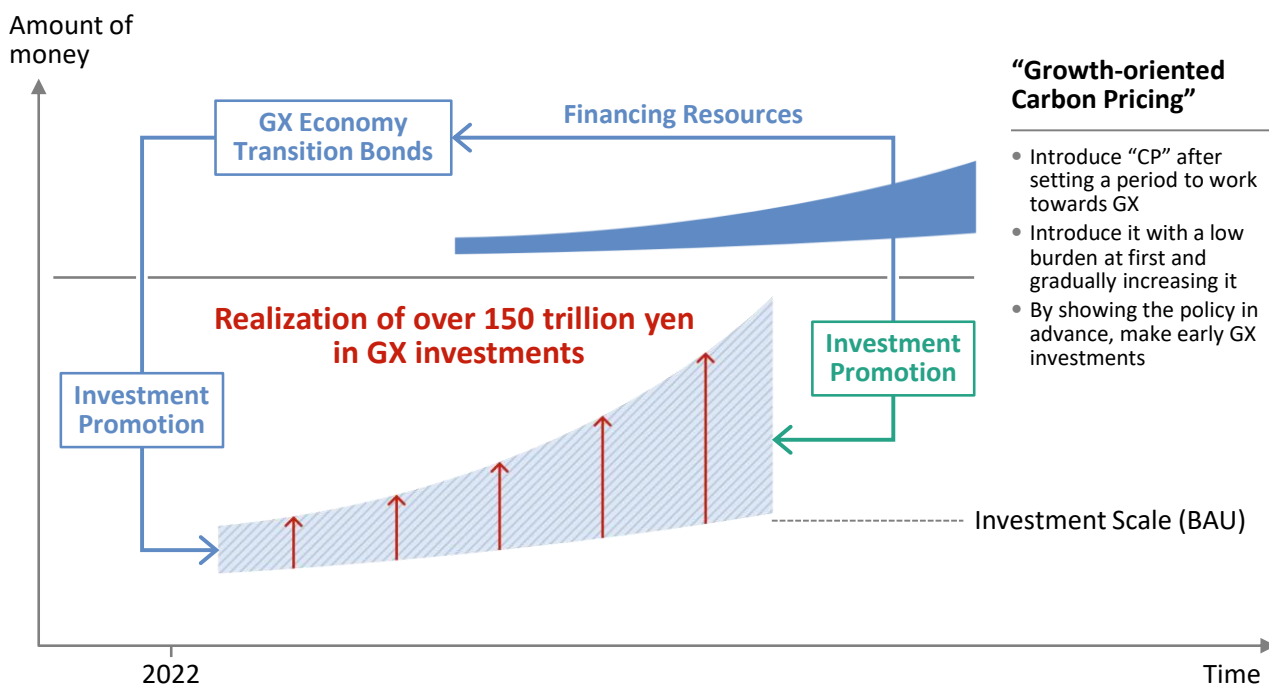
### 2.1.3 GX Promotion Strategy

As mentioned above, Japan set international commitments to reduce GHG emissions by 46% in FY 2030 (compared to FY 2013) and achieve carbon neutrality by 2050. In order to contribute to these goals, Japan has formulated “The Basic Policy for the Realization of GX” as a transition strategy (approved by the Cabinet in February 2023), and in July 2023, the “Strategy for Promoting Transition to a Decarbonized, Growth-Oriented Economic Structure” (hereinafter “GX Promotion Strategy”) was approved by the Cabinet based on the GX Promotion Act.

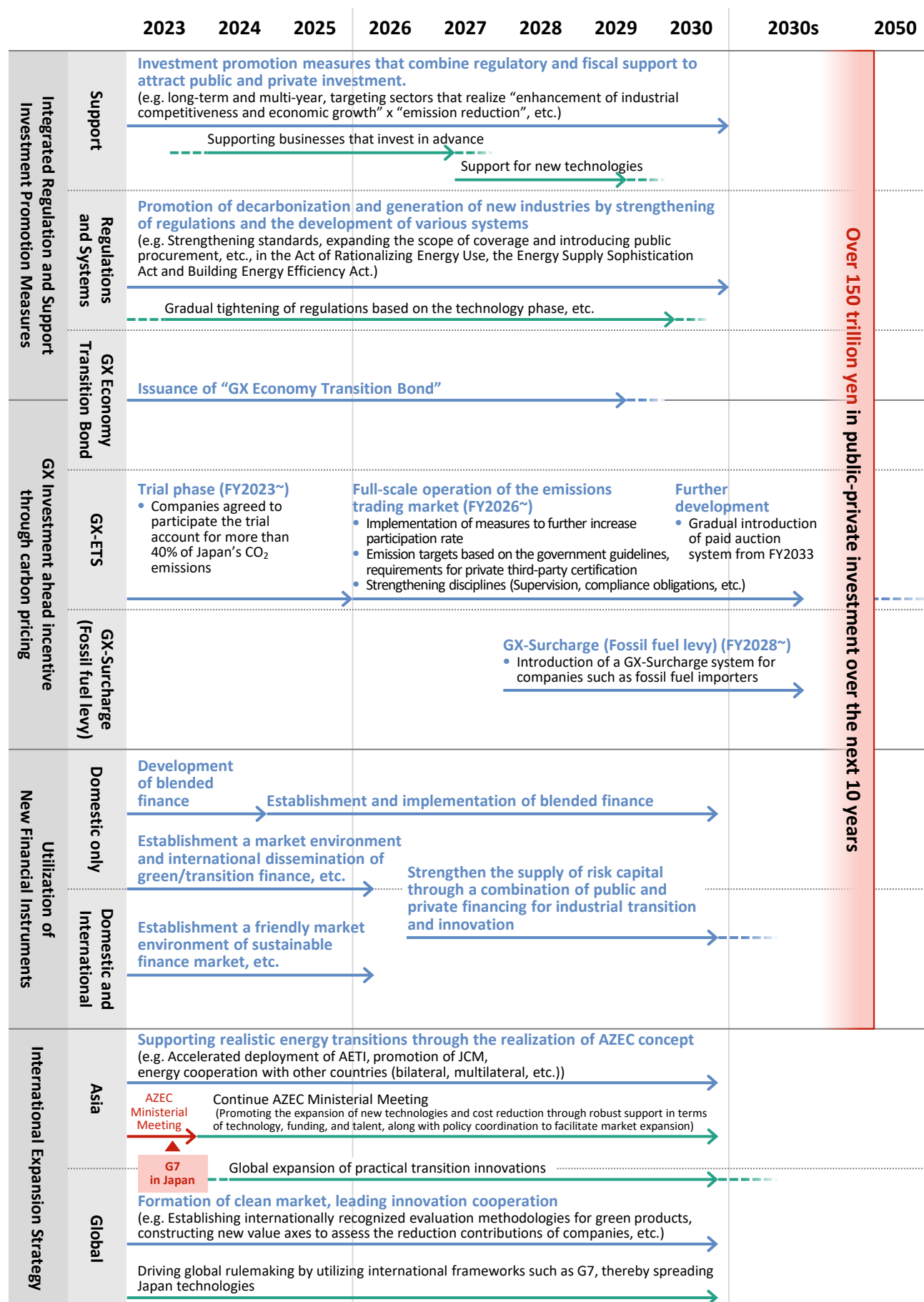
In the GX promotion strategy, the following two key initiatives are established for achieving the above international commitments, ensuring energy stable supply, and realizing economic growth.

1. To ensure a stable energy supply, transition towards decarbonization should be promoted through measures such as energy conservation and transformation of power sources that contribute to improving energy self-sufficiency, including renewable energy and nuclear power.
2. To achieve GX, it is necessary to implement and execute the “Growth-oriented Carbon Pricing Concept,” which includes bold upfront investment support utilizing instruments such as “GX Economy Transition Bonds,” incentives for GX investment through carbon pricing, and the utilization of new financial mechanisms.

Based on these strategies, new policy initiatives will be promptly implemented and following “Roadmap for next 10 years” will be formulated and executed.



## Overview of the roadmap for the next 10 years





Furthermore, reducing emissions in hard-to-abate sectors will be focused in order to achieve GX. Specifically, in addition to the energy sector (such as power generation), measures to reduce emissions will be implemented in industrial sectors such as iron and chemical industries, which account for a significant portion of post-electricity and heat distribution emissions, as well as sectors closely related to the lives of the population, such as households, transportation, and educational facilities. Especially, priority will be given to measures that are highly effective in enhancing industrial competitiveness and economic growth, aiming for a balance between the environment and the economy.

(For ensuring Just Transition)

The GX promotion strategy aims to enhance Japan's industrial competitiveness by transitioning to clean energy and decarbonizing, leading to future economic growth, expanded employment, and increased income. It also contributes to a just transition. Supporting smooth labor migration from fossil fuel-related industries to low-carbon industries not only ensures the livelihoods and employment of nations but also contributes to the economic growth of our country. Therefore, considering the realities of each industry, necessary support will be provided at the national level, including talent development in universities and other institutions. Additionally, Article 3 of the GX Promotion Act stipulates that, as a basic principle of the Act, close collaboration between the government and businesses will be established, taking into account the perspective of a just transition.

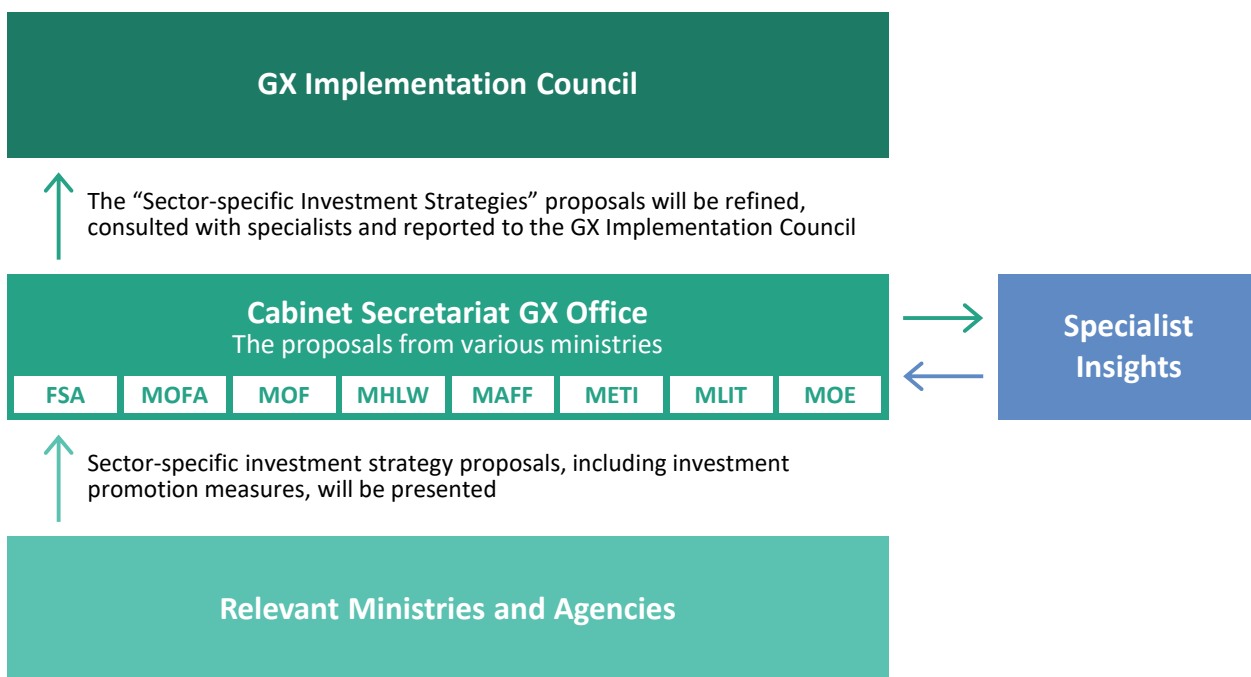


### 2.1.4 Governance

The GX Implementation Council, chaired by Prime Minister has been held since July 2022 for the implementation of Japan’s GX. In the council, the direction of the policy is determined through the discussion among ministers from relevant ministries and experts. Furthermore, as stated in section 3.2, the Ministries and Agencies Liaison Conference has been established to discuss GX Economy Transition Bonds under the GX Implementation Conference.

Moreover, regarding the current status grasp and measures for GHG emissions and absorption in Japan, annual follow-ups are conducted in various fields such as energy transition, industry, transportation and household according to the Plan for Global Warming Countermeasures formulated based on Act on Promotion of Global Warming Countermeasures. The result of follow-ups is approved by Global Warming Prevention Headquarters, which involves all ministers.

As mentioned above, each strategy is appropriately and timely reviewed according to the necessity and change of the circumstances.



- FSA** : Financial Services Agency
- MOFA** : Ministry of Foreign Affairs
- MOF** : Ministry of Finance
- MHLW** : Ministry of Health, Labour and Welfare
- MAFF** : Ministry of Agriculture, Forestry and Fisheries
- METI** : Ministry of Economy, Trade and Industry
- MLIT** : Ministry of Land, Infrastructure, Transport and Tourism
- MOE** : Ministry of the Environment

## 2.2 Business model environmental materiality

GX in Japan is to transform the structure of industry and society from being fossil fuel-centric since the Industrial Revolution to a clean energy-centric. This means a major transition in industrial and energy policies.

While there are a lot of research fields related to decarbonization technologies in which Japanese companies have technological strength, leveraging this knowledge to accelerate GX can contribute not only to ensuring a stable energy supply but also to re-strengthening Japan's industrial competitiveness by creating new demand and markets in the decarbonization sector. This aspect is also mentioned in the “Basic Policy on Economic and Fiscal Management and Reform” established in June 2022, “The Basic Policies for Realization of GX” set in February 2023, the “Grand Design and Action Plan for a New Form of Capitalism” formulated in June 2023, and the “GX Promotion Strategy” approved by the Cabinet in July 2023.

Considering these perspectives, GX can be seen as an initiative that contributes to the transformation of core business activities in Japan, which are crucial for the environment, both now and in the future.

## 2.3 Climate transition strategy with Science-Based targets

### 2.3.1 Sector-Specific Roadmaps for promoting Transition Finance

The target of reducing GHG emissions by 46% in FY 2030 (compared to FY 2013) and achieving carbon neutrality by 2050 is the mid and long term strategy set by Japan as a transition pathway, which is aligned with the goals of the Paris Agreement. All GHGs outlined in the IPCC<sup>15</sup> guidelines are covered, with a coverage rate of 100% for absolute GHG emissions.

Moreover, specific policy implementation is outlined in the future pathway of Plan for Global Warming carbonization for each of the 22 mentioned sectors (see section 2.3.2 Policy roadmap). These policies are in alignment with the roadmaps below (Technology Roadmaps) developed by the METI and related ministries. These Technology Roadmaps cover so called hard-to-abate sectors such as Iron and Steel, Chemical, Power, Gas, Oil, Pulp and Paper, Cement, and Automobile sectors. Each sector-specific roadmap presents a pathway for reducing CO<sub>2</sub> emissions with the introduction of low-carbon and decarbonization technologies, aiming to achieve carbon neutrality by 2050. The sector-specific roadmaps demonstrate the phased conversion, decommissioning, and discontinuation of technologies and facilities towards emission reduction, providing a clear plan and timeline. Implementation of upfront investments towards these goals leads to avoiding lock-in during the transition.

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15 Intergovernmental Panel on Climate Change. The organization was established by World Meteorological Organization(WMO) and United Nations Environment Programme(UNEP) in 1988.

- Technology Roadmap for “Transition Finance” in Iron and Steel Sector
- Technology Roadmap for “Transition Finance” in Chemical Sector
- Technology Roadmap for “Transition Finance” in Power Sector
- Technology Roadmap for “Transition Finance” in Gas Sector
- Technology Roadmap for “Transition Finance” in Oil Sector
- Technology Roadmap for “Transition Finance” in Pulp and Paper Sector
- Technology Roadmap for “Transition Finance” in Cement Sector
- Technology Roadmap for “Transition Finance” in Automobile Sector
- Roadmap to Zero Emission from International Shipping
- Domestic Marine Transport/Summary of the Study Group for Promoting Carbon Neutral Domestic Marine Transport
- Aviation Sector/Procedure Chart for the Promotion of Decarbonization of Aviation

### 2.3.2 Policy roadmap

Although the overall roadmap for the next 10 years is as outlined in “2.1.3 GX Promotion Strategy”, reference material of “The Basic Policy for the Realization of GX”, which is the basis of GX Promotion Strategy, also compiles the pathway of decarbonization for each of the 22 sectors (hydrogen and ammonia, battery industry, iron and steel industry, chemical industry, cement industry, pulp and paper industry, automotive industry, resource circulation industry, housing and buildings, digital investments for decarbonization purposes, aviation industry, zero-emission vessels, bio-based manufacturing, renewable energy, next-generation IT networks, next-generation innovative reactors, transportation sector, infrastructure sector, carbon recycling fuels, CCS (Carbon Capture and Storage), food, agriculture, forestry and fisheries, and regional development and lifestyle)<sup>16</sup>. Regarding these pathways, concrete “sector-specific investment strategies (roadmaps)” for the next 10 years will be further developed and finalized. Within these roadmaps, a “preliminary 5-year action plan” with a focus on achieving carbon neutrality by 2050 will be formulated. The detailed content of these strategies and action plans will be determined through the GX Implementation Council, taking into account objective indicators and expert knowledge.

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<sup>16</sup> [The Basic Policy for the Realization of GX : Reference document](#)

## 2.4 Implementation transparency

Japan aims to achieve over 150 trillion yen of public-private investments in next decade via attracting private companies' investment by providing regulations and supports in an appropriate manner according to business risks and business environment of each sector.

In the global competition for GX investments, Japan will provide government support of sufficient scale and term, taking into account the trends in investment support in other countries and past support achievements.

Starting from the FY 2023, Japan will implement approximately 20 trillion yen upfront investment support over the following 10 years. The image of the government's support is as follows. Based on the GX Promotion Strategy and each roadmap outlined in 2.3, upfront investment support will be implemented for the transition to non-fossil energy sources such as in our country, features in and structures through the effort of both demand and

supply side, especially in the manufacturing sector such as steel and chemical, promotion of substantial energy conservation, and the investment in research and development of resource circulation, carbon capture, and other technologies.


Furthermore, based on the "GX Promotion Strategy" outlined in section 2.1.3, CP will be introduced as part of the Pro-Growth Carbon Pricing Concept. The CP will be initially implemented with a low burden, and the burden will be gradually increased. By demonstrating this from the outset, it leads to encourage upfront GX investments from both the public and private sectors. As outlined in Section 2.1.3, these policies take a just transition into account and support the smooth transition of labor from fossil fuel-related industries to low-carbon industries.

### Breakdown of government support over the next decade 20 trillion yen

<b>Expansion of non-fossil energy</b>	<b>6~8 trillion yen</b>	<p><b>Example</b></p> <ul style="list-style-type: none"> <li>Support for demand expansion of hydrogen and ammonia</li> <li>Research and development of new technologies related to renewable energy etc.</li> </ul>
<b>Transformation of industrial structure on both supply and demand sides &amp; Drastic reinforcement of energy saving</b>	<b>9~12 trillion yen</b>	<p><b>Example</b></p> <ul style="list-style-type: none"> <li>Energy conservation and fuel conversion for structural reform and improving profitability in the manufacturing industry</li> <li>Nationwide measures addressing domestic energy demands</li> <li>Achieve drastic energy savings etc.</li> </ul>
<b>Resource recycling and carbon fixation technologies etc.</b>	<b>2~4 trillion yen</b>	<p><b>Example</b></p> <ul style="list-style-type: none"> <li>R&amp;D and implementation of new technologies etc.</li> </ul>

### Overall public and private investment over the next decade 150 trillion yen

<b>60 trillion yen~</b>	<ul style="list-style-type: none"> <li>Massive introduction of renewables</li> <li>Nuclear energy (R&amp;D of innovative reactors, etc.)</li> <li>Hydrogen and ammonia etc.</li> </ul>
<b>80 trillion yen~</b>	<ul style="list-style-type: none"> <li>Energy saving and fuel conversion in the manufacturing industry (e.g., steel, chemicals, cement)</li> <li>Digital investment for decarbonization</li> <li>Establishment of battery industry</li> <li>Structural transformation of ship and aircraft industries</li> <li>Next-generation automobiles</li> <li>Housing and Buildings etc.</li> </ul>
<b>10 trillion yen~</b>	<ul style="list-style-type: none"> <li>Resource recycling industry</li> <li>Bio manufacturing</li> <li>CCS etc.</li> </ul>


 Attracting private investment in conjunction with regulations, etc

# 3

## Climate Transition Bond Framework



### 3.1 Use of Proceeds

The proceeds will be allocated towards initiatives aligned with the “GX Promotion Strategy” described in 2.1.3, aiming to achieve the internationally committed goal of carbon neutrality by FY 2050 and a 46% reduction (compared to FY 2013) in 2030 in line with the Paris Agreement. The Government of Japan will allocate the proceeds to the projects described in the “GX Promotion Strategy”. Priority is given to investments in sectors that contribute to emission reduction, enhance industrial competitiveness and economic growth which are truly difficult for the private sector alone to make investment judgment on, taking into account the benefits and burdens associated with future CP (fossil fuel surcharge and specific business operator burden in the power sector)<sup>17</sup> that will be a redemption source of the GX Budget<sup>18</sup>. The basic concept will be explained in 3.1.1.

The implementing entities of the projects primarily include companies in hard-to-abate sectors participating in the “GX-ETS”<sup>19</sup>. Furthermore, based on the concept of a regulation-and-support integrated investment promotion policy, The Government of Japan will consider integrating support measures to promote active engagement in emission reduction of companies in hard-to-abate sectors that join in GX League<sup>20</sup> through the GX Economy Transition Bonds during the gradual development of the GX League.

For the achievement of GX investments through public-private collaboration, Government of Japan will allocate the proceeds for subsidies, equity investments and debt guarantees<sup>21</sup> considering

business risks (such as technological and market risks) in each field and technology from research and development to social implementation to enhance the predictability of private businesses by long term and multiple years governmental support measures.

In the “GX Promotion Strategy”, there are 14 “Future Actions” initiatives listed under the “Decarbonization initiatives towards GX based on the premise of ensuring a stable energy supply” for achieving decarbonization by both public and private. These initiatives are categorized as shown in Table 1. Going forward, these initiatives will be organized as eligible criteria for climate transition bonds.

Each initiative may fall under multiple categories of eligibility criteria, such as energy conservation promotion, and there are also policies that cross-cut multiple eligibility criteria, such as research and development projects, startup support, and promoting just transition.

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17 Regarding GX Economy Transition Bonds, it is legally mandated under Article 8 of the GX Promotion Act to repay them by FY 2050, using the revenue from fossil fuel levies and specific business operator contributions. Specifically, starting from FY 2028, the Minister of Economy, Trade and Industry will levy a fossil fuel levy on importers of fossil fuels based on the amount of CO<sub>2</sub> derived from the imported fuels. Additionally, starting from FY 2033, power generation operators will be allocated a partially paid CO<sub>2</sub> emission quota and will be required to pay a specific business operator contribution based on the allocated quota.

18 The GX League consists of approximately 600 companies covering over 40% of Japan's total emissions and will be developed further. From FY 2026, an emissions trading system, “GX-ETS”, will be fully implemented, leading to a gradual introduction of paid auctions in the future.

19 The emissions trading system is a mechanism that sets a cap on greenhouse gas emissions and allows business operators to buy and sell emission allowance.

20 Companies participating in the GX League are actively practicing carbon credits trading, etc., towards carbon neutrality by 2050 and the ambitious NDCs. Support measures through GX Economy Transition Bonds are designed to be integrated with the concept of “regulation and support integration”.

21 Japan anticipate financial support such as debt guarantees and equity investments through GX Promotion Organization within eligible projects.

**Table 1: The approach for classifying eligibility criteria based on energy supply and demand**

Classification of energy supply and demand	Sector classification	Eligibility criteria	
Energy supply side	GX in energy transition	<ul style="list-style-type: none"> <li>● Making renewable energy a major power source</li> <li>● Utilization of nuclear power</li> <li>● Facilitating introduction of hydrogen and ammonia</li> </ul>	<ul style="list-style-type: none"> <li>● Establish electricity and gas markets to achieve carbon neutrality</li> <li>● Battery industry</li> </ul>
		<ul style="list-style-type: none"> <li>● Promotion of thorough energy efficiency improvement and restructuring the manufacturing industry (through fuel and feedstocks transition)</li> <li>● Battery industry</li> </ul>	<ul style="list-style-type: none"> <li>● GX in transport sector</li> <li>● Digital investment aimed at decarbonization</li> <li>● Houses and buildings</li> <li>● Infrastructure</li> </ul>
Energy demand side	GX in industry	<ul style="list-style-type: none"> <li>● Promotion of thorough energy efficiency improvement and restructuring the manufacturing industry (through fuel and feedstocks transition)</li> <li>● Facilitating introduction of hydrogen and ammonia</li> <li>● Battery industry</li> <li>● Resource circulation</li> </ul>	<ul style="list-style-type: none"> <li>● GX in transport sector</li> <li>● Digital investment aimed at decarbonization</li> <li>● Houses and buildings</li> <li>● Infrastructure</li> <li>● Carbon Recycling and CCS</li> <li>● Food, agriculture, forestry, and fisheries industry</li> </ul>
		<ul style="list-style-type: none"> <li>● Promotion of thorough energy efficiency improvement and restructuring the manufacturing industry (through fuel and feedstocks transition)</li> <li>● Battery industry</li> </ul>	<ul style="list-style-type: none"> <li>● GX in transport sector</li> <li>● Digital investment aimed at decarbonization</li> <li>● Houses and buildings</li> <li>● Infrastructure</li> </ul>

### 3.1.1 “Basic conditions” in the selection of the use of proceeds

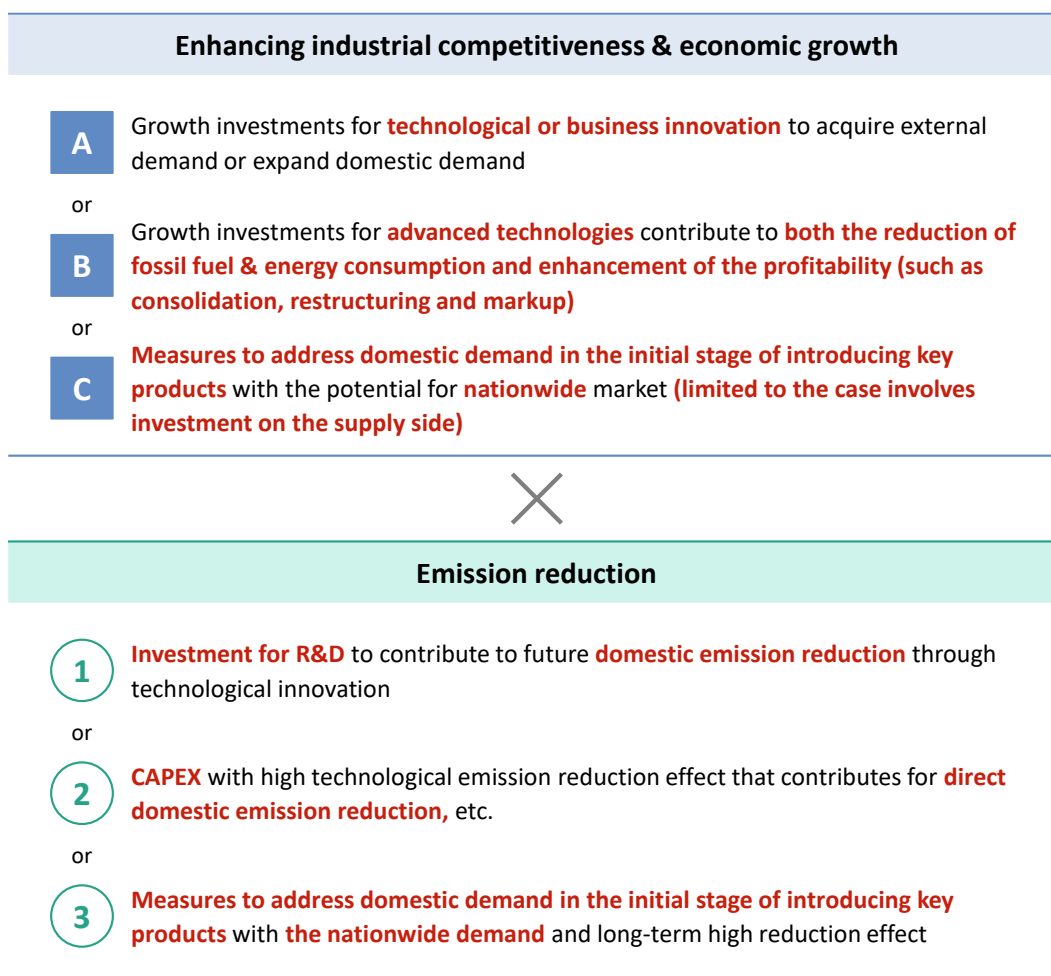
Under the Framework, the selection of the use of proceeds will be made based on the “basic conditions” for investment promotion measures based on the basic concept of GX Economy Transition Bond’s upfront investment, as indicated in Table 2, along with the eligible criteria shown in Table 1.

**Table 2: GX Economy Transition Bond “basic conditions” in the selection of the use of proceeds (overview)**

Basic conditions
I. Efforts that are truly difficult to make investment decisions solely by the private sector
II. Efforts that contribute to strengthening industrial competitiveness, economic growth and emission reduction, which are essential for achieving GX
III. Integration with regulatory regime and system that change corporate investment and demand-side behaviour
IV. Efforts that contribute to the expansion of domestic investment including for human capital



In addition to the above principles, prioritization will be conducted by identifying projects that meet one of the A-C requirements related to strengthening industrial competitiveness and economic growth, as well as one of the 1-3 requirements related to emission reduction.









### 3.1.2 Climate Transition Bond: Classification of the use of proceeds (eligible projects)

Table 3 is the classification table of main eligible use of proceeds (eligible projects) that meet the “basic conditions”.

The use of proceeds are the key economic activities that are currently being organized among the government-led initiatives towards achieving carbon neutrality by 2050 and a 46% reduction (compared to FY 2013 levels) in 2030. These activities are expected to be updated with the progress of GX-related initiatives, etc., in the future. The use of proceeds is broadly classified into six green categories and each category is further classified based on the eligibility criteria.

**Table 3: Climate Transition Bond: Classification of the use of proceeds**

Main Category (Green category)	Sub-category Eligibility criteria	Typical use of proceeds (eligible projects)
<p><b>1</b></p> <p><b>Energy efficiency</b></p> 	Promotion of thorough energy efficiency improvement	<ul style="list-style-type: none"> <li>Promote the spread of energy-efficient appliances</li> </ul>
	Houses and buildings	<ul style="list-style-type: none"> <li>Support for building new houses and buildings with high energy efficiency and retrofitting to improve energy efficiency</li> <li>Replacing windows with thermal insulated models with higher energy efficiency</li> </ul>
	Digital investment aimed at decarbonization	<ul style="list-style-type: none"> <li>Facilitating the development of and investment in energy efficient semiconductors, photonics electronics convergence technologies</li> </ul>
	Battery industry	<ul style="list-style-type: none"> <li>Investments in plants manufacturing batteries together with their material and components</li> </ul>
<p><b>2</b></p> <p><b>Renewable energy</b></p> 	Making renewable energy a major power source	<ul style="list-style-type: none"> <li>Floating offshore wind</li> <li>Next-generation solar cells (perovskite)</li> </ul>
	Infrastructure	<ul style="list-style-type: none"> <li>Development of cities and communities contributing to decarbonization</li> </ul>
<p><b>3</b></p> <p><b>Low-carbon and decarbonized energy</b></p> 	Utilization of nuclear power	<ul style="list-style-type: none"> <li>Next-generation advanced reactors with built-in new safety mechanisms</li> </ul>
	Establishing electricity and gas markets to achieve carbon neutrality	<ul style="list-style-type: none"> <li>Promoting zero-emission thermal power</li> <li>Development of submarine DC transmission systems</li> </ul>
<p><b>4</b></p> <p><b>Clean transportation</b></p> 	GX in transport sector	<ul style="list-style-type: none"> <li>Support for the introduction of next-generation vehicles</li> <li>Developing demonstration aircraft by 2030s and spreading the use of zero-emissions ships</li> </ul>
	Infrastructure (repost)	<ul style="list-style-type: none"> <li>Development of cities and communities contributing to decarbonization</li> </ul>
<p><b>5</b></p> <p><b>Circular economy adapted products, production technologies and processes</b></p> 	Restructuring the manufacturing industry (fuel and feedstocks transition)	<ul style="list-style-type: none"> <li>Development and introduction of innovative technologies such as hydrogen reduction steelmaking</li> <li>Conversion to Carbon-Recycling production systems</li> </ul>
	Facilitating introduction of hydrogen and ammonia	<ul style="list-style-type: none"> <li>Building supply chain both domestically and internationally</li> <li>Research and development as well as the introduction support of production and usage of hydrogen derived from excess renewable energy sources</li> </ul>
	Carbon Recycling and CCS	<ul style="list-style-type: none"> <li>Support for research and development of Carbon Recycling fuel</li> </ul>
<p><b>6</b></p> <p><b>Environmentally sustainable management of living natural resources and land use, Circular economy</b></p> 	Food, agriculture, forestry, and fisheries industry	<ul style="list-style-type: none"> <li>Decarbonization of agriculture, forestry and fisheries</li> </ul>
	Resource circulation	<ul style="list-style-type: none"> <li>Investment to accelerate resource circulation including plastics, metals, sustainable aviation fuel (SAF)</li> </ul>

### 3.1.3

#### Climate Transition Bond: Eligible Criteria and examples of the use of proceeds (eligible projects)

In Tables 4.1 to 4.6, the overview of eligibility criteria described in Table 3 and typical examples of use of proceeds (eligible projects) included in eligibility criteria are provided.

The net proceeds (of each Climate Transition Bond) will be allocated to the projects of which its eligibility has been verified (eligible projects) as confirmed in tables 4.1 to 4.6, as well as research and development, capital investment and initial demand creation, etc., of the eligible projects that meet the basic criteria as confirmed in future evaluations and discussions.

In assessing the eligibility of each project, reference will also be made to the policy roadmap and technology roadmap outlined in Section 2.3 Climate transition strategy with Science-Based targets.

#### 1) Green category: Energy efficiency

**Table 4.1: Energy efficiency “Promotion of thorough energy efficiency improvement”  
“Houses and buildings” “Digital investment aimed at decarbonization” “Battery industry”**

Green category: Energy efficiency
No.1.1 Promotion of thorough energy efficiency improvement
<p>Support will be provided for the necessary environmental improvements (related measures, development of related facilities and systems) to achieve a 62 million kl energy efficiency improvement by FY 2030 compared to FY 2013 levels.</p>
<p><b>&lt; Related key policy roadmaps, technology roadmaps &gt;</b></p> <p><b>Policy roadmaps:</b> Regional and daily life, Iron and Steel industry, Chemical industry, Cement industry, Pulp and Paper industry</p> <p><b>Technology roadmaps:</b> Iron and Steel sector, Chemical sector, Pulp and Paper sector, Cement sector</p>
<p><b>&lt; Examples of initiatives (overview, etc.) &gt;</b></p> <ul style="list-style-type: none"><li>● Support program for promoting energy efficiency in the household sector through the introduction of high-efficiency water heaters Support for the installation of facilities related to efforts to promote the adoption of high-efficiency water heaters by consumers and others</li></ul> <p><b>Criteria example:</b> The heat pump water heater exceeds the 2025 target (energy consumption efficiency: 3.5 or higher, etc.) set by the Top Runner Program under the Act on Rationalizing Energy Use and Shifting to Non-fossil Energy, etc</p> <ul style="list-style-type: none"><li>● Support program for promoting energy-efficiency investments and transitioning demand structures Support for energy-efficiency investments such as upgrading to advanced energy-saving facilities with high technical capabilities and energy efficiency, which have the potential for future expansion of adoption</li></ul> <p><b>Criteria example:</b> In the case of upgrading to advanced facilities and systems, one of the following criteria should be met as a whole of factory and business premises. Energy efficiency rate + increase rate of non-fossil fuel proportion: 30% or higher, Energy saving volume + non-fossil fuel usage volume: 1,000 kl or higher, Improvement rate of energy consumption per unit: 15% or higher, etc</p> <p>In the case of upgrading in a customized manner to fit the usage purposes of the business entity, one of the following criteria should be met as a whole of factory and business premises. Energy efficiency rate + increase rate of non-fossil fuel proportion: 10% or higher, Energy saving volume + non-fossil fuel usage volume: 700 kl or higher, Improvement rate of energy consumption per unit: 7% or higher, etc</p>

## No.1.2 Houses and buildings

To achieve the fundamental energy efficiency improvement of houses and buildings (e.g., ensuring energy-saving performance at the ZEH<sup>22</sup> and ZEB<sup>23</sup> level for new houses and buildings by 2030), the expansion and strengthening of regulations through Building Energy Efficiency Act and other measures will be implemented over the next 10 years.

### < Related key policy roadmaps, technology roadmaps >

**Policy roadmaps:** Houses and buildings, Regional and daily life

### < Examples of initiatives (overview, etc.) >

- Support program for accelerating energy efficiency and CO<sub>2</sub> reduction in the household sector through retrofitting to insulated windows, etc

Support for retrofitting to insulated windows to enhance the thermal performance of existing residential buildings immediately and effectively

**Criteria example:**

Heat transfer coefficient (Uw value) of 1.9 or lower, surpassing the 2030 target level of the Top Runner Programme for building materials, etc

## No.1.3 Digital investment aimed at decarbonization

To drive growth in the semiconductor industry, continuous investment in semiconductor and related supply chains towards achieving GX will be implemented throughout the 2030s. This includes advancing the societal implementation of future technologies such as next-generation semiconductors and optoelectronic fusion. Additionally, carbon neutrality of data centers will be promoted by leveraging these technologies.

### < Related key policy roadmaps, technology roadmaps >

**Policy roadmaps:** Digital investment aimed at decarbonization

### < Examples of initiatives (overview, etc.) >

- Support programs for strengthening the semiconductor supply chain to achieve GX through improved power performance

Achieving overall improvement in competitiveness of Japan's power semiconductors and solving societal challenges such as decarbonization through strengthening the semiconductor supply chain that contributes to energy efficiency enhancement

**Criteria Example:**

The investment should be of a substantial scale (in principle, exceeding 200 billion yen) with a focus on SiC power semiconductors. The performance of equipment and devices to be introduced should be advanced

- Research and development projects for future technologies that are essential for achieving GX, such as optoelectronic fusion

Pursuing the development of important technologies to realize a high-performance and energy-efficient computing infrastructure with high-speed and low-loss

**Criteria Example:**

The performance indicator of semiconductor devices with optoelectronic fusion devices implemented in the package, expressed as bandwidth density/power (Gbps/mm)/(pJ/bit), should be 800 times or more compared to the products currently available at the start of the research and development

<sup>22</sup> The abbreviation for Net Zero Energy House.

<sup>23</sup> The abbreviation for Net Zero Energy Building.

## No.1.4 Battery industry

To achieve the goal of establishing a domestic manufacturing infrastructure for batteries with a capacity of 150 GWh by 2030, intensive investments in battery production facilities will be implemented over the next 5 years while creating demand by approaching demand side through the Act on Rationalizing Energy Use and Shifting to Non-fossil Energy over the next decade.

### < Related key policy roadmaps, technology roadmaps >

**Policy roadmaps:** Battery industry

### < Examples of initiatives (overview, etc.) >

- Supporting initiatives for strengthening the manufacturing supply chain of batteries which are essential for a green society

To ensure the prompt and stable supply of batteries that are essential for maintaining the infrastructure of electrification and digitalization society, enhancement of the domestic manufacturing infrastructure will be implemented by supporting capital investment and technology development in batteries and component materials

#### **Criteria example:**

Expansion of production capacity should be as follows

At least 3 GWh per year (for automotive batteries)

At least 300 MWh per year (for stationary batteries)

## Representative SDGs classifications



## 2) Green category: Renewable energy

**Table 4.2: Renewable energy “Making renewable energy a major power source” “Infrastructure”**

### Green category: Renewable energy

#### No.2.1 Making renewable energy a major power source

Toward the maximum introduction of renewable energy, Japan aim to achieve the social implementation of next-generation renewable energy technologies such as the establishment of a domestic mass production system for next-generation solar power and the formation of large-scale offshore wind power projects including floating offshore wind turbines over the next 10 years.

##### < Related key policy roadmaps, technology roadmaps >

**Policy roadmaps:** Renewable energy, Next generation network (grid and conditioning), Regional and daily life

**Technology roadmaps:** Power sector

##### < Examples of initiatives (overview, etc.) >

- Development and demonstration projects for cost reduction in offshore wind power generation  
Development of element technologies for wind turbines and floating platforms tailored to the weather and sea conditions in Asia. Involvement of users (power generation companies) in the integrated design and demonstration of wind turbines, floating platforms, cables, etc  
**Criteria example:**  
Projected level of 8-9 yen/kWh for the electricity generation cost of bottom-mounted offshore wind turbine under specific conditions (such as wind conditions) by 2030, etc
- Development and demonstration projects for next-generation solar cells  
Development of next-generation solar cells (perovskite solar cells, etc.) that can be installed on building walls and other surfaces  
**Criteria example:**  
Projected electricity generation cost of 14 yen/kWh or lower under specific conditions (such as sunlight conditions) by the FY 2030

#### No.2.2 Infrastructure

Promotion of the formation of Carbon Neutral Ports (CNPs) and decarbonization in construction work to achieve decarbonization and enhance competitiveness in industries and ports. Promotion of renewable energy introduction and thorough energy consumption reduction by utilizing various infrastructures such as airports, roads, dams and sewage systems. Advancing the development of cities and regions that contribute to decarbonization.

##### < Related key policy roadmaps, technology roadmaps >

**Policy roadmaps:** Infrastructure, Regional and daily life

##### < Examples of initiatives (overview, etc.) >

- Support program for the construction of local government- and private-owned microgrids  
Supporting the installation of key decarbonization products and technologies (renewable energy, energy efficiency, energy storage), etc, with high GHG emission reduction effects into local government- and private-owned microgrids in specific regions where private businesses benefit from those microgrids  
**Criteria example:**  
In the areas with local government- and private-owned microgrids, to establish a plan to achieve substantial zero emissions from the household and business sectors by FY 2030

### Representative SDGs classifications



### 3) Green category: Low-carbon and decarbonized energy

**Table 4.3: Low-carbon and decarbonized energy “Utilization of nuclear power”  
“Establishing electricity and gas markets to achieve carbon neutrality”**

Green category: Low carbon and decarbonized energy
<b>No.3.1 Utilization of nuclear power</b>
Developing and constructing next-generation innovative reactors that incorporate new safety mechanisms, with the utmost priority on ensuring safety.
<b>&lt; Related key policy roadmaps, technology roadmaps &gt;</b> <b>Policy roadmaps:</b> Next-generation innovative reactors <b>Technology roadmaps:</b> Power sector
<b>&lt; Examples of initiatives (overview, etc.) &gt;</b> <ul style="list-style-type: none"><li>● Project for the development of fast reactor demonstration Based on the revised “Strategic Roadmap” for fast reactor development, which was updated on December 23<sup>rd</sup> 2022, the specifications for the reactor concept and the core companies to be selected for the conceptual design from FY 2024 onwards</li><li>● Project for the development of high-temperature gas reactor demonstration Feasibility study of carbon free hydrogen production method using high temperature above 800°C. Establishment of connection technologies and evaluation methods to achieve high safety using decarbonized high-temperature heat source above 800°C and hydrogen production technology through commercialized methane steam reforming method <b>Criteria example:</b> With the aim of supplying a large amount of hydrogen stably at approximately 12 yen/Nm<sup>3</sup> by 2050 using decarbonized high-temperature heat above 800°C and carbon-free hydrogen production methods, efforts will be made for industrial applications such as iron and steel production and chemical industries</li></ul>
<b>No.3.2 Establishing electricity and gas markets to achieve carbon neutrality</b>
Towards the expansion of low-carbon and decarbonized energy sources such as hydrogen, ammonia, nuclear power, and renewable energy, necessary environmental development such as research and development for securing Japan’s technological advantage, establishing domestic advanced research facilities, grid integration and ensuring the conditioning, will be implemented.
<b>&lt; Related key policy roadmaps, technology roadmaps &gt;</b> <b>Policy roadmaps:</b> Next-generation network (grid and conditioning), Hydrogen and ammonia <b>Technology roadmaps:</b> Power sector, Gas sector, Oil Sector
<b>&lt; Examples of initiatives (overview, etc.) &gt;</b> <ul style="list-style-type: none"><li>● Support program for the establishment of large-scale hydrogen supply chains Creating a positive cycle of large-scale hydrogen demand production and supply cost reduction through technology development such as scaling up transportation infrastructure and large-scale hydrogen transportation verification for multiple hydrogen carriers (liquefied hydrogen, MCH<sup>24</sup>), and demonstration of hydrogen combustion stability in actual hydrogen power generation systems <b>Criteria example:</b> Supply cost: below 30 yen/Nm<sup>3</sup> by 2030 and below 20 yen/Nm<sup>3</sup> by 2050 (CIF cost. Aim to reduce costs to a level comparable to fossil fuels)</li></ul>
<b>Representative SDGs classifications</b>
   

24 Abbreviation for Methylcyclohexane.

#### 4) Green category: Clean transportation

Table 4.4: Clean transportation “GX in transport sector” “Infrastructure” (repost)

### Green category: Clean transportation

#### No 4.1 GX in transport sector

In the transportation sector, which accounts for approximately 20% of our country’s CO<sub>2</sub> emissions, to achieve the energy efficiency in each transportation mode such as railways and logistics and passenger flow, and transformation of demand structure towards the expansion of utilization of non-fossil fuel, Japan will systematically and strategically promote initiatives for the transition to clean energy over the next 10 years, taking into account the Act on Rationalizing Energy Use and Shifting to Non-fossil Energy, etc. Japan will also aim to expand private investment in related industries such as transportation businesses.

#### < Related key policy roadmaps, technology roadmaps >

**Policy roadmaps:** Automobile industry, Aviation industry, Zero-emission vessels (maritime industry), Transportation, Carbon recycling fuels (SAF, synthetic fuels, synthetic methane), Regional and daily life

**Technology roadmaps:**

Automobile sector, Oil sector, International shipping sector, Domestic shipping sector, Aviation sector

#### < Examples of initiatives (overview, etc.) >

- Support program for promoting the introduction of clean energy vehicles

Support for the purchase cost of electric vehicles, fuel cell vehicles and plug-in hybrid vehicles, etc., in the early stages of adoption

**Criteria example:**

Being eligible vehicles for the FY 2030 fuel efficiency standards under the Top Runner Program of the Act on Rationalizing Energy Use and Shifting to Non-fossil Energy

- Support program for promoting the electrification of commercial vehicles

Support for adoption acceleration of the electrification of commercial vehicles (trucks and taxis)

**Criteria example:**

Setting up plans for the introduction of non-fossil fuel vehicles in accordance with the goals set by the government (e.g., replacing 5% of small trucks under 8 tons with non-fossil fuel vehicles by FY 2030), etc

- Development and demonstration projects for next-generation aircraft

Technology development of core technologies for hydrogen-powered aircraft

**Criteria example:**

Engine combustor: 54% reduction in NOx<sup>25</sup> emissions compared to CAEP/8

Hydrogen fuel storage tank: Achieving a weight of less than twice of stored hydrogen fuel

Aircraft design: Confirmation of the conceptual design of a hydrogen-powered aircraft with a range of 2,000-3,000km through wind tunnel testing

#### No 4.2 Infrastructure (repost)

Promotion of the formation of Carbon Neutral Ports (CNPs) and decarbonization in construction work to achieve decarbonization and enhance competitiveness in industries and ports. Promotion of renewable energy introduction and thorough energy consumption reduction by utilizing various infrastructures such as airports, roads, dams and sewage systems, etc. Advancing the development of cities and regions that contribute to decarbonization.

#### < Related key policy roadmaps, technology roadmaps >

**Policy roadmaps:** Infrastructure, Regional and daily life

### Representative SDGs classifications



25 Abbreviation for Nitrogen oxides.



## 5) Green category: Circular economy adapted products, production technologies and processes

Table 4.5: Circular economy adapted products, production technologies and processes

“Restructuring the manufacturing industry (fuel and feedstocks transition)”

“Facilitating introduction of hydrogen and ammonia” “Carbon Recycling and CCS”

### Green category: Circular economy adapted products, production technologies and processes

#### No 5.1 Restructuring the manufacturing industry (fuel and feedstocks transition)

To address the GX market growing worldwide, in the manufacturing industry which accounts for a significant portion of CO<sub>2</sub> emissions after electricity and heat distribution, Japan will swiftly establish a GX supply chain through research and development as well as capital investment support, and engage in market creation etc., in new GX fields.

##### < Related key policy roadmaps, technology roadmaps >

###### Policy roadmaps:

Iron and Steel industry, Chemical industry, Cement industry, Pulp and Paper industry, Biomanufacturing

**Technology roadmaps:** Iron and Steel sector, Chemical sector, Pulp and Paper sector, Cement sector

##### < Examples of initiatives (overview, etc.) >

- Development and demonstration projects for the utilization of hydrogen in the iron and steel production process  
Research and development towards the establishment and societal implementation of decarbonization technologies, including hydrogen reduction steelmaking, in anticipation of a future where cost-effective and abundant hydrogen supply infrastructure is established

###### Criteria example:

Establishment of hydrogen reduction technology in blast furnaces to achieve over 50% reduction of CO<sub>2</sub> emissions.  
Establishment of direct hydrogen reduction technology to achieve over 50% reduction of CO<sub>2</sub> emissions

- Development and demonstration projects for decarbonization of thermal processes in the manufacturing  
Utilization of zero-emission fuels and development and demonstration of efficient thermal processes to address decarbonization of industrial furnaces

###### Criteria example:

Establishment of industrial furnaces with 50% co-firing capability of existing fuels such as natural gas and hydrogen and ammonia by FY 2031. Establishment of technologies to reduce peak power consumption, etc., by 30% or more by FY 2031

#### No 5.2 Facilitating introduction of hydrogen and ammonia

In order to achieve the domestic introduction targets of 3 million tons of hydrogen and 3 million tons (ammonia equivalent) of ammonia by 2030, and 20 million tons of hydrogen and 30 million tons (ammonia equivalent) of ammonia by 2050, efforts will be made over the next 10 years to establish a large-scale and robust supply chain (manufacturing, transportation, utilization) through the support system for supply chain development and the support system for base development.

##### < Related key policy roadmaps, technology roadmaps >

**Policy roadmaps:** Hydrogen and ammonia

**Technology roadmaps:** Power sector, Gas sector, Oil sector

##### < Examples of initiatives (overview, etc.) >

- Development and demonstration projects for the establishment of a large-scale hydrogen supply chain  
Creating a positive cycle of large-scale hydrogen demand creation and supply cost reduction through technology development such as scaling up transportation infrastructure and large-scale hydrogen transportation verification for multiple hydrogen carriers (liquefied hydrogen, MCH), and demonstration of hydrogen combustion stability in actual hydrogen power generation systems

###### Criteria example:

Supply cost: below 30 yen/Nm<sup>3</sup> by 2030 and below 20 yen/Nm<sup>3</sup> by 2050 (CIF cost. Aim to reduce costs to a level comparable to fossil fuels)

## No 5.3 Carbon Recycling and CCS

Research and development, demonstration, and capital investment will be implemented over the next 10 years to promote the use of fuels that contribute to decarbonization, such as SAF (Sustainable Aviation Fuel), synthetic fuels and synthetic methane. Additionally, there will be efforts for the establishment of regulations and frameworks, and coordination towards international rules establishment.

To ensure the annual storage capacity of CCS which is necessary for achieving carbon neutrality by 2050, efforts will be made to establish advanced CCUS value chains and CCUS markets in Asia, as well as establish CCS business laws as soon as possible and organize a business environment for business initiation in 2030.

### < Related key policy roadmaps, technology roadmaps >

#### **Policy roadmaps:**

Biomanufacturing, Carbon recycling fuels (SAF, synthetic fuels, synthetic methane), CCS, Resource circulation industry

**Technology roadmaps:** Power sector, Gas sector, Oil sector

### < Examples of initiatives (overview, etc.) >

- Development and demonstration projects for control technologies to address feedstock variations in synthetic fuel production  
Development of control technologies for temperature, catalyst quantity, and other parameters to address feedstock variations in synthetic fuel production

## Representative SDGs classifications



**6) Green category: Environmentally sustainable management of living natural resources and land use, Circular economy**

**Table 4.6: Environmentally sustainable management of living natural resources and land use, Circular economy “Food, agriculture, forestry, and fisheries industry” “Resource circulation”**

**Green category:  
Environmentally sustainable management of living natural resources and land use, Circular economy**

**No 6.1 Food, agriculture, forestry, and fisheries industry**

Based on the “Green Food System Strategy” (formulated in May 2021) and the “Act to Promote Environmental Burden Reduction Activities for Establishment of Environmentally Harmonized Food System” (enacted in April 2022, implemented in July 2022), efforts will be made to promote transformation in the food, agriculture, forestry, and fisheries industry towards decarbonization and reducing environmental impacts.

Forests, farmland, algae fields, etc., which serve as production areas for the agriculture, forestry, and fisheries industry, play an essential role as carbon sinks in achieving carbon neutrality by 2050. From the viewpoint of attracting private investment, efforts will be made to strengthen these functions including behavioural changes among stakeholders.

**< Related key policy roadmaps, technology roadmaps >**

**Policy roadmaps:** Food, agriculture, forestry, and fisheries industry

**No 6.2 Resource circulation**

To promote resource circulation through the collaboration between production side and recycle side, and achieve autonomic and robust resource circulation systems, efforts will be made over the next 10 years to establish information distribution platforms utilizing digital technologies. Additionally, resource circulation market will be created through revision of regulatory frameworks towards the acceleration of the collaboration between production side and recycle side, and GX investment support based on the premise of structural reforms.

**< Related key policy roadmaps, technology roadmaps >**

**Policy roadmaps:** Resource circulation industry

**< Examples of initiatives (overview, etc.) >**

- Development and demonstration projects aimed at achieving carbon neutrality in the waste and resource circulation sector  
Development of technologies, etc., related to alternative treatment methods to conventional waste disposal systems, such as incineration, that release CO<sub>2</sub> into the atmosphere, etc
- Criteria example:**  
By 2030, establishing technologies that realize the waste incineration facilities based on CO<sub>2</sub> separation and recovery, which ensures a stable carbon recovery rate of 90% or higher from waste under specific conditions

**Representative SDGs classifications**



### < Exclusionary Criteria >

The Government of Japan commits not to allocate the net proceeds procured based on the Framework to finance projects related to the below.

- Projects involved in manufacturing, sale or distribution of mass destruction weapons such as nuclear weapons, chemical weapons, biological weapons, and inhumane weapons such as anti-personnel landmines and projects involved in manufacturing and providing services of products that support the manufacturing or sale of mass destruction weapons such as nuclear weapons, chemical weapons, biological weapons, and inhumane weapons such as anti-personnel landmines
- Projects involved in mining, refining and transportation of coal
- Projects involved in the ownership or operation of gambling facilities or businesses
- Projects involved in forced labor
- Projects involved in unfair trade practices, bribery, corruption, extortion, embezzlement and other inappropriate relationships that do not comply with the laws of the country where they are located
- Projects involved in transactions that may cause human rights, environmental, or other social issues

### 3.2 Process for Project Evaluation and Selection

The compliance status regarding the adherence to eligible projects stipulated in “3.1 Use of Proceeds” for the allocated projects is confirmed within each relevant ministry or agency. Also, the “Government-Related Ministries and Agencies Liaison Conference on GX Economy Transition Bond Issuance” (Liaison Conference), which consists of director-level officials, confirms based on the compliance status regarding the adherence to eligible projects stipulated in “3.1 Use of Proceeds”. During this process, if necessary, consultations are conducted with other relevant ministries, agencies, and related organizations, and the findings are reported to the GX Implementation Council. Additionally, each project is determined through the approval by the National Diet as part of the government budget annually.

Members of the Liaison Conference are as follows.

- Cabinet Secretariat
- Financial Services Agency
- Ministry of Finance
- Ministry of Economy, Trade and Industry
- Ministry of the Environment

Furthermore, the aforementioned Liaison Conference also discusses the allocation reporting and impact reporting mentioned in 3.4 and conducts the confirmation and evaluation of the allocation status. As necessary, the results are reported to the “GX Implementation Council”.

### < Identification of Environmental and Social Negative Impacts and Implementation of Mitigation Measures >

Through the aforementioned evaluation process, the presence of negative impacts caused by the allocated projects and its mitigation measures are verified. Additionally, when individual businesses implement the allocated projects, they will ensure that mitigation measures are being taken through identifying negative effects on the environment and society based on laws and regulations such as environmental impact assessments.

### 3.3 Management of Proceeds

The Government of Japan will allocate the net proceeds to eligible projects. The eligible projects to be allocated are those that have started operations or have been executed in the fiscal year<sup>26</sup> including the implementation date of funding based on the Framework, as well as projects that have started operations or executed in subsequent FYs and the previous FY.

The allocated projects are managed within the Energy Supply and Demand Account in the Special Account for Energy Measures, separate from other accounts. Within this account, the budget related to GX (allocated projects) will be categorized, and METI will track and monitor the amount of the net proceeds to match the actual expenses on an annual basis using an internal management system.

Until full allocation of the net proceeds, the unallocated proceeds will be managed in cash.

### 3.4 Reporting

#### 3.4.1 Overview of Reporting

After the fund raising based on the framework, the Government of Japan will provide allocation and impact reporting as follows. The reporting aims to go beyond disclosing the progress of eligible projects financed by the Framework and provide information that can be used as a reference for future allocation decisions by conducting appropriate project reviews similar to the verification of regular budget projects and taking into account the progress of the projects, their environmental improvement impacts, etc. Furthermore, disclosure of the midterm strategy and anticipated impacts of eligible projects will be made to the extent possible, strengthening companies' commitment and enabling market evaluation not only of the current financial performance but also of the content of upfront investments.

#### 3.4.2 Allocation Reporting

Until the proceeds are fully allocated to eligible projects, the Government of Japan will report the allocation of net proceeds of GX Finance annually on its website, within the scope of confidentiality obligations and to the extent reasonably practicable, regarding any or all of the following items.

Should a significant change occur after the allocation of the proceeds, such change will be disclosed in a timely manner.

##### < Reporting items >

- The amount of net proceeds allocated to the eligible projects
- The amount of unallocated proceeds
- The estimated amount (or percentage) of the proceeds allocated to the projects in FY which ends before the issuance date

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<sup>26</sup> In the GX Promotion Act, it is stated that “the issuance of GX Economy Transition Bonds can be carried out until June 30<sup>th</sup> of the following year for each FY. In this case, the revenue related to GX Economy Transition Bonds issued after April 1<sup>st</sup> of the following FY shall be attributed to the revenue of the respective FY”. Therefore, for example, funds raised from April 1<sup>st</sup> to June 30<sup>th</sup> in FY X may be attributed to the revenue of FY X-1. In this case, the FY X-1 becomes the “relevant FY” in this provision.

### 3.4.3 Impact Reporting

The Government of Japan will report the environmental impacts for each eligible criterion annually on its website, within the scope of confidentiality obligations and to the extent reasonably practicable, regarding any or all of the following items.

The initial report will be conducted within two years from the first issuance, and subsequent progress reports will be conducted at least until the completion of the individual project period.

#### < Reporting items >

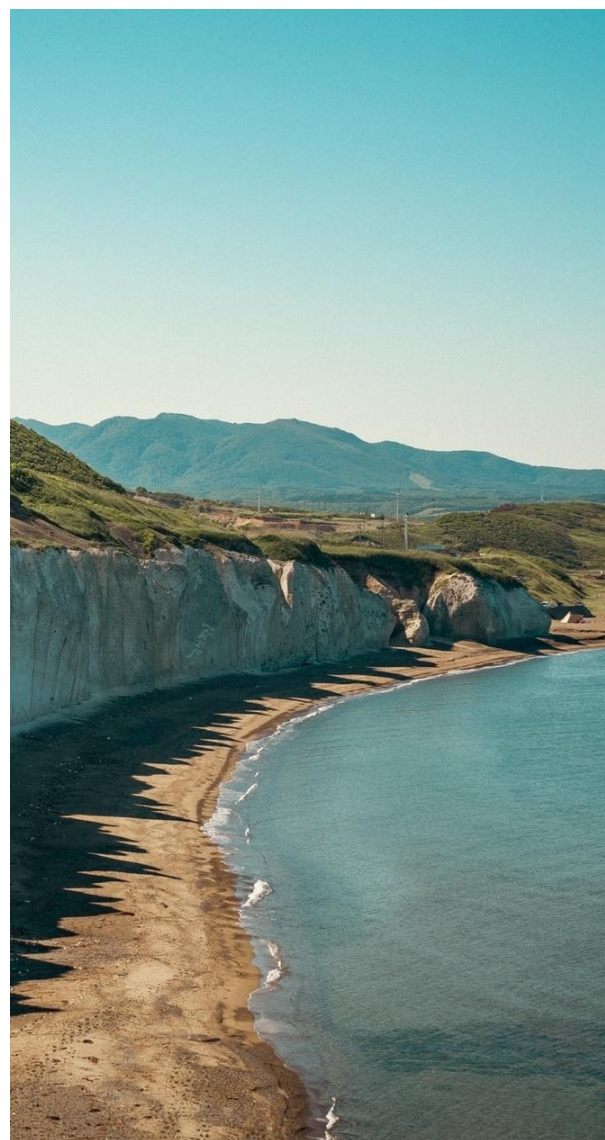
- Environmental improvement effects such as reduction in CO<sub>2</sub> emissions (expected reduction effects for research and development)
- Overview of main projects, allocated amount, number of projects adopted, case studies of project implementation, progress updates on research and development and capital investment, etc.

\* Additionally, other indicators and criteria related to the project may be disclosed as needed.

### 3.5 Review of the Framework

In the future, a review of the Framework will be considered within a period of at least 5 years, depending on the progress of Japan's GX Promotion Strategy and the progress of eligible projects. The Liaison Conference will formulate a revision draft of the Framework, taking into account evaluations and opinions from private sector insights of capital market participants and experts, and report to the GX Implementation Council.

Furthermore, except for minor revisions, when reviewing the Framework, the Government of Japan will engage independent external reviewers to provide second party opinions on the alignment with appropriate principles and guidelines such as ICMA Green Bond Principles.



# 4

## External Review



#### 4.1 Second Party Opinion

The Government of Japan has engaged DNV Business Assurance Japan K.K. and Japan Credit Rating Agency, Ltd. as independent external reviewers to provide Second Party Opinion (“SPO”) on the alignment with the Green Bond Principles (ICMA, 2021), the Green Bond Guidelines (MOE, 2022), the Climate Transition Finance Handbook (ICMA, 2023) and the Basic Guidelines on Climate Transition Finance (FSA, METI and MOE, 2021).

#### 4.2 Post-issuance External Verification

The Government of Japan will engage independent external reviewers to provide annual external verifications on the allocation of the net proceeds financed based on the Framework to the eligible projects and assessment of their environmental impacts until full allocation of the proceeds.





## Disclaimer

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No representation is made as to the suitability of any of the Climate Transition Bonds to fulfil the environmental, social or sustainability criteria required by prospective investors. Each potential purchaser of bonds should determine for itself the relevance of the information contained or referred to in the Framework or the relevant bond documentation for such Climate Transition Bonds regarding the use of proceeds, and its purchase of the Climate Transition Bonds should be based upon such investigation as it deems necessary.

The Government of Japan has set out its intended policy and actions in the Framework in respect of use of proceeds, project evaluation and selection, management of proceeds and reporting, in connection with the Climate Transition Bonds. However, it will not be an event of default or breach of contractual obligations under the terms and conditions of any such Climate Transition Bonds if the Government of Japan fails to adhere to the Framework, whether by failing to fund or complete eligible projects or by failing to ensure that proceeds do not contribute directly or indirectly to the financing of the activities that meet one or more of the exclusionary criteria specified in the Framework, or by failing (due to a lack of reliable information and/or data or otherwise) to provide investors with reports on uses of proceeds and environmental or social impacts as anticipated by the Framework, or otherwise. In addition, it should be noted that all of the expected benefits of the eligible projects as described in the Framework may not be achieved.

Factors including (but not limited to) market, political and economic conditions, changes in government policy (whether with a continuity of the government or on a change in the composition of the government), changes in laws, rules or regulations, the lack of available eligible projects being initiated, failure to complete or implement projects and other challenges, could limit the ability to achieve some or all of the expected benefits of these initiatives, including the funding and completion of eligible projects. Each environmentally or socially focused potential investor should be aware that eligible projects may not deliver the environmental, social or sustainability benefits anticipated, and may result in adverse impacts.

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