News Release

Japan Credit Rating Agency, Ltd.

23-D-1521
February 8, 2024

JCR provided pre-issuance verification report to Japan Climate Transition Bonds to be issued by the Government of Japan

JCR conducted pre-issuance verification of Japan's 10-year Japan Climate Transition Bonds to be issued in February 2024 and 5-year Japan Climate Transition Bonds to be issued in February 2024 as an approved verifier of Climate Bonds Initiative.

*Please see the pre-issuance verification report as per the attached.

February 6, 2024
Verifier name: Japan Credit Rating Agency, Ltd.

Independent Verifier Limited Assurance Report

The Government of Japan

Pre-issuance Verification

▶▶▶ Basic information

1. Issuer Name	The Government of Japan
2. Bond name	10-year Japan Climate Transition Bonds to Be Issued in February 2024 5-year Japan Climate Transition Bonds to Be Issued in February 2024
3. Verifier Name	Japan Credit Rating Agency Co., Ltd.
4. Verification period	September 21, 2023 - February 6, 2024

▶▶▶ Conclusion of Limited Assurance Opinion

As stated in this report dated February 6, 2024, JCR conducted pre-issuance verification in accordance with pre-defined limited assurance procedures. As a result, based on the procedures performed and the evidence obtained by JCR, nothing has come to our attention that causes us to believe that the bonds scheduled to be issued by the Government of Japan (10-year Japan Climate Transition Bonds and 5-year Japan Climate Transition Bonds to be issued in February 2024) do not meet the requirements for project identification, project eligibility criteria, proceeds management, and reporting under the Climate Bonds Standard (CBS) v4.1 and the relevant Climate Bonds Initiative (CBI) Sector Eligibility Criteria.

These limited assurance procedures comply with the relevant general principles and professional standards for independent auditing and the International Standard for Assurance Engagements Other than Audits or Reviews of Historical Financial Information (ISAE 3000).

▶▶▶ Summary of verification results (compatibility of the bond with the four elements required by the Climate Bonds Standard)

1-1. Use of proceeds and applicable sector eligibility criteria

In the Japan Climate Transition Bond Framework, the Government of Japan specifies that the funds will be used for research and development of projects that meet the basic conditions stipulated in the GX Promotion Strategy from the fields specified in the GX Promotion Strategy as measures that contribute to Japan's GX. Based on this framework, the Government of Japan has selected the research and development projects and subsidy programs shown in Table 1 to use the proceeds of the bonds.

Table 1: Projects allocated to this Bonds[1]

	budget year	Business type	Appropriation projects (including some appropriation candidate projects)	Sector	Planned amount to be allocated (billion yen)
(1) GI Fund[2]	2022 2023	R &D	1. Development of next-generation solar cells (Expansion of demonstration scale of perovskite solar cells)	Electricity	15.0
	2022	R &D	2. Lowering the cost of offshore wind power generation (Development of common infrastructure related to integration of wind turbines, floating structures, etc. in floating offshore wind power, floating offshore wind power demonstration project)	Electricity	*1
	2022	R &D	3. Building a large-scale hydrogen supply chain (Demonstration of hydrogen power generation technology (high co-firing (equal or greater than 30%)) using large gas turbine)	Electricity	15.0
	2022	R &D	4. Development of next-generation aircraft (development of electric aircraft)	Transport	30.6
	2022	R&D	5. Development of next-generation ship (development of zero emission ship)	Transport	*1
	2022	R &D	6. Development of fuel manufacturing technology using CO2 etc. (Development and demonstration of control technology that responds to raw material fluctuations in synthetic fuel (transportation fuel) production)	Transport	*1
	2022	R &D	7. Hydrogen utilization in the steelmaking process (Expansion of demonstration scale of hydrogen reduction ironmaking technology)	Heat Manufacturing	256.4
	2022	R &D	8. Decarbonization of thermal processes in the manufacturing sector	Heat Manufacturing	32.5
	2022	R &D	9. Building a large-scale hydrogen supply chain (commercialization demonstration of liquefied hydrogen/MCH supply chain, research and development of dehydrogenation technology from ammonia for large-scale hydrogen transportation)	Electricity and heat Manufacturing	*1

[1] Created by JCR from materials provided by the Ministry of Economy, Trade and Industry.
[2] The project details described in the parentheses are examples of main projects to be conducted.
(For details, refer to Annex 4, JCR's preliminary Climate Transition Bond Evaluation Results)

	2022	R &D	10. Hydrogen production through water electrolysis using electricity derived from renewable energy, etc.	Electricity and heat Manufacturing	*1
	2022	R &D	11. Achieving carbon neutrality in the waste and resource recycling field	Waste	44.5
	2022	R &D	12. Development of plastic raw material manufacturing technology using CO2 etc.	Waste Manufacturing (Chemical)	*1
	2022	R &D	13. Promoting carbon recycling using CO2 as a direct raw material using bio-manufacturing technology	Manufacturing (Chemical)	*1
Subtotal of GI Funds (subtotal amount of *1, which has not yet been determined the amounts to be allocated)					756.4 (362.4)
(2) R&D other than GI Funds	2022	R &D	14. Among the post-5G information and communication system infrastructure reinforcement research and development projects, research and development of future technologies that are essential for realizing GX such as optoelectronic convergence	ICT	75.0
	2022	R &D	15. Innovative GX technology creation project	Transport Electricity and heat	49.6
	2023	R &D	16. Fast reactor demonstration reactor development project	Electricity	7.6
	2023	R &D	17. High temperature gas reactor demonstration reactor development project	Electricity and heat	4.8
Subtotal of R&D other than GI Funds					137.0
Subtotal CBI ELIGIBLE R&D Project (No.1-14, 16 and 17)					843.8
Subtotal non ELIGIBLE R&D Project (No. 15)					49.6
Total R&D Project					893.4

	budget year	Business type	Appropriation projects (including some appropriation candidate projects)	CBI sector criteria	Planned amount to be allocated (billion yen)
(3) Subsidy program	2022	Subsidy	18. Among the support projects for strengthening the supply chain of important materials in response to changes in the economic environment, the project supports strengthening the semiconductor supply chain for use in renewable energy components, EVs, electrified rail systems, storage batteries, power transmission and distribution systems, to achieve GX by improving power performance.	1. Solar v2.3 2. Wind v1.3 3. Low carbon transport (Rev2.2) 4. Electrical Grids and Storage (March 2022)	152.3
	2022	Subsidy	19. Among the support projects for strengthening supply chains for important materials in response to changes in the economic environment, support for strengthening supply chains for manufacturing storage batteries, which are essential for a green society.	1. Low Carbon Transport (Rev2.2) 2. Electrical Grids and Storage (March 2022)	331.6
	2022	Subsidy	20. Project to promote the introduction of advanced equipment to improve the insulation performance of houses	Buildings (White list for Low Carbon Building Technology Rev1.0)	100.0

	2022	Subsidy	21. Energy saving investment promotion/demand structure transformation support project subsidy. Energy efficiency improvement of SME to Large Corporate factories	No CBI sector criteria available	25.0
	2022 2023	Subsidy	22. Subsidy to promote the introduction of clean energy vehicles (BEV, PHEV, FCV)	Low Carbon Transport (Rev.2.2)	90.0
	2023	Subsidy	23. Commercial vehicle electrification promotion project	Low Carbon Transport (Rev2.2)	13.6
	2023	Subsidy	24. Subsidy for promoting regional decarbonization (independent line microgrid project subsidy)	Electrical Grids and Storage (March 2022)	3.0
Subtotal CBI ELIGIBLE Project of subsidy programs (No.18-20, No. 22-24)					690.5
Subtotal non CBI ELIGIBLE Project of subsidy programs (No.21)					25.0
Total of subsidy programs					715.5
TOTAL project amount					1608.9

**1: Detailed plans for these seven projects have not been determined at the time of verification. The actual allocation results of GI Fund will be disclosed in the post-issuance Reporting on the allocation of proceeds*

Among the uses of proceeds from this bond, items 1-17 are R&D projects. JCR has confirmed that I the nominated R&D projects 1-14, 16 and 17 meet the requirements of, CBSv.4.1 for R&D projects. JCR has also confirmed that all the subsidy programs except No. 21(Energy saving investment promotion/demand structure transformation support project subsidy) meet the requirements of CBS v4.1 and the relevant CBI's sector criteria.

Of the uses of proceeds from this bond, No. 15 (Innovative GX technology creation project) and No. 21 (Energy saving investment promotion/demand structure transformation support project subsidy) comply with ICMA's Green Bond Principles, but eligibility cannot currently be assessed under the CBI R&D or sector criteria. Therefore, JCR has considered these two projects' alignment with the flexibility pocket rules stipulated in part A.2 of CBS v.4.1 and has confirmed that both projects meet the relevant conditions.

As a result, 95.4% of the proceeds from the bonds complies with the Climate Bonds Standard v4.1 and relevant sector criteria, while 4.6% does not and has hence been included in the flexibility pocket (Part A.2 of CBSv4.1).

Please refer to Annex 2-1 for the details of each project and Annex 3 for JCR's eligibility assessment of each project.

1-2. Selection criteria and process

The Government of Japan has established the following eligibility criteria in the framework, and it will verify whether the projects meet the following criteria when selecting projects.

1) CBI Standard v.4.1 and relevant Sector Criteria(see Table 1 for corresponding criteria for each project) (Only for this issuance)
2) ICMA Green Bond Principles
3) Ministry of Environment Green Bond Guidelines
4) ICMA Climate Transition Finance Handbook

5) Financial Services Agency, Ministry of Economy, Trade and Industry, Ministry of the Environment Basic Guidelines on Climate Transition Finance
6) Other eligibility criteria

In the Climate Transition Bond Framework, the Government of Japan states that the selection of the use of proceeds will be based on the "basic conditions" of investment promotion measures based on the basic concept of upfront investment support for GX Economic Transition Bonds shown in Table 2.

Table 2: "Basic conditions" (overview) for selecting the use of GX Economic Transition Bond proceeds[3]

Basic conditions	
I.	Projects that are truly difficult to make investment decisions solely by the private sector
II.	Things that contribute to strengthening industrial competitiveness, economic growth, and reducing emissions that are essential for achieving GX
III.	Integration with regulations and systems that change corporate investment and demand-side behaviour
IV.	Things that lead to expansion of domestic investment including for human capital

Exclusion criteria

The Government of Japan has set criteria for excluding the following businesses from eligible projects for this bond.

- Businesses aimed at manufacturing, selling, or distributing weapons of mass destruction such as nuclear weapons, chemical weapons, or biological weapons, or inhumane weapons such as anti-personnel landmines; Businesses that manufacture products and provide services that support the manufacture or sale of inhumane weapons
- Businesses related to coal mining, refining, and transportation
- Business related to owning or operating gambling facilities/businesses
- Businesses related to forced labor that do not comply with the laws and regulations of the country where the business is located and involve inappropriate relationships such as bribery, corruption, extortion, embezzlement, etc.
- Businesses related to transactions that may cause social issues such as human rights and the environment.

JCR evaluates that the selection criteria established by the Government of Japan in the Climate Transition Bond Framework are consistent with the GX Promotion Strategy and are appropriate and have environmental improvement effects. It has been confirmed that all the projects are likely to contribute to decarbonization of Japan detailed in the previous chapter and meet the selection criteria of the framework. Of the uses of the proceeds from this bond, the environmental improvement effects of research and development projects are expected to be elaborated by a technical working group organized by the government periodically after the bond issuance. JCR evaluates that the project selection criteria are appropriate.

[3]Source: November 2020 Cabinet Secretariat / Financial Services Agency / Ministry of Finance / Ministry of Economy, Trade and Industry / Ministry of the Environment Climate Transition Bond Framework

The direction of Japan's GX implementation is determined by the GX Implementation Council, chaired by the Prime Minister and attended by relevant ministers and experts. The members of the executive committee include experts in the industrial and financial fields. In addition, in the operation of the executive committee, the Cabinet Secretariat GX Office, which is made up of officials dispatched from the Financial Services Agency, Ministry of Foreign Affairs, Ministry of Finance, Ministry of Health, Labor and Welfare, Ministry of Agriculture, Forestry and Fisheries, Ministry of Economy, Trade and Industry, Ministry of Land, Infrastructure, Transport and Tourism, and Ministry of the Environment, will be in charge of the relevant ministries and agencies. This system compiles proposals including investment promotion measures, and submits field-specific investment strategy proposals to the GX Executive Committee based on consideration by a working group consisting of external experts

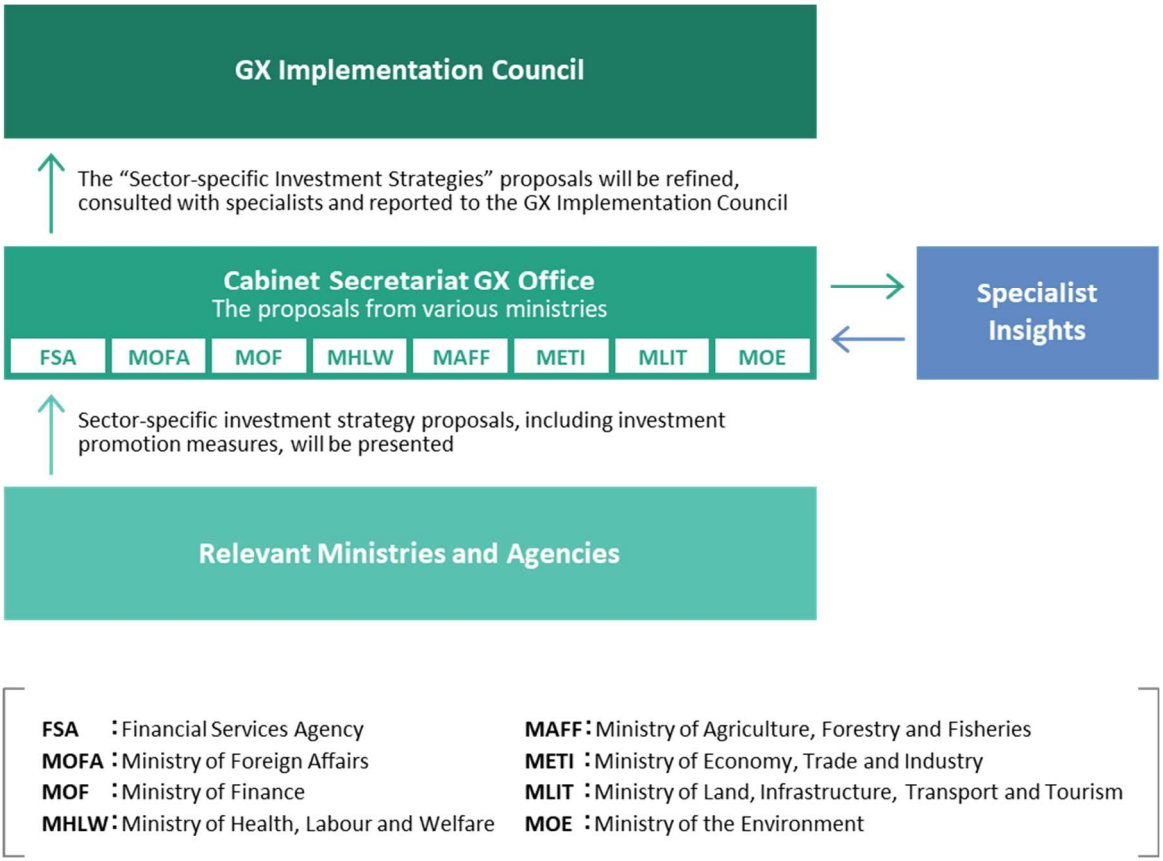


Figure 1 : Governance structure1[4]

From the perspective of measuring the effects of the investment strategy mentioned above, the progress of GHG emissions reductions and the countermeasures against global warming are approved by the Global Warming Countermeasures Promotion Headquarters, which is attended by all cabinet members every year, and plans are updated and promoted as necessary. JCR found that the Government of Japan's process for selecting the use of proceeds is appropriate, as the eligibility of each project is examined by a liaison meeting made up of relevant ministries.

[4]Source: November 2020 Cabinet Secretariat / Financial Services Agency / Ministry of Finance / Ministry of Economy, Trade and Industry / Ministry of the Environment Climate Transition Bond Framework

1-3. Management of proceeds

The funds raised based on these bonds will be immediately entered into the energy supply and demand account of the special account for energy measures after the bond issuance. Regarding the procedures of the allocating the funds, the entire budget for the GI Fund will be transferred in one lump sum from national budget to the New Energy and Industrial Technology Development Organization, the national research and development agency that implements the project. Thereafter those funds will be sequentially allocated to candidate projects depending on the selection status of each R&D project. Funds to be allocated to other R&D projects will also be transferred in on lump sum form as the GI Fund. The subsidy program is scheduled to be implemented from the special account for energy measures each time a project is finalized. The fund allocation status will be managed using an accounting system dedicated to this bond, and execution status will be handled by the Cabinet GX Office established in the Cabinet Office.

In addition, funds will be allocated to projects that have started operations or had funds allocated after the relevant business year, and it is expected that all funds will be allocated within a year after the issuance. If unallocated funds arise, Management will be conducted in cash or cash equivalents. Based on the above, it is appropriate.

The management of proceeds will be inspected by the Board of Audit, an independent body, like the regular budget process. In addition, the decision on the use of funds and the status of allocation will be confirmed at the relevant ministries' liaison meeting. Accounts related to the management of procured funds will be retained until the redemption of the applicable bonds and the retention period based on laws and regulations.

Based on the above, JCR finds the Government of Japan's management system as being highly transparent and well established.

1-4. Reporting

Reporting on the allocation status of funds

The Government of Japan plans to annually disclose on its website the details of the allocation of funds raised through this bond, as stipulated in the Japan Climate Transition Bond Framework. In addition, if there is a major change in circumstances after the proceeds have been allocated in full, the Government of Japan plans to make a timely disclosure.

In the framework, the government stipulates the reporting items on the allocation status of funds as follows:

“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 the following items.

Should a significant change occur after the allocation of the proceeds, such changes 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”

Regarding the selection of projects for the 5- and 10-year issuances, the government intends to take into account the duration of nominated projects so that the progress or outcome of each project is expected to be confirmed within the redemption periods. As was described in the above, the actual allocation results will be reported in the post-issuance reporting at full allocation within 12 months of issuance, and then annually thereafter until maturity/redemption. All post-issuance reports will be subject to independent verification by a third-party verifier.

Reporting on environmental improvement effects

The Government of Japan plans to disclose the contents of the Japan Climate Transition Bond Framework on its website as well as an annual report on the allocation of the proceeds and the environmental improvement effects of eligible projects until the redemption period. These disclosure items include the progress and expected CO2 reduction effects for research and development, and the environmental improvement effects such as CO2 reduction effects for subsidy programs, as part of brushing up investment strategies by field. The government plan to proceed with quantification, and quantitative disclosure to the extent possible. Regarding impact reporting, the progress status and environmental improvement effects will be updated at least until the end of each individual project, and this information will be disclosed on the website etc. until the redemption period.

In the framework, the government stipulates the planned impact reporting as follows（The text below supplements the framework text with what JCR has confirmed.）：

"The initial impact report will be conducted within 24 months after the full allocation of the first issuance, and subsequent annual R&D progress reports will be conducted at least until the completion of the individual project period.

＜Reporting items＞

- Environmental improvement effects such as reduction in CO2 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"

Based on the above, JCR evaluates that the Government of Japan's reporting system is appropriate.

▶▶▶ Overview of verification work

1. scope of work

The Government of Japan is preparing to issue the bonds and plans to use the proceeds to finance the eligible projects shown in Table 1 (hereinafter referred to as "Eligible Green Projects").
The Government of Japan has commissioned JCR, a Climate Bonds Approved Verifier, to conduct pre-issuance and post-issuance verification of the Bonds with limited assurances.
JCR engaged in this verification process from September 21, 2023, to February 6 2024.

1-1. Independence and quality control

JCR has various rules to maintain its independence and neutrality as a third-party status and control the quality of this verification report.

1-2. Work details for verification

JCR carries out the following verification procedures.

- JCR requested the Government of Japan to provide reliable information necessary for JCR's verification work.
- JCR reviewed the government's R&D implementation schedule R&D development plan of each project and confirmed the current TRL level and its goal to be reached by 2030. In addition to it, JCR researched each project's technology readiness level through publicly available research reports provided by academia, research institute and corporates. The target Technical Readiness Levels for each R&D project and JCR's evaluation of their alignment with the CBS appear in Annex 3.
- Interviews with Government of Japan officials related to the use of the proceeds from this bond, as well as those responsible for planning the Government of Japan's decarbonization transition strategy.
- Evaluation of evidence provided by the Government of Japan regarding the eligibility assessments with the CBS.
- Internal committee to determine verification report and conclusions.
- Limited warranty report provided.

2. Criteria

The verification standards for climate change bonds (hereinafter referred to as the "Standards") referenced by JCR are as follows.

- Climate Bonds Standard (CBS, ver.4.1)
- Sector criteria for each project listed in Table 1

3. Responsibilities of the Government of Japan

The Government of Japan is responsible for the collection, preparation and presentation of subject matters in accordance with the Standards and for maintaining appropriate records and internal controls designed to support the bonds.

4. JCR's responsibilities

JCR is responsible for reviewing the information and documents provided by the Government of Japan and assessing the compliance of the Bonds with the CBS.

- Eligible Green Projects Compliance with CBS
- Conformance of internal processes and cash management to CBS
- Adapting reporting to CBS

▶▶▶ Restrictions on distribution and use of verification reports

The verification report for CBI certification is intended for use by the Government of Japan and the Climate Bonds Standard Board. This document may be published by the Government of Japan, CBI and JCR. CBI and JCR will publish the report with the consent of the Government of Japan.

Assurance level statement

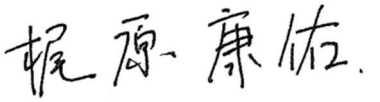
Limited assurance engagement means conducting an investigation and applying analysis, appropriate testing, and other evidence-gathering procedures sufficient to obtain a meaningful level of assurance that no matter has come to the verifier’s attention that the subject matter may be misstated. They do not provide all evidence necessary to provide a reasonable level of assurance. The steps taken are dependent on the assurance practitioner's judgment, including the risk of material misstatement of specific activity data, whether intentionally or negligently.

Although we considered the effectiveness of management's internal control in determining the nature and extent of our procedures, this review is not intended to provide assurance of internal control. JCR believes that the evidence it has obtained is sufficient and appropriate to provide a basis for its conclusions.

Verifier's signature

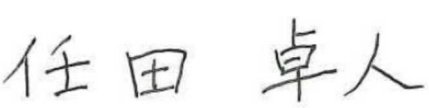
[Name of Supervisor]

[Name of Analyst in charge]
ATSUKO KAJIWARA
Supervisor, Chief Sustainable Finance Analyst



[Name of Analyst in charge]
KOSUKE KAJIWARA
Senior Sustainable Finance Analyst

[Name of Analyst in charge]
TOMOHIKO INAMURA
Senior Sustainable Finance Analyst



[Name of Analyst in charge]
TAKUTO TOUDA
Sustainable Finance Analyst

[Name of Analyst in charge]
HARUNA GOTO
Sustainable Finance Analyst

February 6, 2024

Japan Credit Rating Agency, Ltd.
Jiji Press Building, 5-15-8 Ginza, Chuo-ku, Tokyo 104-0061, Japan
Tel. +81 3 3544 7013, Fax. +81 3 3544 7026

Important explanation regarding this third-party verification

1. Relationship with acts related to credit rating business
   The act of providing this third-party verification is performed by JCR as a related business and is different from acts related to the credit rating business.
2. Relationship with credit rating
   This third-party verification is different from a credit rating, and does not promise to provide a predetermined credit rating or make it available for viewing.
3. JCR's third party nature
   There are no capital or personnel relationships that could create a conflict of interest between the subject of this evaluation and JCR. In addition, care should be taken to ensure that one of the tasks does not unduly influence the results of the other task, such as by separating the persons in charge of the third-party verification and review evaluation preparation tasks. We are doing so.

Annex 1: Pre-issuance report on facts

Details of the work in accordance with the terms of the contract, including the use of valuation techniques;

1. R&D Eligibility Requirement		
Climate bonds standard requirements	**Findings**	**Requirement Met**
It is included in the definition of a project or asset that meets the CBS eligibility criteria?	The proceeds of the bonds will be used for one of the following: vi. Subsidy vii. Related expenditures (R&D projects) Confirmation materials: Annex 2: Japan Climate Transition Bond Framework (hereinafter referred to as "Annex 2")	✔
a. Any early or later stage expenditure relating to the research, applied research and experimental development of solutions, processes, technologies, business models and other products dedicated to the substantial reduction, avoidance or removal of GHG emissions for which the ability to substantially reduce, remove or avoid GHG emissions has been demonstrated in a relevant environment, corresponding to at least Technology Readiness Level (TRL)6 b. For the avoidance of doubt this includes expenditure related to research, applied research and experimental development to bring the solution, process, technology, business model or other product through TRLs 1-5. In addition, funds or subsidy schemes incentivizing early stage R&D (TRL1 to TRL5) may be considered eligible if aiming to bring the solution, product or technology to TRL6. c. Substantial reduction, removal or avoiding GHG emissions requires the R&D to: i. Provide research, development or innovation for technologies, products or other solutions that enable an economic asset or activity to meet the respective Sector Eligibility Criteria under the Climate Bonds Standard v4.1; or ii. Aim to bring to market a solution that is expected to have a substantially better performance in terms of life cycle GHG emissions than best commercially available technologies based on public or market information or which substantially improves their technological and economic feasibility to facilitate their scaling up. d. TRL6 or above must be demonstrated as follows: i. TRL6 requires that the technology is fine-tuned to a variety of operating conditions, the process is reliable and the performances match the expectations, interoperability with other connected technologies is demonstrated, the manufacturing	All R&D projects covered by the bonds aim to reach TRL6 by the end of the term of the bonds. JCR requested the government to submit the relevant documents such as R&D plan of each project, each sector strategy roadmap approved by ministries committee and GI fund related disclosed materials. However, when supporting research by researchers that will lead to GHG emission reductions, subsidies may be provided for research at TRL 1 to 5. Even in that case, it is necessary to formulate an R&D plan with an eye toward organically linking it to the next R&D aimed at TRL6. With the exception of one project (No.15), all projects are research and development of technologies, products, or other solutions that enable CBS v.4.1 to be met. ii. It has been quantitatively confirmed that there is an additional improvement effect over the currently available technology. In research and development aiming for TRL6 or higher, mutual relationships with other technologies, definition of manufacturing methods, and understanding of environmental, regulatory, and socio-economic risks are done at the R&D proposal stage. At this stage, it does not cover technologies with TRL7 or higher, so patents, etc. are not subject to	✔

approach is clearly defined and that all environmental, regulatory and socio-economic issues are addressed. ii. Where the researched, developed or innovated technology, product or other solution is at TRL 6 or 7, life- cycle GHG emissions are evaluated in simplified form by the entity carrying out the research. The entity demonstrates one of the following, where applicable: (a) a patent not older than 10 years associated with the technology, product or other solution, where information on its GHG emission reduction potential has been provided; (b) a permit obtained from a competent authority for operating the demonstration site associated with the innovative technology, product or other solution for the duration of the demonstration project, where information on its GHG emission reduction potential has been provided. iii. Where the researched, developed or innovated technology, product or other solution is at TRL 8 or higher, life- cycle GHG emissions are calculated using Recommendation 2013/179/EU or, alternatively, using ISO 14067:2018 or ISO 14064-1:2018 and are verified by an independent third party. e. Where the R&D expenditure relates to products, solutions or activities for which Climate Bonds has not yet developed Sector Eligibility Criteria, eligibility will be individually assessed on a case-by-case basis. f. R&D expenditure must be continually assessed to ensure that the relevant climate-related goals are being achieved. g. Any training and education costs directly related to activities a. to d. above.	verification. Although there are no CBI sector criteria set for the fast reactor demonstration project, ICMA's research and development has confirmed that it is a carbon-free energy source and that its safety is much higher than that of current nuclear reactors. JCR evaluates that the bonds meets the Green Bond Principles. A verifier appointed by the government will evaluate all R&D projects annually to determine their contribution to achieving relevant climate-related goals. Confirmation materials: Annex 2-1, 4, materials submitted by the government and publicly available research. Confirmation materials: Annex 2-1, 4, Documents submitted by the Government of Japan	

A.2.1. Use of Proceeds		
Climate bonds standard requirements	**inspection result**	**Satisfying requirements**
2.1.1. Issuers must document that the projects and assets tied to the green bond are green-eligible projects and assets. The issuer must maintain a list of eligible projects and assets and update it from time to time until the maturity date of the bond.	The issuer has created a green bond framework (in the case of this bond, referred to as the Japan Climate Transition Bond Framework) to document that the projects linked to the green bond are green eligible projects. Confirmation materials: Annex 2	✔
2.1.2. All Nominated projects and assets must meet the documented objectives of the debt instrument as set out in the Issuer's Green Finance Framework.	All proceeds from the bonds will contribute to the issuer's GHG emissions reduction goals for 2030 and 2050. Confirmation materials: Annex 3, 4	✔

2.1.3. Issuers must allocate at least 95% of the net proceeds of the debt instrument to projects and assets that meet the Sector Eligibility Criteria requirements of the Standard.	95.4%of the bonds will be allocated to projects and assets that meet CBS and its sector criteria. (See Table 1) Confirmation materials: Annex 2-1,3, 4	✔
2.1.4. For any part of the net proceeds that will finance projects and assets that do not fully satisfy the Sector Eligibility Criteria requirements (up to 5%), the Issuer must provide detailed disclosures in the Green Finance Framework.	The following two projects do not fully meet the sector criteria. Innovative GX technology creation project (49.6 billion yen for primary academic research of raw-materials for battery storage, bio-manufacturing, etc.) Energy saving investment promotion/demand structure transformation support project subsidy (25 billion yen, energy efficiency (introduction of energy reduction equipment in large-scale, medium-sized and small-scale factories)) Details of these are described and disclosed in the issuer's green bond framework (in the case of this bond, referred to as the Japan Climate Transition Bond Framework) and in the third-party evaluation report prepared by JCR. Confirmation materials: Annex 4	✔
2.1.5. Any Nominated Projects and Assets which do not fully satisfy the Sector Eligibility Criteria may be considered eligible if they meet all of the following conditions: i. They must relate to sectors for which Climate Bonds has not yet developed Sector Eligibility Criteria; and ii. They must fall under any of the Green Project categories listed in the ICMA Green Bond Principles or the ICMA Social Bond Principles; and iii. The Verification Report opinion must confirm their alignment with the ICMA Green/Social Bond principles iv. They must not relate to any of the following excluded activities:: ① The exploration, extraction or transportation of proven conventional or unconventional fossil fuel reserves. ②Natural gas production ③Refining crude oil to produce derivative products ④ The supply and/or use of fossil fuels for power generation and heat	JCR confirmed through this verification work that the above two projects meet all the requirements stipulated in 2.1.5. Confirmation materials: Annex 2-1, 3	✔

⑤Conversion or fragmentation of high-carbon-stock land or unsustainable operations on high-carbon stock land leading to the loss of its status as high-carbon stock land.		
2.1.6. The expected Net Proceeds of the debt instrument must be no greater than the Issuer's total Investment Exposure to the proposed Nominated projects and assets or the relevant proportion of the total Market Value of the proposed Nominated projects and assets owned or funded by the Issuer.	It has been confirmed that the expected net proceeds from the bonds (approximately 1.600 trillion yen) is lower than the total amount of the target project (approximately 1.608 trillion yen). Confirmation materials: Documents submitted by the Government of Japan	✔
2.1.7. Nominated projects and assets must not be nominated to other Certified debt Instruments, unless the Issuer demonstrates that distinct portions of the Nominated projects and assets are being funded by different Certified debt Instruments or, the existing Certified debt Instrument is being refinanced via another Certified debt Instrument.	The issuer has not previously issued green bonds or certified climate bonds, and the target project does not overlap with the use of proceeds from other green bonds. Additionally, all proceeds from the bonds will be used for new investments. Confirmation materials: Annex 2	✔

2.2 Evaluation and selection process for eligible projects and assets		
Climate bonds standard requirements	**inspection result**	**Requirements met**
2.2.1. The Issuer must establish, document, and maintain a decision-making process which it uses to determine the eligibility of the Nominated projects and assets.	The issuer has developed a green bond framework (in the case of this bond, referred to as the Japan Climate Transition Bond Framework) and has appropriately documented the following items within it. Confirmation documents: Annex 2	✔
2.2.2 The decision-making process must include, without limitation:		
i. A statement on the climate-related objectives of the debt instrument.		
ii. How the climate-related objectives of the debt instrument are positioned within the context of the Issuer's overarching objectives, strategy, policy and/or processes relating to environmental sustainability.		

iii. The Issuer's rationale for issuing the Bond.		
iv. A process to determine whether the Nominated projects and assets meet the eligibility requirements of the Climate Bonds Standard.		✔
v. Related Sector Criteria, including any exclusion criteria and any other process, applied to identify and manage potentially material environmental or governance risks associated with the Nominated projects and assets.	Regarding research and development projects in which funds are used, for projects (offshore wind power) that require an environmental impact assessment under relevant domestic laws and regulations, an environmental impact assessment is scheduled to be conducted by the business operator before applying for the project to identify and manage significant environmental and social risks. ・ JCR confirmed that the possible risks are appropriately managed, avoided or alleviated. In addition, for all research and development projects, application materials require applicants (business operators) to identify business risks and incorporate measures to reduce them and explain that management should take the initiative in decarbonization. JCR also confirmed through an interview with the government and by the documents which describes the R&D fund rules submitted by the government that if there is a serious risk, the project should be discontinued in the event that a problem occurs, or research and development does not progress as planned. In case that any R&D project is discontinued/terminated, the Government intends to nominate the corresponding expenditure against other eligible projects under the framework. The government will consider how to reallocate upon facing such situations. In the subsidy program, JCR confirmed that there are no subsidy targets that may pose a significant risk to the environment or society, such as those involving large-scale civil engineering works. In addition, all subsidy programs for corporations require the submission of a CO2 reduction plan for 2030 and a business plan for eligible green businesses, and governance is also checked.	✔
vi. Any green standards or certifications referenced in the selection of Nominated projects and assets.	In selecting projects, JCR refers to the following criteria. 1. CBI Standard v.4.1, criteria for each sector shown in Table 1 2. ICMA Green Bond Principles 3. MOE Green Bond Guidelines 4. ICMA Climate Transition Finance Handbook 5. JFSA, METI, MOE Basic Guidelines on Climate Transition Finance Confirmation materials: Annex 2,3	✔

2.3. Management of proceeds		
Climate bonds standard requirements	**Findings**	**Requirements Met**
2.3.1. The Issuer must document and disclose to the Approved Verifier the systems, policies, and processes they will use to manage the Net Proceeds. These must include arrangements for the following activities:	Management methods are documented by a green bond framework (in the case of this bond, referred to as the Japan Climate Transition Bond Framework) and disclosed to JCR, the verification agency. Confirmation materials: Documents submitted by the Government of Japan, Annex2	✔
a. Tracking of proceeds: The Net Proceeds of the debt instrument can be credited to a sub-account, moved to a sub-portfolio, or otherwise tracked by the Issuer in an appropriate manner and documented.	A dedicated ledger will be prepared for the issue proceeds and will be managed appropriately therein. Confirmation materials: Documents submitted by the Government of Japan, Annex2	✔
b. Managing unallocated proceeds: The balance of unallocated Net Proceeds can be managed as per the requirements in Clause A.3.3.3.	Unallocated funds are managed in cash or cash equivalents. Confirmation materials: Documents submitted by the Government of Japan, Annex2	✔
c. Earmarking funds to Nominated projects and assets: An earmarking process can be used to manage and account for funding to the Nominated projects and assets and enables estimation of the share of the Net Proceeds being used for financing and refinancing.	Processes for allocating funds to targeted projects and assets are appropriately established. The proceeds from the bonds will be used for a new investment. Confirmation materials: Documents submitted by the Government of Japan, Annex2	✔
2.3.2. Where the prospectus requires the proceeds to be ring-fenced, they must be credited to designated bank accounts that can only fund the specified Nominated projects and assets. The Issuer must track and monitor all payments from the designated bank accounts.	Not Applicable	

2.4. Pre-issuance reporting: Green finance framework and disclosure documentation		
Climate bonds standard requirements	**Findings**	**Requirement Met**
2.4.1. The Issuer must prepare a Green Finance Framework and make it publicly available prior to, or at the time of, issuance. The Green Finance Framework must be provided to the Climate Bonds Standard Secretariat as one of the certification documents.	The issuer has disclosed its green bond framework (in the case of this bond, referred to as the Japan Climate Transition Bond Framework). https://www.meti.go.jp/english/policy/energy_environment/transition_finance/index.html	✔

2.4.2. The green finance framework must include: i. A statement of compliance with the Climate Bonds Standard and/or other applicable standards such as the Green Bond Principles or the United Nations Sustainability Development Goals. ii. A summary of the expected use of proceeds. iii. A description of the decision-making process for project selection iv. A description of the Issuer's processes for managing the proceeds v. A description of the Issuer's processes for reporting and external review or verification.	JCR confirmed that the issuer's framework includes all the items listed on the left. Confirmation materials: Annex2	✔
2.4.3. The green finance framework must also include, without limitation: i. Information on the methodology and assumptions to be used for confirming that the characteristics or performance of the Nominated projects and assets conform to the relevant Sector Criteria, where required, and any other additional impact metrics that the Issuer will define. ii. A summary of the approach to managing unallocated Net Proceeds in accordance with Clause A.3.3.3. iii. The intended approach to provide Update Reports to reaffirm conformance with the Climate Bonds Standard while the debt instrument remains outstanding iv. The list of proposed Nominated projects and assets associated with the debt instrument and the investment areas into which the Nominated projects and assets fall. Where there are limits on the detail that can be made publicly available about specific Nominated projects and assets, information disclosed must include the investment areas into which the Nominated projects and assets fall and an explanation of why detail on Nominated projects and assets is limited. v. Where a proportion of the Net Proceeds are used for refinancing, an estimate of the respective shares of the Net Proceeds used for financing and refinancing, and the relevant Nominated projects	JCR confirmed that the issuer's framework includes all the items listed on the left. Confirmation materials: Annex2	✔

and assets or investment areas which may be refinanced. This may also include the expected look-back period for refinanced Nominated projects and assets.		
2.4.4. Issuers are encouraged to disclose as much information as possible with respect to Nominated projects and assets. However, in many cases it is not possible for the Issuer to disclose detailed information about specific projects and assets prior to the issuance of the Bond. This limitation may be due to confidentiality arrangements with owners of projects and assets, the dynamic nature of the project portfolio, competitive considerations, or other legal provisions which limit the disclosure of detailed information.	JCR obtained as much information as possible from documents submitted by the government. Confirmation materials: Documents submitted by the Government of Japan, Annex2, 2-1,3,4	✔
2.4.5. Issuers should include the following in their disclosure materials:		
i. The investment areas into which the Nominated projects and assets fall.	Included in the disclosure. Confirmation materials: Annex 2-1	✔
ii. The intended types of temporary investment instruments for the management of unallocated Net Proceeds in accordance with Clause A.3.3.3.	Included in the disclosure. Confirmation materials: Annex 2	✔
iii. The Approved Verifier engaged by the Issuer for the mandatory Verification Engagements.	Included in the disclosure. Confirmation materials: Annex 2	✔

iv. The intended approach to provide Update Reports to reaffirm conformance with the Climate Bonds Standard while the debt instrument remains outstanding, including the location of the published documents.	Included in the disclosure. Confirmation materials: Annex 2	✔
v. The Climate Bonds Initiative Disclaimer provided in the Certification Agreement.	The CBI disclaimer follows a predefined format and is included in the certification agreement. Confirmation document: Certification Agreement	✔

Other items to report (for a checklist related to climate change mitigation, adaptation and resilience, please refer to the detailed list of each project attached in Annex 2)

Annex 2: Detailed Fact Findings (Japan Climate Transition Bonds Framework)
https://www.meti.go.jp/policy/energy_environment/global_warming/transition/climate_transition_bond_framework_eng.pdf
Annex 2-1 (Excel sheet)
Detailed and complete list of eligible green projects reviewed during verification engagements (Confidential)
Annex 3: Eligibility, adaptation and resilience check list (Excel sheet)
Annex 4: JCR Evaluation Report（Bonds）
Annex 5: JCR Evaluation Report (Framework)
https://www.jcr.co.jp/download/b5abf0635c83b738b5c0dbc0628553c0b1bc9d13dcb3365a5c/23d1036en_2.pdf
Annex 6: List of verification steps carried out by the verification team to confirm green bond compliance with CBS（Confidential）

Annex 3 : Eligibility, adaptation and resilience check list

	budget year	Business type	Allocation projects (including some allocation candidate projects)	Sector	Planned amount to be allocated (billion yen)	CBI Sector Criteria Asset/Activity class	CBI Sector Criteria Asset/Activity class			
						R&D Requirement a&b TRL level	c.1 Substantial reduction, removal or avoiding GHG emissions	d.i. TRL 6 or above must be demostrated as follows:	d.ii. & iii. For TRL 6-7 requirement	Requirement/Conditions
(1) GI Fund *2	2022	R&D	1. Development of next-generation solar cells (Expansion of demonstration scale of perovskite solar cells)	Electiricty	15.0	TRL 6-7 (2023-2030)	Meet CBS v4.1.	JCR confirmed the following item are included in the proposal Variety of operating conditions considered? The Process is reliable? Performances match the expectations? Interoperability with other technologies is demonstrated? Manufacturing approach is clearly defined? All environmental, regulatory and socio-economic issues are addressed?	This is not Applicable, as the R&D stage will be reached to TRL 6 in 2030.	
	2022	R&D	2. Lowering the cost of offshore wind power generation (Development of common infrastructure related to integration of wind turbines, floating structures, etc. in floating offshore wind power, floating offshore wind power demonstration project)	Electricity	*1	TRL6 (2023-2030)	Meet CBS v4.1.	JCR confirmed the following item are included in the proposal Variety of operating conditions considered? The Process is reliable? Performances match the expectations? Interoperability with other technologies is demonstrated? Manufacturing approach is clearly defined? All environmental, regulatory and socio-economic issues are addressed?	This is not Applicable, as the R&D stage will be reached to TRL 6 in 2030.	
	2022	R&D	3. Building a large-scale hydrogen supply chain (Demonstration of hydrogen power generation technology (high co-firing) using large gas turbine)	Electricity	15.0	TRL6 or higher (2026-2030)	Meet CBS v4.1.	JCR confirmed the following item are included in the proposal Variety of operating conditions considered? The Process is reliable? Performances match the expectations? Interoperability with other technologies is demonstrated? Manufacturing approach is clearly defined? All environmental, regulatory and socio-economic issues are addressed?	This is not Applicable, as the R&D stage will be reached to TRL 6 in 2030.	Achieve a minimum blending rate of ≥ 30% for cofiring
	2022	R&D	4. Development of next-generation aircraft (development of electric aircraft)	Transport	30.6	TRL 6 or higher (2030)	Meet CBS v4.1.	JCR confirmed the following item are included in the proposal Variety of operating conditions considered? The Process is reliable? Performances match the expectations? Interoperability with other technologies is demonstrated? Manufacturing approach is clearly defined? All environmental, regulatory and socio-economic issues are addressed?	This is not Applicable, as the R&D stage will be reached to TRL 6 in 2030.	
	2022	R&D	5. Development of next-generation ships (Zero-emission ships)	Transport	*1	Hydrofen fuel engine: TRL 8 or higher in 2030 Ammonia fuel engine: TRL 9 or higher (2028)	Meet CBS v4.1..	JCR confirmed the following item are included in the proposal Variety of operating conditions considered? The Process is reliable? Performances match the expectations? Interoperability with other technologies is demonstrated? Manufacturing approach is clearly defined? All environmental, regulatory and socio-economic issues are addressed?	This is not Applicable, as the R&D stage will be reached to TRL 6 in 2030.	
	2022	R&D	6. Development of fuel manufacturing technology using CO2 etc. (Development and demonstration of control technology that responds to raw material fluctuations in synthetic fuel (transportation fuel) production)	Transport	*1	TRL8-9 (2040)	Meet CBS v4.1.	JCR confirmed the following item are included in the proposal Variety of operating conditions considered? The Process is reliable? Performances match the expectations? Interoperability with other technologies is demonstrated? Manufacturing approach is clearly defined? All environmental, regulatory and socio-economic issues are addressed?		Annual reporting on the progress to reach TRL level initially determined and disclosed in its research and development plan (see Annex4)
	2022	R&D	7. Hydrogen utilization in the steelmaking process (Expansion of demonstration scale of hydrogen reduction ironmaking technology)	Heat Manufacturing	256.4	TRL 6-7 (2030)	Meet CBS v4.1. 2 million t-CO2e/year by 2030	JCR confirmed the following item are included in the proposal Variety of operating conditions considered? The Process is reliable? Performances match the expectations? Interoperability with other technologies is demonstrated? Manufacturing approach is clearly defined? All environmental, regulatory and socio-economic issues are addressed?	This is not Applicable, as the R&D stage will be reached to TRL 6 in 2030.	Annual reporting on the progress to reach TRL level initially determined and disclosed in its research and development plan (see Annex4)
	2022	R&D	8. Decarbonization of thermal processes in the manufacturing sector	Heat Manufacturing	32.5	TRL 6 or higher (2031)	Meet CBS v4.1. 20 million t-CO2e/year by 2040	JCR confirmed the following item are included in the proposal Variety of operating conditions considered? The Process is reliable? Performances match the expectations? Interoperability with other technologies is demonstrated? Manufacturing approach is clearly defined? All environmental, regulatory and socio-economic issues are addressed?	This is not Applicable, as the R&D stage will be reached to TRL 6 in 2030.	Annual reporting on the progress to reach TRL level initially determined and disclosed in its research and development plan (see Annex4)
	2022	R&D	9. Building a large-scale hydrogen supply chain (commercialization demonstration of liquefied hydrogen/MCH supply chain, research and development of dehydrogenation technology from ammonia for large-scale hydrogen transportation)	Electricity and heat Manufacturing	*1	TRL 6 or higher (2030)	Meet CBS v4.1. 7 million t-CO2e/year	JCR confirmed the following item are included in the proposal Variety of operating conditions considered? The Process is reliable? Performances match the expectations? Interoperability with other technologies is demonstrated? Manufacturing approach is clearly defined? All environmental, regulatory and socio-economic issues are addressed?	This is not Applicable, as the R&D stage will be reached to TRL 6 in 2030.	Annual reporting on the progress of measures that contribute to energy loss reduction.
	2022	R&D	10. Hydrogen production through water electrolysis using electricity derived from renewable energy, etc.	Electricity and heat Manufacturing	*1	TRL 6 or higher (2030)	Meet CBS v4.1. 400 million t-CO2e/year	JCR confirmed the following item are included in the proposal Variety of operating conditions considered? The Process is reliable? Performances match the expectations? Interoperability with other technologies is demonstrated? Manufacturing approach is clearly defined? All environmental, regulatory and socio-economic issues are addressed?	This is not Applicable, as the R&D stage will be reached to TRL 6 in 2030.	

	2022	R&D	11. Achieving carbon neutrality in the waste and resource recycling field	Waste	44.5	TRL 6-7 (2027-2030)	Meet CBS v4.1. 10.5 million t-CO2e/year by 2030	JCR confirmed the following item are included in the proposal Variety of operating conditions considered? The Process is reliable? Performances match the expectations? Interoperability with other technologies is demonstrated? Manufacturing approach is clearly defined? All environmental, regulatory and socio-economic issues are addressed?	This is not Applicable, as the R&D stage will be reached to TRL 6 in 2030.	• Waste hierarchy must be followed. • If waste burning/bioenergy, follow appropriate Sector Criteria ・CCUS（excludhing BECCUS） a minimum effiency design target of at 70% is required (if used) ・If it is necessary to handle specific hazardous materials, the materials will be utilized in accordance with Japanese regulations in a manner that does not have a negative impact on external environment.
	2022	R&D	12. Development of plastic raw material manufacturing technology using CO2 etc.	Waste Manufacturing (Chemical)	*1	TRL 6 or 7 (2027-2030)	Meet CBS v4.1. 40 million t-CO2e/year by 2030	JCR confirmed the following item are included in the proposal Variety of operating conditions considered? The Process is reliable? Performances match the expectations? Interoperability with other technologies is demonstrated? Manufacturing approach is clearly defined? All environmental, regulatory and socio-economic issues are addressed?	This is not Applicable, as the R&D stage will be reached to TRL 6 in 2030.	• Supply chain may not link to new or expansion of any O&G facilities (commissioned/ expanded or newly refurnished, as of 1 Jan 2020, excluding chemical plants). • Any required expansion/ upgrade and/or repair to distribution infrastructure is not restricted under the above
	2022	R&D	13. Promoting carbon recycling using CO2 as a direct raw material using bio-manufacturing technology	Manufacturing (Chemical)	*1	TRL 7-9 (2040)	Meet CBS v4.1. 1.35 billion t-CO2e/year by 2040	JCR confirmed the following item are included in the proposal Variety of operating conditions considered? The Process is reliable? Performances match the expectations? Interoperability with other technologies is demonstrated? Manufacturing approach is clearly defined? All environmental, regulatory and socio-economic issues are addressed?	This is not Applicable, as the R&D stage will be reached to TRL 6 in 2030.	Annual reporting on the progress to reach TRL level initially determined and disclosed in its research and development plan (see Annex4)
Subtotal					756.4					
(2) R&D other than GI Funds	2022	R&D	14. Among the post-5G information and communication system infrastructure reinforcement research and development projects, research and development of future technologies that are essential for realizing GX such as optoelectronic convergence	ICT	75.0	TRL 6 (2030)	Meet CBS v4.1.	JCR confirmed the following item are included in the proposal Variety of operating conditions considered? The Process is reliable? Performances match the expectations? Interoperability with other technologies is demonstrated? Manufacturing approach is clearly defined? All environmental, regulatory and socio-economic issues are addressed?	This is not Applicable, as the R&D stage will be reached to TRL 6 in 2030.	Annual reporting on the progress to reach targets (such as emission saving compared to baseline) initially determined and disclosed in its research and development plan.
	2022	R&D	15. Innovative GX technology creation project	Transport Electricity and Heat	49.6	Storage battery: TRL 6 or higher (2040) Hydrogen: TRL 6 or higher (2030) Bio-manufacturing: TRL 6 or higher (2040)	Does not meet CBS v4.1 This is classified into flexibility pocket.	JCR confirmed the following item are included in the proposal Variety of operating conditions considered? The Process is reliable? Performances match the expectations? Interoperability with other technologies is demonstrated? Manufacturing approach is clearly defined? All environmental, regulatory and socio-economic issues are addressed?	This is not Applicable, as the R&D stage will be reached to TRL 6 in 2030.	
	2023	R&D	16. Fast reactor demonstration reactor development project	Electricity	7.6	TRL 6 or higher	Meet CBS v4.1.	JCR confirmed the following item are included in the proposal Variety of operating conditions considered? The Process is reliable? Performances match the expectations? Interoperability with other technologies is demonstrated? Manufacturing approach is clearly defined? All environmental, regulatory and socio-economic issues are addressed?		• National nuclear regulations must be followed, for, nuclear material (i) sourcing, (ii) handling, (iii) transport, (iv) use, (v) storage AND (vi) safe disposal) when constructing reactors.
	2023	R&D	17. High temperature gas reactor demonstration reactor development project	Electricity and heat Manufacturing	4.8	TRL 6 or higher	Meet CBS v4.1.	JCR confirmed the following item are included in the proposal Variety of operating conditions considered? The Process is reliable? Performances match the expectations? Interoperability with other technologies is demonstrated? Manufacturing approach is clearly defined? All environmental, regulatory and socio-economic issues are addressed?		• National nuclear regulations must be followed, for, nuclear material (i) sourcing, (ii) handling, (iii) transport, (iv) use, (v) storage AND (vi) safe disposal) when constructing reactors.
subtotal					137.0					
(3) Subsidy program	2022	Subsidy	18. Among the support projects for strengthening the supply chain of important materials in response to changes in the economic environment, the project supports strengthening the semiconductor supply chain to achieve GX by improving power performance.	CBI sector criteria: 1. Solar v2.3 2. Wind v1.3 3. Low carbon transport (Rev2.2) 4. Electrical Grids and Storage (March 2022)	152.3	Core parts of EV cars electric train and Solar/wind power which enable to decrease energy loss	Meet CBS v4.1 Sector Criteira Low Carbon Transport Electrical Grids and Storage			
	2022	Subsidy	19. Strengthening supply chains for manufacturing storage batteries for EV and renewable energy, which are essential for a green society.	CBI sector criteria: 1. Low Carbon Transport(Rev2.2) 2. Electrical Grids and Storage (March 2022)	331.6	Electricity Storage Facilities	Meet CBS v4.1. Sector Criteria Electrical Grids and Storage			
	2022	Subsidy	20. Project to promote the introduction of advanced equipment to improve the insulation performance of houses	CBI sector criteria: Buildings (White list for Low Carbon Building Technology Rev1.0)	100.0	double- and triple-glazed windows	Meet CBS v4.1. Sector Criteria Building (white list) Minimum U-values are stipulated by 7 regions of Japan by from north to south.			
	2022	Subsidy	21. Energy saving investment promotion/demand structure transformation support project subsidy *3	No CBI criteria available.	25.0	No criteria suited to this project.	Does not meet CBS v4.1 This is classified into flexibility pocket.*2			
	2022	Subsidy	22. Subsidy to promote the introduction of clean energy vehicles (BEV, PHEV, FCV)	CBI sector criteria: Low Carbon Transport (Rev.2.2)	90.0	passenger cars	Meet CBS v4.1. Sector Criteria Low Carbon Transport All the PHEVs, supported by this program meets CBI sector criteria (under 50g-CO2/km/person)			
	2023	Subsidy	23. Commercial vehicle electrification promotion project	CBI sector criteria: Low Carbon Transport (Rev.2.2)	13.6	Passenger cars (PHEV are for taxi only)	Meet CBS v4.1. Sector Criteria Low Carbon Transport All the PHEVs, supported by this program meets CBI sector criteria (under 50g-CO2/km/person)			

	2023	Subsidy	24. Subsidy for promoting regional decarbonization (independent line microgrid project subsidy)	CBI sector criteria: Electrical Grids and Storage (March 2022)	3.0	Transmission and distribution networks (Grids)	Meet CBS v4.1. Sector Criteria Electrical Grids and Storage Construction of wholly dedicated infrastructure directly connecting between a solar and hydropower energy and a electricity network of as village.			
subtotal					715.5					
total					**1608.9**					

*1 Detailed plans for these seven projects have not been determined at thise time of verification. The actual allocation results of GI Fund will be disclosed in the post-issuance Reporting on the allocation of proceeds

*2 The project details described in the parentheses in column D are examples of main projects to be conducted. (For details, refer to Annex 4, JCR's preliminary Climate Transition Bond Evaluation Results)

*3 This project includes gas uses (e.g. gas cogeneration firing system in factories). JCR found that this gas cogeneration system is necessary for the manufacturing factories which use both electricity, heat and water vapor. These factories are classified into steel, pulp, other metal or food manufacturing plants. JCR found that this kind of gas cogeneration firing system is necessary in the process of decarbonization of manufacturing factories, as there is no clean technology which enable to supply both electricity, high heat and water vapor. The government and Japanese companies are now conducting R&D for the development of hydrogen and ammonia, one of the use of proceeds of these bonds, which gas cogeneration systems may utilize in the future once the technologies are commercialized. Although, it is difficult to disclose the actual percentage of energy saving rate of each project, JCR has confirmed projects with an energy saving rate or decarbonization rate of more than 30%

Private line microgrid

Grid and storage infrastructure adaptability and resiliency checklist		Submitted
1. There are clear boundaries and significant interdependencies between the infrastructure and the systems in which it operates. Identified.		
1.1	The infrastructure boundary uses (1) a list of all infrastructure and assets and activities associated with the use of bond proceeds, (2) a map of their location, and (3) identification of the expected operating period of the activities. is defined. , asset or project.	The boundaries are clearly defined as follows: Location: Entire area of Ikusaka Village, Nagano Prefecture (721 residences, 24 private companies, 43 public facilities) Introduced solar power generation (4,974kW) and storage batteries (8,640kWh) to private houses, private facilities, and public facilities through PPA. Renewable electricity will be supplied from off-site solar power generation (1,000 kW) during paid holidays to older homes with unusable roofs. Introducing small hydroelectric power generation (100 kW) and large storage batteries (2,000 kW), and constructing private line microgrids in key industries such as vineyards and public facilities to ensure an independent power supply system. We are building a forestry industry in the village by constructing a wood pellet factory and introducing pellet stoves into homes, etc., as well as decarbonizing old houses.
1.2	Critical interdependencies between the infrastructure and the systems it operates on are identified. Identifying these interdependencies requires consideration of the potential for adverse effects resulting from, but not limited to: (1) The impact of interruptions or interruptions in supply on users or populations dependent on electricity. (2) worsening of wildfires; (3) Relationship of the property/project to nearby flood zones. (4) Decrease in pollinating insects and birds. (5) Decline in 10 habitats of high biodiversity or conservation value. (6) Damage to or diminution of value of adjacent property by boundary structures that are at risk of falling during storms. (7) Fires and other activities that affect air quality. (8) Expropriation of land or economic assets from neighboring vulnerable groups11.	(1) The impact of the supply interruption and the number of households, companies, and facilities are clearly indicated. (2) It does not include forest, so it is not affected by wildfires. (3) Because the PPA utilizes existing buildings and idle land, it is less susceptible to the effects of flooding. (4) As the project does not involve large-scale development work, almost no impact on living organisms is expected. (5) Same as above (6) The risk of falling during rainstorms, etc. will be taken into consideration during construction. (7) As for fire prevention measures, a firefighting system has been established for the village as a whole. (8) There is no risk as the project is being carried out under the initiative of the village.
2. An assessment is being conducted to identify the major physical climate hazards to which the infrastructure will be exposed and vulnerable during its operational life.		
2.1	Key physical climate risks and indicators of these risks are identified according to the following guidelines: · Risks are identified based on (a) a set of climate hazards, and (b) information about the risks in the current local situation, including references to previously identified associated hazard zones (e.g. flood zones) .	There is no large-scale development work involved, and hazard maps are created by the local government, so the risk of damage from flooding is low.
	To be confident that assets and activities are robust and flexible in the face of climate change uncertainties, climate risks that are assessed and addressed must address the risks most relevant to T&D grids and energy storage. It is essential that you are covered. Physical characteristics of climate change that should be considered in risk assessments include: · Temperature rise o High temperatures can affect the electrical rating of assets, reducing transmission capacity and reducing the network's ability to meet demand. o Rising temperatures may also lead to longer overhead lines, reducing tree clearance. o Rising temperatures may also change the load on assets due to increased cooling demand (increased summer peak demand) and reduced winter heating (decreased winter peak demand). · Increase in heavy rain o Heavy rain can cause flash flooding, which can have a major impact on electrical equipment, especially ground-based equipment. · Sea level rise o Potential for flooding of coastal infrastructure and assets due to storm surge. · Increased lightning o Lightning strikes can cause temporary power outages due to power surges. · Increased wind/strong winds o Strong winds can damage overhead power lines, distribution lines, and supporting infrastructure (pylons and utility poles). o Fallen roots of trees and vegetation can also affect power lines. · Increased snow, sleet, ice, and frozen fog o Icing and snow accumulation can make overhead power lines more susceptible to strong winds. o Snow and ice can also prevent access to the repair site in the event of a failure. · Increased coastal/river erosion o Risks to assets located in coastal or riverside locations · Forest fire o Wildfires pose a risk to electricity infrastructure in affected areas and can significantly impede access to repair damaged infrastructure. o Power infrastructure can also cause wildfires. For example, contact between power lines and dry vegetation can cause a fire. · Landslides/ground movements o Surface movements can put both underground and above-ground infrastructure at risk. o Access may be blocked for repairs.	Because it is a small-scale hydropower, rooftop solar power, and microgrid limited to a village, the physical risks of temperature rise, heavy rain, and other natural disasters that are assumed to be climate change risks are low, and hazard maps have been developed to appropriately mitigate them.
	Issuers might consider the climate risks posed through specific interdependencies which might include, for example: · Availability of telecommunications for control systems and operational / field staff communications when dealing with extreme weather events, where the telecommunications rely on third party providers and infrastructure. · Flood risk and resilience will likely have interdependencies with local and national agencies, for example related to local flood defences, coastal flood risk management, shoreline management plans etc. Optional guidance for carrying out risk assessments: · Users should apply climate scenarios based on representative concentration pathway (RCP) 4.5 and 8.5 or similar / equivalent to ensure consideration for worst case scenario. · A broad range of models can be used to generate climate scenarios · Time horizons for assessing climate risk in agriculture can be based on annual seasonal forecasts and every ten years for the lifetime of the assets and projects. Where accurate assessments of climate variability for specific locations are not possible, use worst-case scenarios. · Risks can be characterized by the associated annual probability of failure or annual costs of loss or damage · For risk assessment, the TCFD The Use of Scenario Analysis in Disclosure of Climate- Related Risks and Opportunities is recommended.	This microgrid projects are aimed for strengthening the locl area's resilience. It plans to store enough renewable related power generation facilities inside a community, a village or a city. And once the severe disaster attacks this area, this microgrid system can be separated from the commercial line and the power generated by this area are suppled inside the community. As such, this project aims to reduce the climate risks to maintaiin the power supply to the targetted area of the project.

3. The measures that have or will be taken to address those risks, mitigate them to a level such that the infrastructure is suitable to climate change conditions over its operational life.		
3.1	The following are examples of risk management activities that bond issuers might consider, or that might be adopted as part of regulations (e.g. codes and standards). This list is not exhaustive and bond issuers should fully assess the mitigation measures that are relevant to the climate risks and impacts identified in the risk assessment. Temperature - Design standards that maintain equipment rating over its lifetime performance in the face of all potential ranges of temperature rise - Manage vegetation under power lines to ensure adequate clearance is maintained - Assess changing demand profile (milder winters, increased summer cooling) over equipment lifetime Rainfall: - Design for resilience to pluvial flooding - Assessment of site drainage requirements - Impact of restricted access to sites / lines due to flooding Increased lightning - Design of electrical equipment to withstand lightning impulses, including shielding and surge suppression devices - Redundancy Increased winds / gales - Design to withstand extreme winds - Cut vegetation regularly to safe distance to reduce risk from up-rooting - Invest in storm and hurricane forecasting tools - Consider placing cables underground - Redundancy Increased snow, sleet, ice, freezing fog - Design equipment for ice loading - Suitable vehicles for access to sites in heavy snow / icy conditions Increased flooding - Flood risk assessment and planning. - Site ground installations outside of potentially affected zones - Ensure flood defence systems and coastal management plans are adequate - Consideration of site access during flooding events Increased coastal / river erosion - Shoreline management plans / coastal erosion assessment Wildfires - Management of vegetation around electricity infrastructure to ensure adequate clearance Landslides / ground movement - The potential for ground movement and landslides should be taken into account when assessing sites for installing grid infrastructure. General risk mitigation measures: - Business continuity plans - System restoration plans - Black start - Islanded operation / microgrids - System security standards	The possible risks related to climate change are identified and necessary measures are stipulated in the national climate adaptation plan stipulated by the central government. In responset to this national plan, each local government stipulated its climate adaptaion plan, which more precisely consider the local weather and climate change impacts. https://adaptation-platform.nies.go.jp/en/local/plan/index.html
3.2	Risk reduction measures must be tolerant to a range of climate hazards and not lock-in conditions that could result in maladaptation.	Risk reduction measures are prepared by the local government which is tolerant to a range of climate hazards and not lock-in conditions that could result in maladaptation. In order to preventing lock-in, the government estabishes a center for monitoring climate change adaptation in each region. https://adaptation-platform.nies.go.jp/en/local/lccac/index.html
4. The infrastructure enhances the climate resilience of the defined system it operates within, as indicated by the boundaries of and critical interdependencies with that system as identified in item 1 in this checklist.		
4.1	Issuers are to assess the climate resilience benefits of system focused assets and activities and demonstrate they are 'fit for purpose', in the sense that they enhance climate resilience at a systemic level, with the flexibility to take into account the uncertainty around future climate change impacts. The assessment is conducted according to the principle of best available evidence during the investment period taking into account the infrastructure's boundaries and critical interdependencies as defined in Criteria 1. 'Fit for purpose' is defined as measures that mitigate the following effects: (1) the effects of supply disruption or interruption on dependent electricity users or populations; (2) exacerbation of wildfires; (3) relationships of the asset/project to nearby flood zones; (4) reduction in pollinating insects and birds; (5) reduction in biodiversity or High Conservation Value[12] habitat; (6) damage or reduction in value of neighbouring property due to boundary structures at risk of falling during storm events; (7) fire and other practices that affect air quality; (8) appropriation of land or economic assets from nearby vulnerable groups[13];	The necessary considerations related to this item are included when planned a microgird project in each region. (1) The scope of generation and supplied users and populations are determined in the beginning of the project planning (2) This microgrid system are developed inside the village, town, community level and not located in the forest. (3) Flood countermeasures are taken according to hazard map made by local governments. (4) There is no such concern, since a small grid extention might be expected but in general, utilizing existing grids this time. (5) There is no such concern, since a small grid extention might be expected but in general, utilizing existing grids this time. (6) These risks are considered and necessary measures shall be taken when installing new power generation systems. (7) Air pollution possibilities from bio-gas power generation in the farm should be minimized by complying to Japanese air pollution prevention laws and regulations. (8) There is no scope of such land or economic assets appropriation from the neaby vulnerable groups.
5. The issuance is required to demonstrate that there will be ongoing monitoring and evaluation of the relevance of the risks and resilience measures and related adjustments to those measures will be taken as needed.		
5.1	Indicators for risks identified under item 2 in this checklist are provided.	As this is not a large scale new grid installation, the risks identified under item 2 are out of scope.
5.2	Indicators for risk mitigation measures identified under item 3 in this checklist are provided.	Local governments are planning each microgrid system to mitigate risks, reffering its climate change adaptation plan and information gathered by monitoring centers for climate change adaptation. https://adaptation-platform.nies.go.jp/en/local/plan/index.html https://adaptation-platform.nies.go.jp/en/local/lccac/index.html In addition to the above high-level plan and system, there is an eligible requirement criteria to condiser possibel climate mitigation and resilience risks and countermeasure taken for this projects. This is provided by the government to JCR and it is disclosed in the govenent website. (As this is disclosed only in Japanese, JCR will provide the AI english translation version) https://sii.or.jp/microgrid02/uploads/R2MG_kofutebiki.pdf
5.3	Indicators for "fit for purpose" resilience benefit measures identified under item 4 in this checklist are provided.	there is an eligible requirement criteria to condiser possibel climate mitigation and resilience risks and countermeasure taken for this projects. This is provided by the government to JCR and it is disclosed in the govenent website. (As this is disclosed only in Japanese, JCR will provide the AI english translation version) https://sii.or.jp/microgrid02/uploads/R2MG_kofutebiki.pdf

5.4	Issuers have a viable plan to annually monitor (a) climate risks linked to the infrastructure, (b) climate resilience performance, (c) appropriateness of climate resilience measure(s) and to adjust as necessary to address evolving climate risks.	Issuers plans to collect a report from the subsidized city about the monitoring results of climate risks, resilience performance and appropriateness of climate resilience measures when a local government applies for this subsidy program.
5.5	Where electricity supply has been interrupted, the number of customer interruptions and customer minutes lost (i.e. aggregate duration of supply interruptions) should be measured and reported, together with the cause of the interruption. Any actions taken to reduce the risk of further impacts should also be recorded.	This project itself aims to prepare in the event of commercial electricity supply interruption.

Annex 4: JCR Evaluation Report（Bonds）

Japan Credit Rating Agency, Ltd. (JCR) announces the following preliminary Climate Transition Bond Evaluation Results.

The Government of Japan

1st Japan Climate Transition Bond　Assignment

Issuer	The Government of Japan
Subject	10-year Japan Climate Transition Bonds 5-year Japan Climate Transition Bonds
Type	interest-bearing government bonds
Issue Amount	10-year bonds: face value of approximately JPY 800 billion 5-year bonds: face value of approximately JPY 800 billion
Interest Rate	to be decided
Auction Date	10-year bond: February 14, 2024 5-year bond: February 27, 2024
Redemption Date	10-year bond: December 20, 2033 5-year bond: December 20, 2028
Method of Redemption	Lump-sum redemption at maturity
Use of Proceeds	Businesses that meet the eligibility criteria identified in the Climate Transition Bond Framework based on the GX Promotion Strategy

Evaluation Overview

1. Overview of Japan

Japan is located off the coast of the Far East and East Asia at the eastern tip of the Eurasian continent, and along the northwest coast of the Pacific Ocean, forming an arcuate archipelago as a whole. Approximately 70 per cent of Japan's land is mountainous, and approximately 67 per cent of that is forest. Japan is a country that experiences more natural disasters such as earthquakes and typhoons than any other country in the world. 18.5 per cent of earthquakes of magnitude 6 or higher that occur around the world occur in Japan. In addition, Japan accounts for 17.5 per cent of the damage caused by natural disasters including typhoons and earthquakes worldwide. In Japan, natural disasters, which have become increasingly severe in recent years, have caused much damage, including blackouts that lasted for several weeks, and further measures to both mitigate and adapt to climate change have become an urgent and top priority issue.

Japan has many manufacturing industries that are internationally competitive. According to the 2023 White Paper on Manufacturing Industries, there were 825 major manufacturing items in 2020, of which 220 items had a global share of 60 per cent or more, making it an overwhelming leader in the world. Approximately 70 per cent of this is used as parts and materials for electronics and automobiles, making this a strength of Japan's manufacturing industry.[1]

The total amount of greenhouse gas (hereinafter referred to as "GHG")[2] emissions in Japan with the thriving manufacturing industry, was 1.17 billion tons-CO_{2e} as of FY 2021 that ranked the fifth largest in the world; however, the actual amount in FY 2021 was reduced by approximately 16.9 per cent from FY 2013. Of which, the total carbon dioxide (hereinafter referred to as "CO_2") emissions amounted to 1,064 million tons-CO_2 and 92.9 per cent of the emissions are resulting from energy use. The breakdown by sector is as follows: the energy transformation sector, 40.4 per cent; the industrial sector, 25.3 per cent; the transportation sector, 16.7 per cent; the commercial industry, etc. sectors, 5.6 per cent and the residential sector, 4.8 per cent.

2. Overview of Japan's transition strategy

The Government of Japan declared "2050 carbon neutral" in October 2020, based on the goals set out in the Paris Agreement (substantially reduce global greenhouse gas emissions to hold global temperature increase to well below 2°C above pre-industrial levels and pursue efforts to limit it to 1.5°C above pre-industrial levels,) and legalized it by amending the Act on Promotion of Global Warming Countermeasures in 2021. In April 2021, the government expressed that it

[1] Ministry of Economy, Trade and Industry, Ministry of Health, Labor and Welfare, Ministry of Education, Culture, Sports, Science and Technology "2023 White Paper on Manufacturing Industries (Annual report based on Article 8 of Basic Act on the Promotion of Core Manufacturing Technology)" https://www.meti.go.jp/report/whitepaper/mono/2023 /index.html

[2] CO_2, methane, dinitrogen monoxide (nitrous oxide,) hydrofluorocarbons (HFC,) perfluorocarbons (PFC) and sulfur hexafluoride (SF6)

aimed to reduce GHG by 46 per cent (from FY 2013) in FY 2030 and continuingly challenge to realize 50 per cent reduction as an interim goal for carbon neutral in 2050.

As mentioned above, energy-derived CO_2 accounts for a little under 90 per cent of total GHG emissions of Japan. It is therefore significant to steadily take concrete measures for decarbonization in the industry, business, transportation and residential sectors, based on the national energy basic plan and the national energy mix to achieve the 2030 target. The Government of Japan launched GX that is to transform the industrial and social structures from fossil energy-centered since the Industrial Revolution into clean energy-centered in the 6th Strategic Energy Plan decided in the cabinet in October 2021. The government has held the GX Implementation Council, chaired by the Prime Minister and composed of experts from the government, private sector experts and academia since 2023 and compiled Basic Policy for the Realization of GX. The GX Promotion Act and the GX Decarbonization Electricity Act were enacted in 2023, and a system to promote the initiatives toward "Pro-Growth Carbon Pricing (CP) Concepts" was established. "GX Promotion Strategy" was decided in the cabinet in July 2023, based on the GX Promotion Act as a concrete strategy for implementing a series of policies.

The government centered to seek for further energy consumption reduction and for making renewable energy the main power sources as its first prioritized strategy. It then supports to realize the development of next-generation technologies in 22 sectors, including, but not limited to, the maximum utilization of nuclear power or hydrogen/ammonia/carbon recycling.

▶▶▶ 3. Validity on Transition Strategy (Outline of Alignment Evaluation with CTFH)

The Government of Japan's transition strategy and specific policies satisfy the four elements of the Climate Transition Finance Handbook[3] and the Basic Guidelines on Climate Transition Finance[4] (collectively referred to as the CTFH, etc.). The goal set by the Government of Japan to reduce GHG emissions by 46 per cent compared to 2013 levels in 2030 meets the goal of limiting global temperature rise to below 2°C as set by the Paris Agreement, but does not meet the goal limiting global temperature rise to 1.5°C or lower. JCR expects the government's further considerations to accelerate its efforts to reach even higher targets which will be enable 1.5°C level rise. JCR evaluates the level of ambition as being relatively ambitious when comparing the target values of other countries with the same base year.

The Government of Japan's transition strategy calls for public and private sectors to invest 150 trillion yen over the next 10 years in order to achieve carbon neutrality in 2050 and the interim milestone goal of 2030 (46 per cent reduction compared to 2013). The plan is to go beyond the SDS scenario (Business As Usual), as the government is planning to attract GX investment by

[3] International Capital Market Association (ICMA) "Climate Transition Finance Handbook 2023" https://www.icmagroup.org/sustainable-finance/the-principles-guidelines-and-handbooks/climate-transition-finance-handbook/

[4] Financial Services Agency, Ministry of Economy, Trade and Industry, Ministry of the Environment "Basic Guidelines on Climate Transition Finance 2021 Edition" https://www.meti.go.jp/press/2021/05/20210507001/20210507001-1.pdf

implementing investments stipulated in the Climate Transition Bond Framework in advance. JCR evaluates that this is a highly ambitious strategy, requiring efforts in addition to the BAU.

4. Overview of climate transition bond evaluation

The subjects of this evaluation are the 10-year Japan Climate Transition Bonds and 5-year Japan Climate Transition Bonds to be issued by Japan in February 2024 (collectively or individually referred to as the "1st Japan Climate Transition Bonds" or the "Bonds"). JCR will evaluate whether this Bonds complies with the Green Bond Principles (GBP)[5], Green Bond Guidelines (GB Guidelines)[6], CTFH, etc. Although these are principles or guidelines and are not legally supported regulations, JCR conducts evaluations by referring to the principles and guidelines as currently unified domestic and international standards.

The Government of Japan has established eligibility criteria for the Climate Transition Bond Framework in line with the goals and policies established in the GX Promotion Strategy based on the Plan for Global Warming Countermeasures, the Basic Energy Plan, etc. The projects for which the proceeds of this Bonds will be used are R&D funds and/or subsidy programs selected by the Government of Japan which meets the eligibility criteria set forth in its framework. In addition, although many of the eligible projects are research and development funding and subsidy programs and are unlikely to directly cause serious negative environmental or social impacts, environmental and social considerations should be taken into account when evaluating and selecting individual eligible projects. Based on the above, it is expected that the use of proceeds from this Bonds will promote GX initiatives across Japan and contribute to achieving carbon neutrality in 2050 and its milestone goal in 2030. Looking at the specific allocation of funds by CO_2 emitting sector, JCR sees that measures are being taken in a well-balanced manner, as shown in the figure below.

[5] International Capital Market Association (ICMA) "Green Bond Principles 2021" https://www.icmagroup.org/green-social-and-sustainability-bonds/green-bond-principles-gbp/

[6] Ministry of the Environment "Green Bond Guidelines 2022 Edition" https://wwitnv.go.jp/content/000062495.pdf

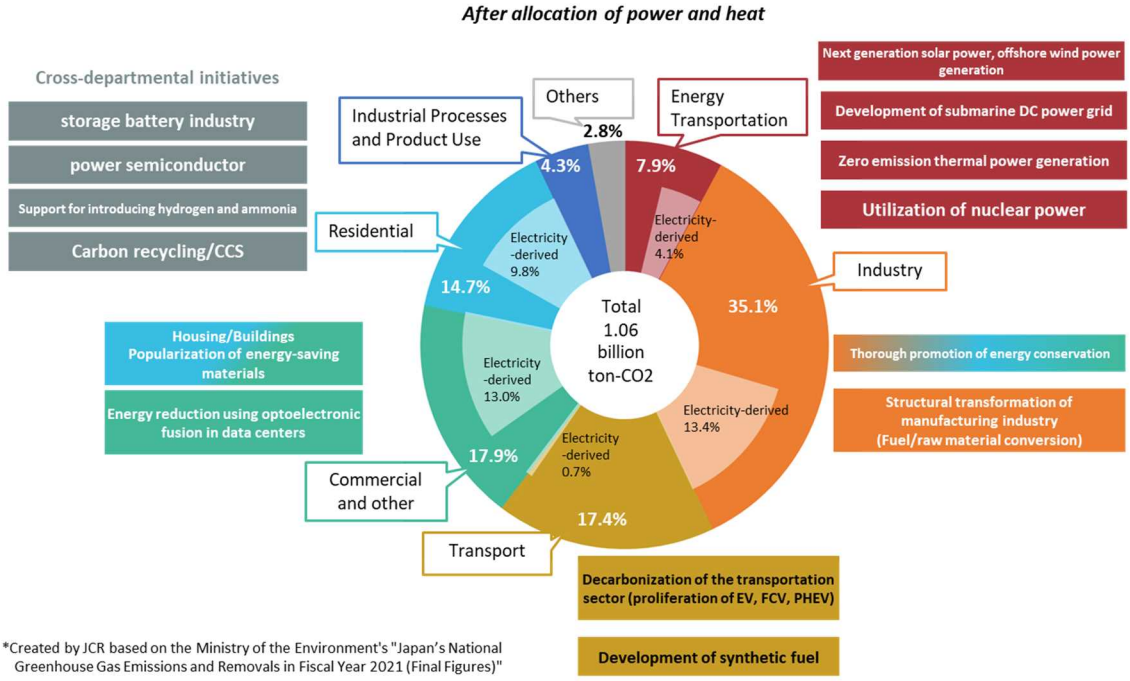


Figure 1: Relationship between use of proceeds and CO_2 emitting industries1[7]

In the process of selecting projects set out in this bonds by the government include (1) a liaison system between relevant ministries and agencies has been established; (2) the selection is to be finally approved in the GX Implementation Council haired by the Prime Minister; (3) bonds to be issued, based on this framework are managed separately from other accounts in the energy supply and demand account of the special account for energy measures and (4) allocated projects are separately categorized as GX-related budgets in the same account. JCR therefore has evaluated that a system has been established to properly classify and manage proceeds financed, based on this framework. JCR has also confirmed that reporting contents/periods on the allocation of proceeds and impacts are adequately established. Accordingly, JCR has evaluated that the management and operation system in the national government has been established and has transparency.

Accordingly, JCR has assigned "gt1" to the preliminary evaluation of the "Greenness/Transition Evaluation (Use of Proceeds),"m1" to the preliminary evaluation of the "Management, Operation and Transparency Evaluation" and "Green 1(T)" to the "JCR Climate Transition Bond Preliminary Evaluation" for this Bonds. JCR has evaluated that this Bonds satisfies the criteria for items required in the "Green Bond Principles," "Green Bond Guidelines," and CTFH, etc.

[7] Created by JCR based on the Ministry of the Environment's "Japan's National Greenhouse Gas Emissions and Removals in FY 2021 (Final Figures)"

Table of contents

Chapter 1: Overview of Evaluation Targets

The subjects of this evaluation are the 10-year Japan Climate Transition Bonds and 5-year Japan Climate Transition Bonds to be issued by Japan in February 2024 (collectively or individually referred to as the "1st Japan Climate Transition Bonds" or the "Bonds").

The funds financed from this bonds will be allocated to the projects, aiming to realize the 2050 carbon neutral that is an international commitment aligned with the Paris Agreement and a 46 per cent reduction by FY 2030 (from FY 2013) based on the "Strategy for Promoting Transition to a Decarbonized, Growth-Oriented Economic Structure (known as GX Promotion Strategy)."

The proceeds shall be selected from the measures/projects stipulated “GX Promotion Strategy” as well as the Climate transition finance framework established by the government. It will be repaid by several measures, since future carbon pricing ("CP" refers to charge for fossil fuels and expenses borne by specified business in the electricity sector) as financial resources: 1) it shall be taken into account the balance between benefits and burdens of citizens, 2) the investment decision is difficult for the private sector while considering the benefits and burdens perspectives and 3) it shall be prioritized to the investment area which will contribute to realize both emission reduction and industrial competitiveness strengthening and economic development of Japan.

The government considers to support high emission companies which participate in emission trading system called “GX League[8]”. So the implementing bodies of the use of proceeds shall be selected from those companies.

The "GX Promotion Strategy" listed 14 future action for efforts as exemplified in the "Decarbonization initiatives for GX on the premise of ensuring a stable energy supply" that promote toward decarbonization by the public and private sectors. The Government of Japan has organized these efforts into the Climate Transition Bond Framework as eligibility criteria for "Japan Climate Transition Bonds," which are individual issues of GX Economy Transition Bonds (See Japan Climate Transition Bond Framework[9] and JCR Evaluation Report[10] published on November 7, 2023).

In the Japan Climate Transition Bond Framework, the Government of Japan states that the selection of the use of proceeds will be based on the "basic conditions" of investment promotion measures based on the basic concept of upfront investment support for GX Economy Transition Bonds shown in Table 1(eligible business).

---

[8] GX is an abbreviation for Green Transformation, which refers to the transformation and activities aimed at achieving this goal by utilizing clean energy while avoiding the use of fossil fuels as much as possible. The GX League is a group of companies that are actively working on GX, together with players from the government, academia, and finance who are taking on the challenge of GX, to discuss reforming the entire economic and social system and creating new markets. It was established by the Ministry of Economy, Trade and Industry as a place to practice creativity.

[9] Cabinet Secretariat / Financial Services Agency / Ministry of Finance /Ministry of Economy, Trade and Industry / Ministry of the Environment, "Japan Climate Transition Bond Framework", November 2023
https://www.meti.go.jp/policy/energy_environment/global_warming/transition/climate_transition_bond_framework_eng.pdf

[10] JCR "Japan Climate Transition Bond Framework Evaluation Report", November 2023
https://www.jcr.co.jp/download/b5abf0635c83b738b5c0dbc0628553c0b1bc9d13dcb3365a5c/23d1036en_2.pdf

Table 1: GX Economy Transition Bond "basic conditions" in the selection of the use of proceeds (overview) [11]

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 regulations and institutional measures that change corporate investment and demand-side behaviour
IV.	Efforts that contribute to the expansion of domestic investment including for human capital

The government prioritizes projects that align with the types which meet each of the requirements from A to C for increasing industrial competitiveness/economic growth and the requirements from 1 to 3 for emission reduction as candidates subject to support in addition to the aforementioned principles.

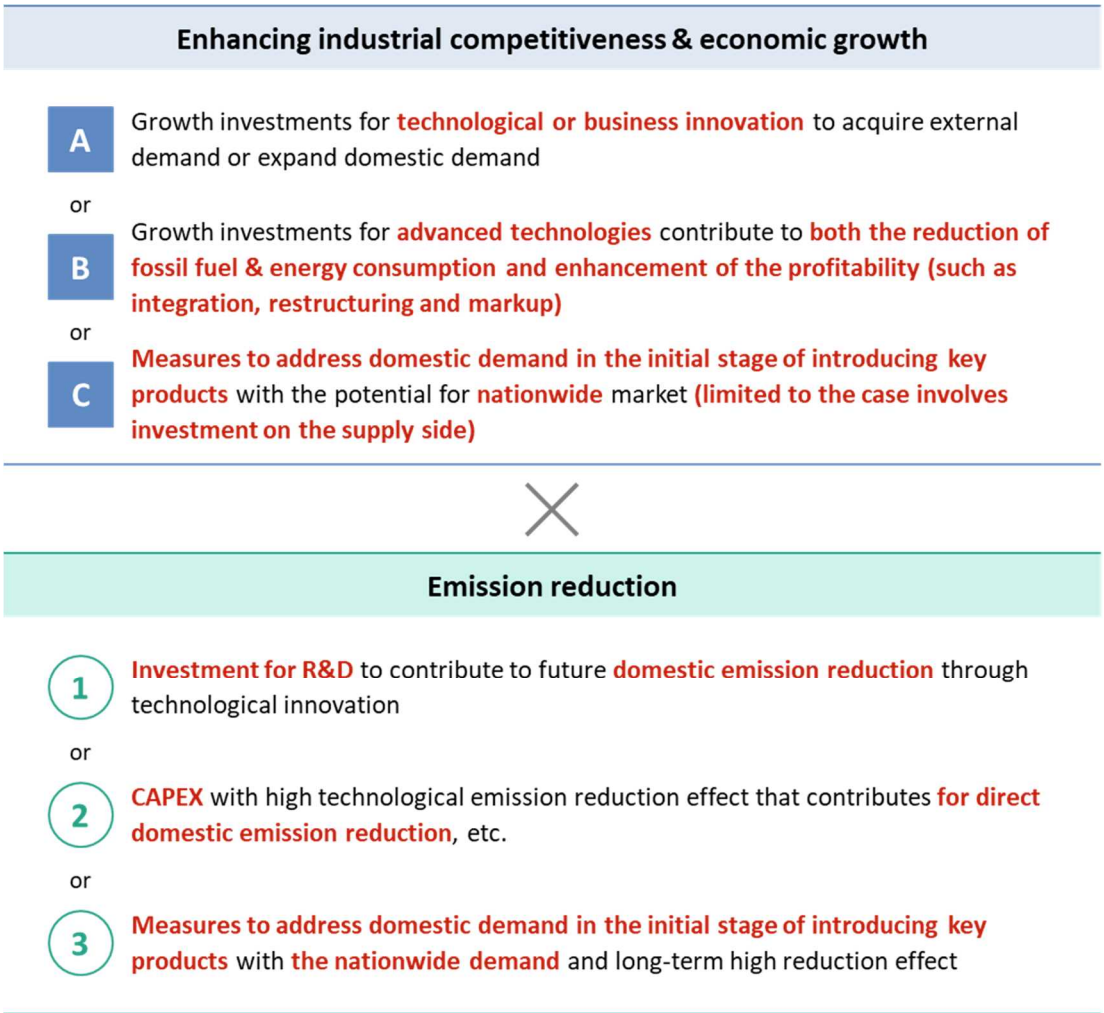


Figure 2: Requirements for selecting the use of proceeds for GX economy transition bonds[12]

[11] Source: Cabinet Secretariat / Financial Services Agency / Ministry of Finance /Ministry of Economy, Trade and Industry / Ministry of the Environment, "Japan Climate Transition Bonds Framework", November 2023

[12] Source: Cabinet Secretariat / Financial Services Agency / Ministry of Finance /Ministry of Economy, Trade and Industry / Ministry of the Environment, "Japan Climate Transition Bonds Framework", November 2023

Based on the above, JCR evaluates the alignment of this Bonds with the Green Bond Principles, the Green Bond Guidelines of the Ministry of the Environment, and CTFH, etc., based on JCR Green Finance Evaluation Methodology in the next chapter in detail.

Chapter 2: Alignment with Climate Transition Finance Handbook

2-1. Japan's Economic Policy and Transition Strategy

<Outline/Political/Social Situations>

Japan is located off the coast of the Far East and East Asia at the eastern end of the Eurasian Continent and the coastal areas in northwestern part of the Pacific Ocean, and it is island arcs as a whole. The land area is roughly 378,000 km^2, approximately 70 per cent of which is mountainous terrain that include roughly 67 per cent of forests and it ranks 62nd in the world. Natural disasters, such as earthquakes or typhoons has hit Japan more often than the rest of the world. While Japan's land area accounts for only about 0.29 per cent in the world, 18.5 per cent of earthquakes with a magnitude of 6 or higher have occurred in Japan since 7.1 per cent of the world's active volcanoes are located in Japan where there are many active faults. The amount of damage that Japan has suffered by natural disasters, including typhoons or earthquakes accounts for 17.5 per cent of the world; therefore, Japan is called as a disaster-prone country. Further measures from both mitigation/adaptation to climate change are urgent and the most important issues since many damage has recently occurred due to earthquakes and intensifying storms and floods disasters although the national government strives to make the country more resilient to climate change and earthquakes.

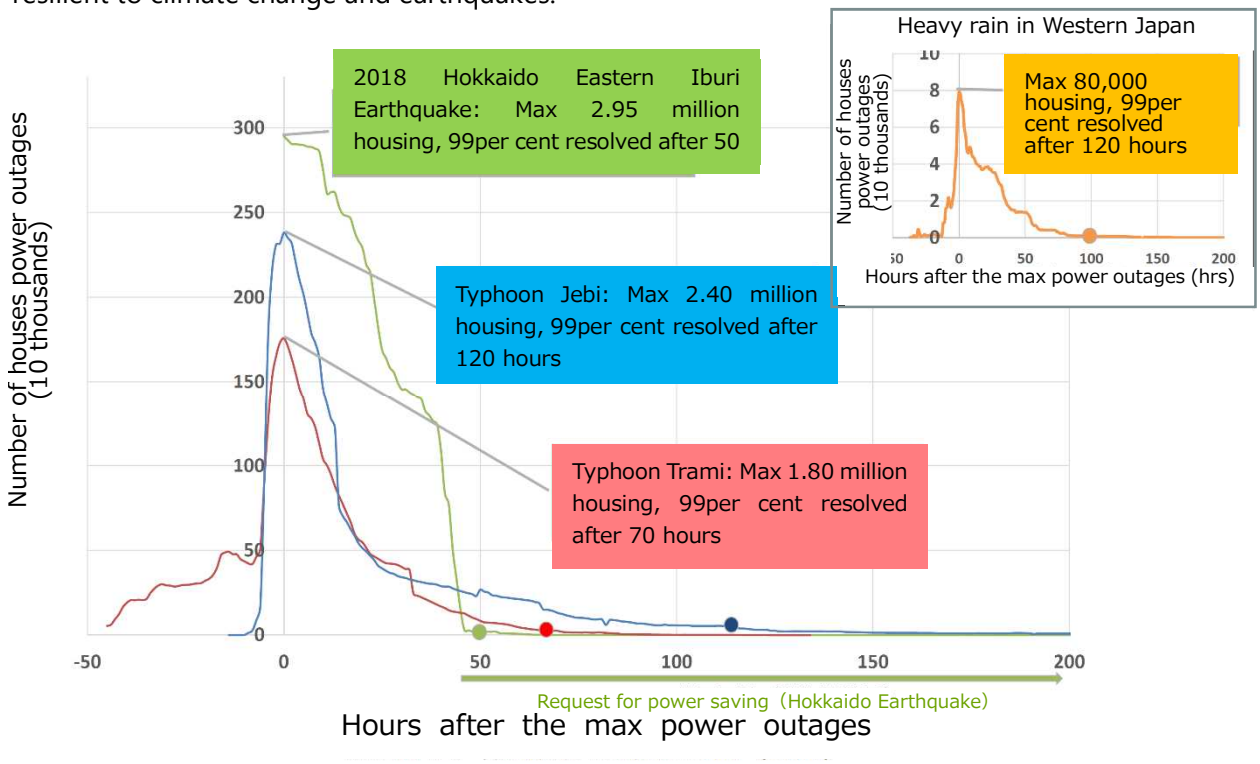


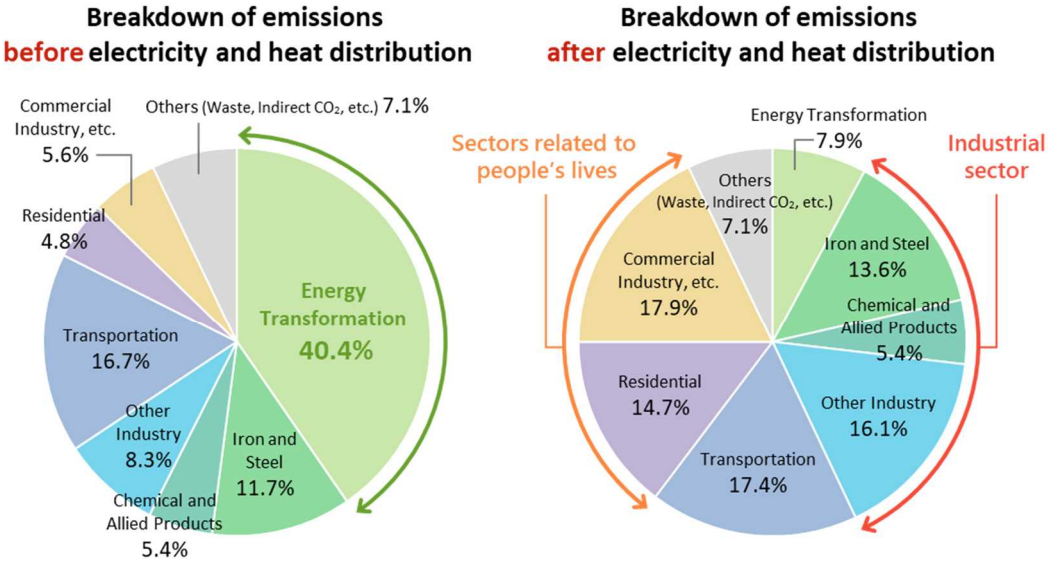
Figure 3: The number of power outages and time taken to resolve in each disaster[13]

The Japanese GDP in 2022 ranked third after the United States and China thanks to a large number of internationally competitive manufacturing companies. According to the 2023 White Paper on Manufacturing Industries, Japan has 825 major manufacturing items in 2020 of which 220 items hold 60 per cent or more global market shares, a predominantly high number,

[13] Agency for Natural Resources and Energy at https://www.enecho.meti.go.jp/about/special/johoteikyo/blackout.html

compared to the United States (99 items,) Europe (50 items) and China (45 items.) Roughly 70 per cent of the items are parts/materials, including electronics or automobiles, which is the strength of the Japanese manufacturing industry.

The total amount of GHG emissions in Japan with the thriving manufacturing industry, was 1.17 billion tons-CO_{2e} as of FY 2021, ranked the fifth largest in the world; however, the actual amount in FY 2021 was reduced by approximately 16.9 per cent from FY 2013. Of which, the total CO_2 emissions amounted to 1,064 million tons-CO_2, and 92.9 per cent of the emissions are resulting from energy use. The breakdown by sector is as follows: the energy transformation sector, 40.4 per cent; the industrial sector (the iron and steel, chemical and allied products and other industry), 25.3 per cent; the transportation sector, 16.7 per cent; the commercial industry, etc. sectors, 5.6 per cent and the residential sector, 4.8 per cent (Figure 3, before electricity and heat distribution.)



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

Figure 4: Breakdown of CO_2 emissions by sector (Final figures for FY 2021)[14]

The Government of Japan has aggressively led the decarbonization initiatives in the international community with ambitious developmental promotion of solid/new technologies by discussing over global promotion of GX that is a transformation of the entire economic and social system so as to shift to the clean energy-centered economy, society and industrial structure from the fossil fuel-centered since the Industrial Revolution, based on the spirit of the Paris Agreement and furthermore to integrate carbon neutral, a circular economy and nature revival by accelerating the measures against climate change in the whole world and by compiling an agreement, stating to aim to keep the global temperature rise below 1.5 °C by 2030 in the "G7 Sapporo Climate, Energy and Environment Ministers' Meeting" as its host country in the G7 Hiroshima Summit in May 2023.

[14] The outline of the 2021 Greenhouse Gas Emissions/Absorption (Final Figures) by National Institute for Environmental Studies under the jurisdiction of Ministry of the Environment

<Plan for Global Warming Countermeasures>

The Government of Japan established goals set forth in the Paris Agreement (keep the global temperature rise well below 2 °C and to pursue efforts to limit the temperature increase even further to 1.5 °C) and set out the basic principles for promoting global warming countermeasures, such as realizing decarbonized society for the 2050 Carbon neutral, the integrated improvement of the environment, economy and society and the close cooperation with citizens and other parties concerned in the Act on Promotion of Global Warming Countermeasures revised in March 2021. The goal of reducing GHG by 46 per cent in FY 2030 from FY 2013 as an interim target was announced, adding its challenge continues to further reduce by 50 per cent in the Plan for Global Warming Countermeasures revised in October 2022, based on the revised Act on Promotion of Global Warming Countermeasures.

The transition of GHG emissions in Japan, which is the premise of the plan, is shown in Figures 5 and 6, respectively. The total GHG emissions amounted to 1.170 billion t-CO_{2e} in FY 2021, decreased by roughly 16.9 per cent (238 million t-CO_{2e}) from FY 2013 (1.408 billion t-CO_{2e}.)

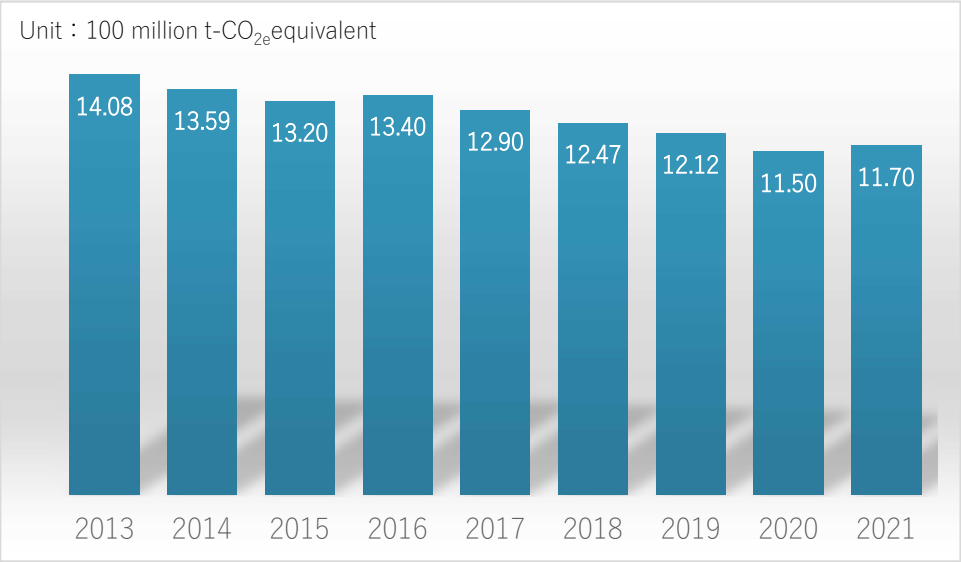


Figure 5: Changes in Japan's total GHG emissions[15]

[15] Created by JCR based on the Plan for Global Warming Countermeasures (in October 2021) materials provided by Ministry of the Environment

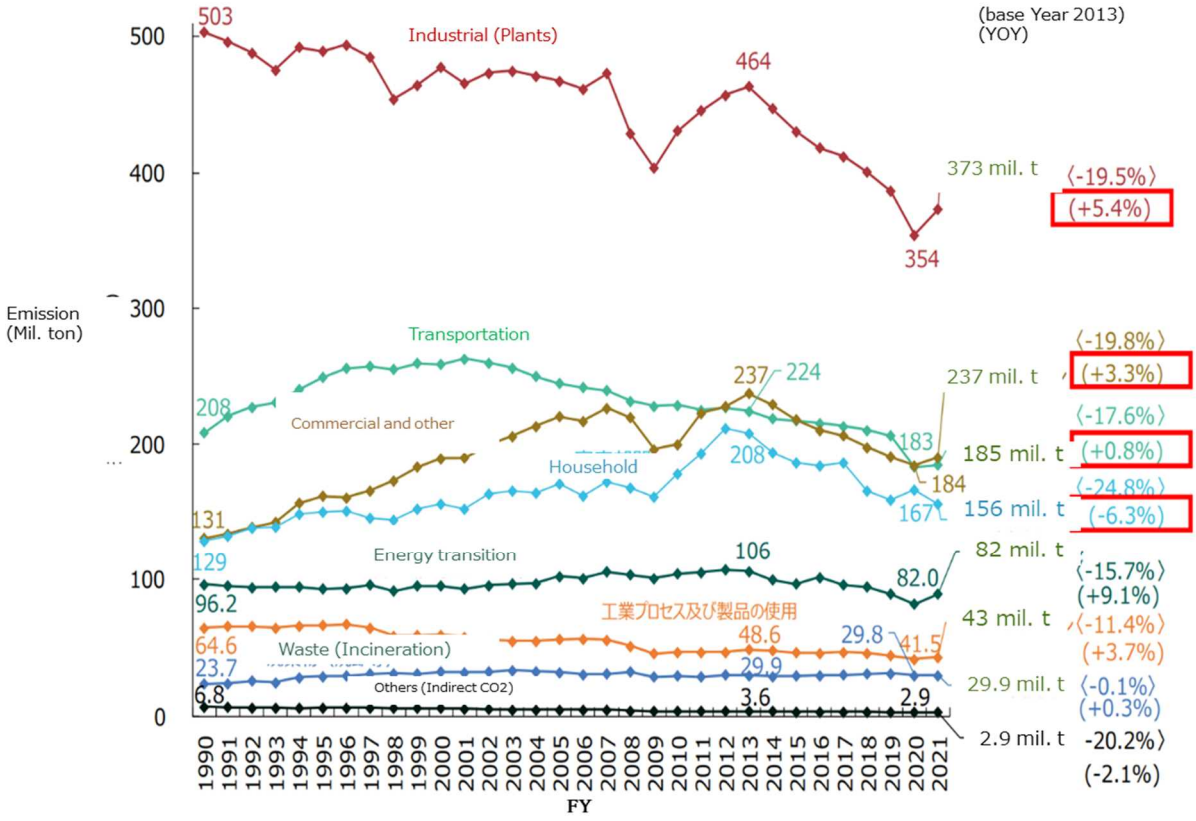


Figure 6: Trends in Japan's CO_2 Emissions by Sector[16]

The reduction targets were established for FY 2030 by GHG and by division for energy-derived CO_2 in the Plan for Global Warming Countermeasures (see Figure 7.) Some examples of measures that are expected to be taken by the national and local governments for respective emission sources or targets by division were also set forth with the specific reduction figures in this plan.

[16] The outline of the 2021 Greenhouse Gas Emissions/Absorption (Final Figures) by National Institute for Environmental Studies under the jurisdiction of Ministry of the Environment

(Unit: Mil. t-CO2, (Base year 2013 comparison))

			FY2013	FY2019	FY2030
GHG emission/absorption			1,408	1,166 (▲17%)	760 (▲46%)
	Energy oriented CO_2		1,235	1,029 (▲17%)	677 (▲45%)
		Industry	463	384 (▲17%)	289 (▲38%)
		Busines and others	238	193 (▲19%)	116 (▲51%)
		Household	208	159 (▲23%)	70 (▲66%)
		Transport	224	206 (▲8%)	146 (▲35%)
		Energy transition	106	89.3 (▲16%)	56 (▲47%)
	Non Energy oriented CO_2		82.3	79.2 (▲4%)	70.0 (▲15%)
	CH_4		30.0	28.4 (▲5%)	26.7 (▲11%)
	N_2O		21.4	19.8 (▲8%)	17.8 (▲17%)
	Alternative		39.1	55.4 (+42%)	21.8 (▲44%)
		HFCs	32.1	49.7 (+55%)	14.5 (▲55%)
		PFCs	3.3	3.4 (+4%)	4.2 (+26%)
		SF_6	2.1	2.0 (▲4%)	2.7 (+27%)
		NF_3	1.6	0.26 (▲84%)	0.5 (▲70%)
	GHG absorption source		-	▲45.9	▲47.7
	Bilateral credit system (JCM)		0.1 billion t-Co2 reduction		

Figure 7: Japan's GHG Emission Reduction Targets and guidelines by GHG and other categories[17]

<Strategy for Promoting Transition to Decarbonized Growth-Oriented Economic Structure (GX Promotion Strategy)>

As shown in Figure 7 above, energy-derived CO_2 accounts for a little under 90 per cent of GHG emissions in Japan. It is therefore important to steadily take concrete measures for decarbonization in the industry, business, transportation and residential sectors, based on the national energy basic plan and national energy mix in order to achieve the 2030 target. The Government of Japan launched "GX" that is to transform the industrial and social structures mainly from fossil energy-centered since the Industrial Revolution into clean energy-centered in the 6th Strategic Energy Plan, decided in the cabinet in October 2021. The government has held the GX Implementation Council, chaired by the Prime Minister and composed of experts from the government, private sectors and academia since 2023 and compiled "the Basic Policy for the Realization of GX." The GX Promotion Act and the GX Decarbonized Power Supply Act were

[17] Source: "Plan for Global Warming Countermeasures" decided in the cabinet in October 22, 2021 at https://www.env.go.jp/content/900440195.pdf

enacted in 2023, and a system to promote initiatives toward "Pro-Growth Carbon Pricing Concept" was established. "GX Promotion Strategy" was decided in the cabinet in July 2023, based on the GX Promotion Act as a concrete strategy for implementing a series of policies.

Table 2: Overview of GX Promotion Strategy[18]

(1) GX initiatives based on the premise of ensuring a stable energy supply	(2) Realization and implementation of the "Pro-Growth Carbon Pricing Concept" and other initiatives
1. Promotion of thorough energy efficiency improvement ・ Energy saving support for small- and medium-sized enterprises ・ Housing energy saving support ・ Conversion to non-fossil energy and further energy saving support in five major industries (steel, chemical, cement, paper and automobile) 2. Making renewable energy a mainstay power source ・ Accelerating maintaining grids and realizing revised direct current (DC) transmission from Hokkaido ・ Introducing renewable energy in harmony with the community, social implementation of next generation solar power (Perovskite) and floating offshore wind power 3. Utilization of nuclear power ・ Materializing next-generation innovation reactors ・ Securing an operation period of 40 years + 20 years and additional extension on the premise of strict safety inspection ・ Increasing efforts for nuclear fuel cycles/ decommissioning and final disposal 4. Other important matters ・ Constructing hydrogen/ammonia supply chains ・ Introducing decarbonization power supply auction ・ Strategically securing surplus LNG ・ R & D, capital expenditures and demand creation for GX, such as carbon recycling, storage batteries, resource recycling, next-generation automobiles/ aircraft or zero-emission ships	To realize GX investments with over 150 trillion yen by public and private sectors for the next 10 years. 1. Upfront Investment support utilizing GX Economy Transition Bonds ・ Support up-front investment of 20 trillion yen for the next 10 years 2. GX investment incentives through "Pro-Growth Carbon Pricing Concept" <Specific example> i) Full-scale operations of the emissions trading scheme (in and after FY 2026) ii) Introducing a carbon tax system for fossil fuels importers (in and after FY 2028) * GX Promotion Organization was established as the aforementioned implementing body 3. Utilization of new financial instruments ・ GX Promotion Organization considers/implements risk supplement measures, such as debt guarantee ・ Environment development to promote sustainable finance 4. International strategy, Just Transitions, and GX of small and medium enterprises (SMEs) and other businesses ・ Asia Zero Emission Community Initiatives ・ Promoting smooth labor mobility ・ Stimulating demand for decarbonized products ・ Promoting efforts throughout the supply chains, including SMEs, such as human resources development during the SME support period for push-type support
(3) Progress Evaluation and Necessary Reviews: Progress evaluation will be regularly conducted, based on the impacts on the progress of GX investments, global trends and economy.	

The GX Promotion Strategy highly prioritize energy conservation and introducing as much renewable energy as possible as a main power source, After doing the prioritized policy above, the government supplements the rest of the electricity demands which cannot be covered by renewable energy by next-generation clean energy such as hydrogen, ammonia and synthetic fuels as well as nuclear power to realize zero carbon emission society. It also includes resources recycling and other important measures. All of these measures are based on technical grounds, and the combinations of technologies assumed in each cross section by FY 2023, FY 2030, FY 2040 and FY 2050 are compiled as "Future milestones" for all 22 categories. CO_2 reduction effects, economic rationality and probability of social implementation in the sectoral investment strategies for the next 10 years and the action plan with a five-year lead will be discussed per sector by experts with academics invited and will be eventually decided in the GX

[18] Summarized/prepares by JCR based on disclosure materials provided by METI.

Implementation Council, chaired by the Prime Minister as for concrete projects for the measures set forth in these Pathway.

The "Future milestones" is aligned with the sectoral technology roadmaps (hereinafter referred to as "sectoral roadmap") formulated by the METI. The sectoral roadmaps have been prepared sequentially since FY 2021 for industries with relatively large emissions, such as steel, chemicals, electric power, gas, oil, paper and pulp, cement or automobiles. Low-carbon/decarbonized technologies for achieving the 2050 carbon neutral to be sectorally used are comprehensively covered, including the existing/future technologies that will be developed, aiming at social implementation and the routes are shown so as to align with the 2030 goals to limit to keep the global temperature rise well below 2 °C and to pursue efforts to limit the temperature increase even further to 1.5 °C and to achieve the 2050 carbon neutral with the combination of these technologies.

<Materiality of Decarbonization Transition Strategies in Japan>

The Government of Japan has positioned the GX initiatives as important measures that will contribute to the re-increasing Japanese industrial competitiveness by ensuring a stable supply of clean energy and creating new demand and markets in the decarbonization sector through shifting from the industrial and social structures on fossil energy-centered since the Industrial Revolution to clean energy-centered. Acceleration of GX, DX etc. is positioned as one of the five pillars for increasing investments and implementing economic and social reforms to accelerate new capitalism in the "Basic Policy on Economic and Fiscal Management and Reform 2023" and "Grand Design and Action Plan for a New Form of Capitalism."

Table 3: Framework of Basic Policies for Economic and Fiscal Management and Reform for 2023[19]

<table>
<tr><td colspan="2">I. Basic Views on Macroeconomic Management
Proceed with bold reforms to overcome the historical and structural changes and challenges facing Japan, both internal and external, which may be referred to as “turning points in the times.”</td></tr>
<tr><td>II. An Accelerating New Form of Capitalism
Realization of structural wage increases through the trinity labor market reforms, and strengthening investment in people, and creating a substantial middle class
Drastic strengthening of measures to cope with the declining birth rate and child policy
Expanding investment and implementing economic and social reforms
1. Increasing domestic investment and strengthening supply chains through public-private partnerships
2. Acceleration of GX, DX etc.
3. Driving Start-ups and Converting to New Industrial Structure Promoting Impact Investment
4. Promoting Science, Technology and Innovation through Public-Private Partnerships
5. Deploying Inbound Strategies
Creation of an inclusive society</td><td>III. Responding to the Environment Changes Surrounding Japan
Responding to changes in the international environment
Disaster prevention and mitigation, national resilience, reconstruction from the Great East Japan Earthquake, etc.
Safety and security of people's lives</td></tr>
</table>

[19] Prepared by JCR, based on the website of Cabinet Office, Basic Policy on Economic and Fiscal Management and Reform 2023 https://www5.cao.go.jp/keizai-shimon/kaigi/cabinet/honebuto/2023/summary_en.pdf

Revitalization of local communities and small businesses	
IV. Medium- and Long-Term Economic and Fiscal Management	V. Policy for Near-term Economic and Fiscal Management and FY2024 Budget Formulation

<Governance>

The directions of policies for GX implementation will be decided in the GX Implementation Council, chaired by the Prime Minister, with relevant ministers and experts participated. The Council includes experts in the industrial and financial sectors. The Cabinet Secretariat GX Office include officials sent from the Financial Services Agency, the Ministry of Foreign Affairs, the Ministry of Finance, the Ministry of Health, Labor and Welfare, the Ministry of Agriculture, Forestry and Fisheries, the METI, the Ministry of Land, Infrastructure, Transport and Tourism and the Ministry of the Environment, and they will compile proposals, including investment promotion measures of relevant ministries and agencies and will submit the sectoral investment strategical proposals, based on considerations in the working group with external experts to the GX Implementation Council.

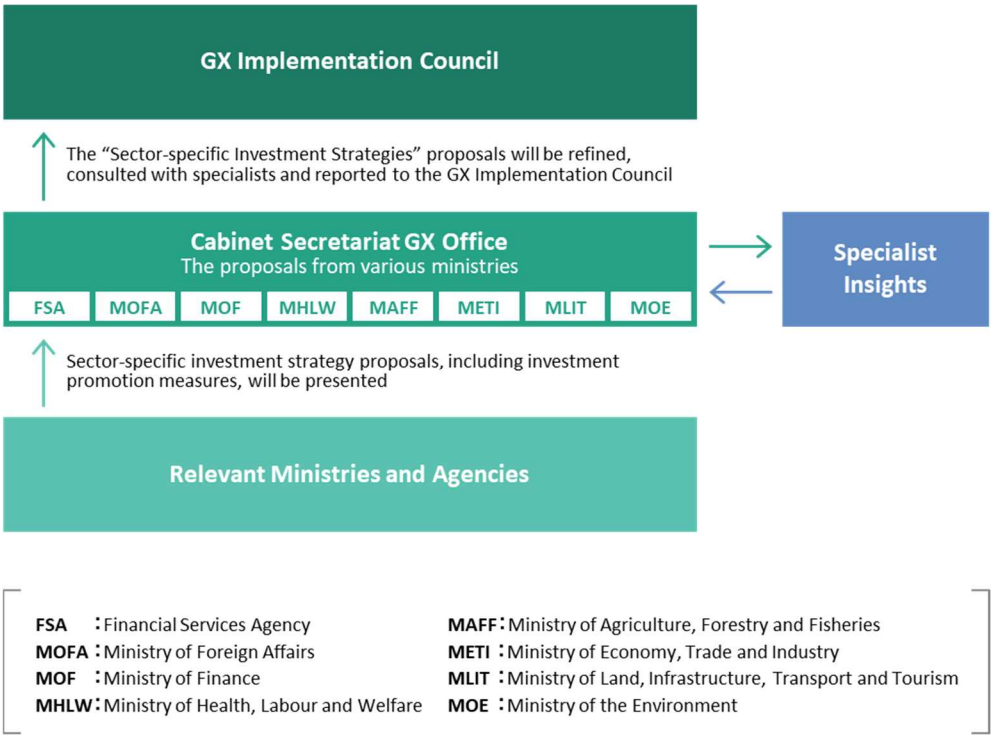


Figure 8: Governance Structure[20]

The current status/measures of GHG emissions/absorptions will be approved in the Global Warming Prevention Headquarters, in which all ministers annually participate, and then the plan will be updated/promoted as necessary from the viewpoint of measuring the effects of the aforementioned investment strategies.

[20] Source: Cabinet Secretariat / Financial Services Agency / Ministry of Finance /Ministry of Economy, Trade and Industry / Ministry of the Environment, "Japan Climate Transition Bonds Framework", November 2023

2-2. Alignment with Items Required in the Climate Transition Finance Handbook

Element 1: Issuer's climate transition strategy and governance

(1) Does the issuer have a transition strategy for climate change mitigation?

The Government of Japan has clarified that it aims to achieve the 2050 carbon neutral for which it will take necessary measures in the Act on Promotion of Global Warming Countermeasures. The government set the 2030 target (a 46 per cent reduction from FY 2013) to align with the target agreed in the Paris Agreement and established the reduction target per emission source for FY 2030 from FY 2013 in the Plan for Global Warming Countermeasures revised in 2021.

Specific measures toward the aforementioned goals are compiled in the GX Promotion Strategy (see Table 2 above.) The top priority is to thoroughly promote energy conservation and to make renewable energy main power source as specific initiatives to be undertaken by the Government of Japan, and then it aims to achieve its goals by supporting in respective sectors so as to implement/achieve next-generation technologies/developments, such as the utilization of nuclear power or hydrogen/ammonia/carbon recycling in the 22 sectors.

Accordingly, the Government of Japan has strategies for transitioning to mitigate climate change.

(2) Is the use of the "transition" label in financing intended to contribute to realizing a strategy for transitioning to a business model in which issuers can effectively address climate-related risks and contribute to achieving the goals of the Paris Agreement?

The Government of Japan published the Basic Guidelines on Climate Transition Finance in May 2021, shortly after the first edition of CTFH was published by ICMA in December 2020. This basic guideline aims to encourage efforts to steadily reduce carbon emissions, such as energy saving in sectors where is difficult to reduce emissions or to accelerate the innovation that contributes to transitions, including long-term R & D for decarbonization. The Guideline was formulated to achieve carbon neutral in 2050 in Japan and to contribute to realizing the goals of the Paris Agreement in order to establish the position as a financing tool for transition, in particular, in the sector where is difficult to reduce emissions and to use more proceeds by early disseminating climate transition finance and by ensuring the credibility when financing proceeds under the name of transition finance.

This Bonds was formulated in accordance with the CTFH and its Basic Guidelines, and is intended to contribute to realizing the strategies to shift to a business model by which Japan as a whole is contributable to achieving the goals of the Paris Agreement.

(3) Has a governance system been established to ensure the effectiveness of the transition strategy?

The Government of Japan, as mentioned above, will invite relevant ministries, external academics and experts in respective sectors required for GX, will eventually formulate the transition strategy in the GX Implementation Council, chaired by the Prime Minister based on necessary discussions, will report the subsequent progress to the Council and will review them as needed.

Accordingly JCR has evaluated that the Government of Japan has established a system to steadily implement the transition strategy.

Element 2: Business model environmental materiality

Japan's GHG emissions are the fifth largest in the world, and it is expected for Japan to lead the international community to initiatively limit the global temperature rise to the level set by the Paris Agreement. Taking into account that carbon prices will be introduced domestically and internationally hereafter, it is urgent to realize a carbon-neutral society, to decarbonize various types of products stipulated by the GX Promotion Act and to change the structure of each business type while many manufacturing industries that is internationally competitive continuously maintain good performance. Under these circumstances, the Government of Japan presented a "Grand Design and Action Plan for a New Form of Capitalism" in June 2023 in which GX in Japan is expected to contribute to re-increasing the industrial competitiveness by making the best use of its knowledge in these sectors and to accelerating the transition to the decarbonization in the country as a whole since there are many research decarbonization technologies in which Japanese companies have technological strength.

Accordingly, JCR has evaluated that the Government of Japan's efforts to achieve carbon neutral in GX are one of the most important issues for Japan.

Element 3: Climate transition strategy and targets to be science-based

Does the transition roadmap meet the followings?

(1) The roadmap is quantitatively measurable and the target covers Scope 1 and Scope 2, respectively (it is desirable that the Scope 3 target be set to the extent feasible.)

As shown in the Plan for Global Warming Countermeasures, Japan's GHG emission reduction target is aligned with the goals of the Paris Agreement, which are science based targets agreed upon by the international community; specifically, to limit the global temperature increase to well below 2 °C. JCR has examined this factor according to the definition established by PCAF[21] since the Government of Japan does not use the concept of Scope 1, Scope 2 and Scope 3 for the total amount of emissions. Assuming that the direct business activities of Government of Japan are Scope 1 and Scope 2, the target setting and specific measures are planned for reducing

[21] "Decarbonization practice guidance starting from portfolio carbon analysis for financial institutions" by Ministry of Environment, at https://www.env.go.jp/content/000125696.pdf

the emission from the central government's administration activities. The total emissions of Japan as a whole, which is equivalent to those of Scope 3 are disclosed in the Plan for Global Warming Countermeasures, by emission sources and by sectors as described in Figure 6 of this report.

Accordingly, the Government of Japan's plan appropriately covers the target scopes. And both the emission reduction results and mid target are disclosed, which shows Japan's transition plan's high transparency.

(2) Whether the GHG emission reduction target aligns with globally recognized science based target or not

The target set by the Government of Japan was established in 2021 on the premise of achieving the global temperature rise well below 2 °C declared in the Paris Agreement. The sectorial roadmaps which were formulated especially for high GHG emitted industries to achieve net zero emission by 2050, align with the IEA[22]'s NZE scenario[23] and SDS scenario[24]. The sectoral pathway were also taken into consideration of the possible menu of the current and future carbon reduction technologies.

The target formulated by the Government of Japan (a reduction rate, 2.7 per cent per year) is set to align with the 1.5 °C level shown in the IPCC[25]'s 1.5 °C Special Report[26] (a 45 per cent reduction by 2030 from the 2010 level; a reduction rate of 2.25 per cent per year.) Consequently, JCR has evaluated that the government targets is aligned with the target established, based on scientific grounds.[27]

[22]IEA: International Energy Agency
[23]Net Zero Emissions by 2050 Scenario by IEA
[24]Sustainable Development Scenario (Sustainable Development Scenario), which is the path to fully achieve the sustainable development goals by the IEA
[25]IPCC: Intergovernmental Panel on Climate Change
[26]IPCC "Global Warming of 1.5°C An IPCC Special Report on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty at https://www.ipcc.ch/site/assets/uploads/sites/2/2022/06/SR15_Full_Report_HR.pdf
[27]The IPCC's 1.5 °C Special Report was updated in the IPCC's the 6th Assessment Report (AR6) Integration Report in which the 1.5 °C is targeted to be reduced by roughly 36 – 69 per cent of CO_2 from FY 2016 by FY 2030: Reduction Rate: 3.3 – 3.6 percent per year.

For reference, the figure below shows the relative ambition level of goal setting compared to that of other countries.

Country	Emission Reduction Target by 2030 (Base Year 2013)
The U.K.	-54.6%
Switzerland	-49.4%
Brazil	-48.7%
Japan	**-46.0%**
The U.S.A.	
Saudi Arabia	-45.6%
EU27	-43.3%
Canada	-41.6%
South Africa	-40.4%
South Koriea	-33.3%
Ukraine	-23.7%
Australia	-23.0%
Mexico	-18.4%
Thailand	-0.4%
Kazakhstan	7.0%
China	8.6%
Malaysia	14.1%
Russia	23.1%
India	51.8%
Indonesia	99.2%
Pakistan	131.0%
	234.6%

Figure 9: GHG emission reduction rate target for FY 2030 (comparison when each country's target is replaced with figures based on the 2013 standard)[28]

(3) Details must be publicly disclosed (including intermediate milestones)

The goal of the Government of Japan to achieve carbon neutral in 2050 is clearly stated in the Act on Promotion of Global Warming Countermeasures. The goal of reducing the total GHG emissions by 46 per cent from FY 2013 in FY 2030 was announced in the Plan for Global Warming Countermeasures as an interim target, and it is also added that the challenge will continue, aiming for a higher goal, a 50 per cent reduction. Furthermore, the 2030 targets per emission source are disclosed in the plan, which is highly transparent.

(4) Certified/verified by an independent third party

The government received neither certification nor verification from third parties for GHG emissions unlike other companies due to their particularity. On the other hand, (1) Global Warming Prevention Headquarters with all cabinet ministers attended are annually held in which approval is given, (2) the plans updated/promoted are reported to the GX Implementation Council, chaired by the Prime Minister and external academics participated as necessary. Accordingly, JCR has evaluated that domestic and international experts other than departments

[28] Materials of a joint meeting for a clean energy strategy "Materialize political initiatives for realizing GX"

in charge of calculating GHG emissions thoroughly control the GX emissions and third parties confirm them as well.

Consequently, JCR has evaluated that the Government of Japan's efforts to achieve carbon neutral by 2050 are based on scientific evidences and meet the requirements in Element 3.

Element 4: Implementation transparency

The Government of Japan has recognized the need for invest a total amount of 150 trillion yen of public and private investment in the GX Promotion Strategy for the next 10 years. The specific breakdown is also published by energy supply division and demand division, respectively as follows:

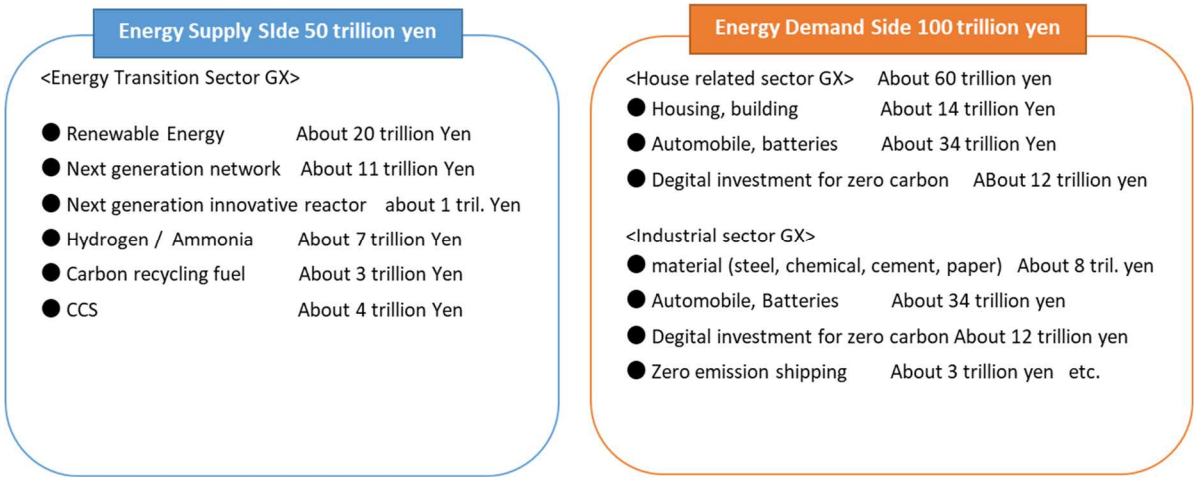


Figure 10-1: Breakdown of public/private investments for the next 10 years[29] (continued on next page)

[29]Sources: Materials for the GX Implementation Conference: Toward the achievement of GX in Japan

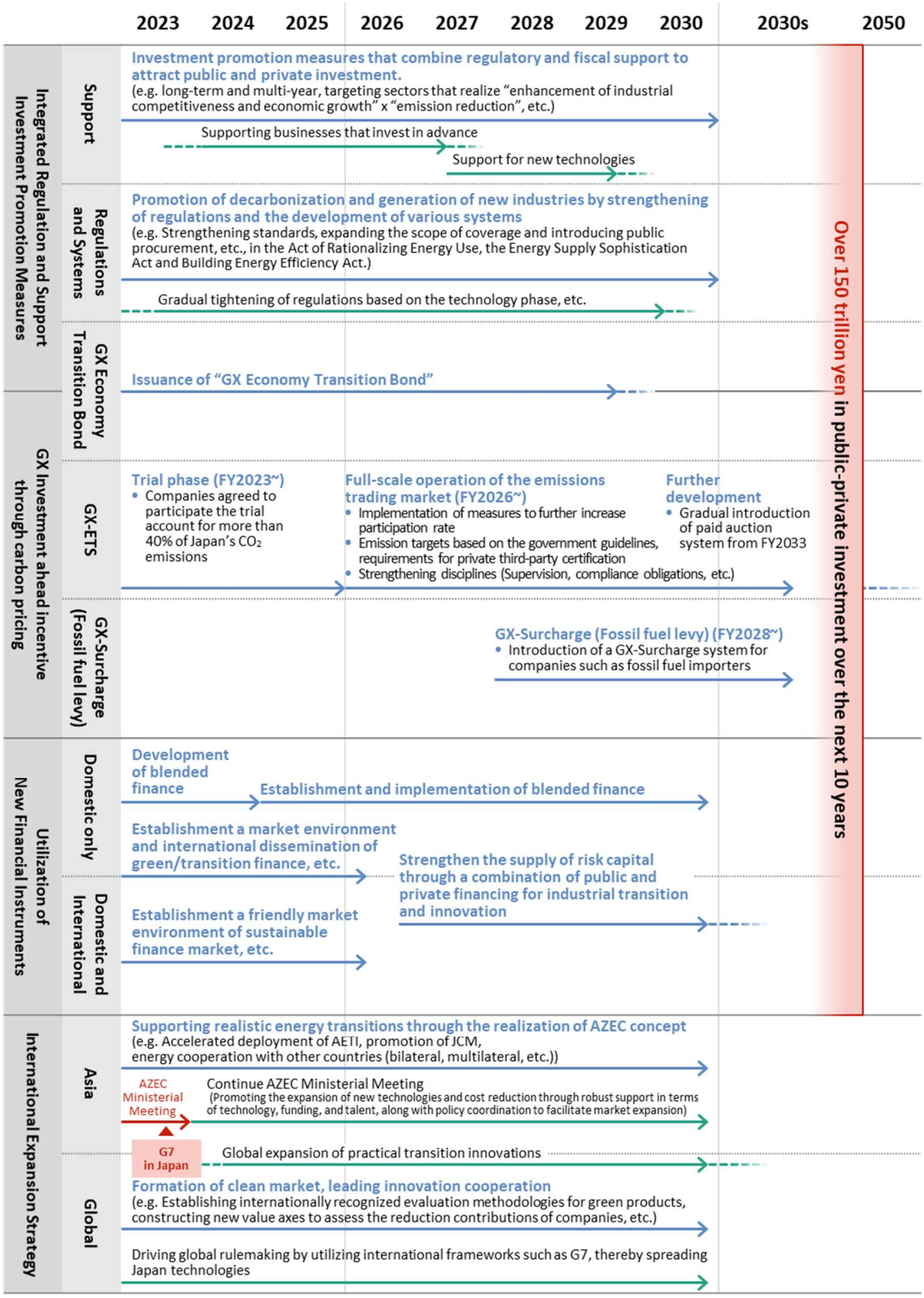


Figure 10-2: Breakdown of public/private investments for the next 10 years[27] (continued from previous page)

Of the total investment of 150 trillion yen, 20 trillion yen is expected to be implemented as an investment promotion measure through GX Economy Transition Bonds. The Government of

Japan plans to take the following measures hereafter for this investment promotion measure so as to increase the predictability of companies and attract investors to the GX investment.

1. Refine/finalize specific "sector-specific investment strategies (roadmaps)" for the next 10 years by the end of 2023.
2. Formulate the "preliminary 5-year action plan" based on the 2050 carbon neutral in the roadmaps described in the above (1).

The specific investment details are to be announced when an annual budget request is made since the government's budget is to be implemented in a single year.

Accordingly, JCR has evaluated that the government's investment plans were disclosed, including the government's expenditure plan, investments by both the public and private to be promoted with the expenditure above and 10-year roadmap and is highly transparent.

The sectoral roadmaps formulated by the METI indicated that there are more than one sectors that require business transformation or employment transfer along with the implementation of the transition strategy in Japan. No consideration is needed for direct and just transition like companies' transition strategies since much expenditures through GX economy transition bonds are used for R & D or subsidy programs for companies. On the other hand, the Government of Japan recognizes that the realization of just transition is an important issue when considering Japanese characteristics, which has a high ratio of manufacturing and low mobility of human resources. For this reason, the government will promote just transition as a whole policy package, such as the design of CP that ensures predictability and the consideration in the GX Implementation Council in which academics from the world of labor and the business circle participated.

The possibility of a lock-in to fossil fuels is lower since both of the sectoral roadmap formulated by the Government of Japan and the path in the GX Promotion Strategy are designed to achieve the 2050 carbon neutral, and the roadmap is established not to rely on carbon credit as much as possible and to realize carbon neutral through the next-generation technological innovation.

Serious negative impacts on the environment are considered to be avoided for the viewpoint of DNSH (Do No Significant Harm) since the proceeds in this Bonds is much used for R & D funds, and the criteria for granting subsidies are clarified in the subsidy program.

Accordingly, JCR has evaluated that this Bonds satisfy the four elements required in the Climate Transition Finance Handbook.

Chapter 3: Consistency with Green Bond Principles, etc.

Evaluation Phase 1: Greenness/Transition Evaluation

gt1

I. Use of Proceeds

JCR's Key Consideration on This Factor

In this section, JCR will firstly confirm whether the proceeds financed are allocated to green/transition projects that bring about clear environmental benefits. Then, in case where negative impacts on the environment and society is expected with the use of proceeds, the impacts will be fully examined by an in-house specialized division or external third parties and will confirm that necessary workarounds and mitigation measures are taken. Lastly, JCR will confirm alignment with the Sustainable Development Goals (hereinafter referred to as "SDGs".)

▶▶▶ Current Status of Evaluation Targets and JCR's Evaluation

JCR conducted an evaluation of the Japan Climate Transition Bond Framework developed by the Government of Japan and published the evaluation report on November 7, 2023. In this evaluation report, JCR confirms how each criterion of the Japan Climate Transition Bond Framework contributes to the realization of a decarbonized society in Japan. All of the uses of proceeds determined by the Government of Japan for this Bonds fall under the categories whose eligibility and environmental improvement effects were confirmed in the framework evaluation. Therefore, JCR evaluates that all of the planned uses of the proceeds from this Bonds are important projects for Japan's 2030 GHG reduction goals and Japan's transition to a decarbonized society.

1. Overview of use of proceeds

In the Japan Climate Transition Bond Framework, the Government of Japan determines the use of proceeds from the areas specified in the GX Promotion Strategy as measures that contribute to Japan's GX, and the basic conditions specified in the strategy (see Chapter 1). Established as research and development funds and/or subsidy programs for projects that meet the requirements. Table 4 shows the use of proceeds for this Bonds, which is organized according to the use of proceeds classification in the Japan Climate Transition Bond Framework. In Table 4, the use of proceeds that fall under multiple eligibility criteria is classified into green categories that are considered to have a major impact.

Table 4: Use of proceeds for this Bonds in the classification of the Japan Climate Transition Bond Framework[130]

Main Category (Green category)		Sub-category Eligibility criteria	Use of proceeds for this Bonds
1	Energy efficiency	Promotion of thorough energy efficiency improvement	- Energy saving investment promotion/demand structure transformation support project subsidy
		Houses and buildings	- Project to promote the introduction of advanced equipment to improve the insulation performance of houses
		Digital investment aimed at decarbonization	- Among the support projects for strengthening the supply chain of important materials in response to changes in the economic environment, the project supports strengthening the semiconductor supply chain to achieve GX by improving energy performance. - Among the post-5G information and communication system infrastructure reinforcement research and development projects, research and development of future technologies that are essential for realizing GX such as optoelectronic convergence
		Battery industry	- Among the support projects for strengthening supply chains for important materials in response to changes in the economic environment, support for strengthening supply chains for manufacturing storage batteries, which are essential for a green society.
2	Renewable energy	Making renewable energy a major power source	- (GI) Development of next-generation solar cells - (GI) Lowering the cost of offshore wind energy generation
		Infrastructure	- Subsidy for promoting regional decarbonization (independent line micro grid project subsidy)
3	Low-carbon and decarbonized energy	Utilization of nuclear power	- Fast reactor demonstration reactor development project - High temperature gas reactor demonstration reactor development project
		Establishing electricity and gas markets to achieve carbon neutrality	((GI)Building a large-scale hydrogen supply chain (Demonstration of hydrogen energy generation technology (high co-firing) using large gas turbine) also falls under the relevant criteria)
4	Clean transportation	GX in transport sector	- Subsidy to promote the introduction of clean energy vehicles (BEV, PHEV, FCV) - Commercial vehicle electrification promotion project - (GI)Development of next-generation aircraft - (GI)Development of next-generation ship - (GI)Development of fuel manufacturing technology using CO_2 etc. - Innovative GX technology creation project
		Infrastructure (repeat)	(No applicable projects in this Bonds)

[30] Created by JCR from materials provided by the Ministry of Economy, Trade and Industry.

5	Circular economy adapted products, production technologies and processes	Restructuring the manufacturing industry (fuel and feedstocks transition)	- (GI)Decarbonization of thermal processes in the manufacturing sector - (GI)Hydrogen utilization in the steelmaking process (Expansion of demonstration scale of hydrogen reduction ironmaking technology) - (GI) Development of plastic raw material manufacturing technology using CO_2 etc. ((GI) Development of fuel manufacturing technology using CO_2 etc. also falls under the relevant criteria)
		Facilitating introduction of hydrogen and ammonia	- (GI)Building a large-scale hydrogen supply chain (Demonstration of hydrogen energy generation technology (high co-firing) using large gas turbine) - (GI)Building a large-scale hydrogen supply chain (commercialization demonstration of liquefied hydrogen/MCH supply chain, research and development of dehydrogenation technology from ammonia for large-scale hydrogen transportation) - (GI)Hydrogen production through water electrolysis using electricity derived from renewable energy, etc. (Innovative GX technology creation project also falls under the relevant criteria)
		Carbon Recycling and CCS	((GI) Development of plastic raw material manufacturing technology using CO_2 etc. and (GI) Development of fuel manufacturing technology using CO_2 etc. also fall under the relevant criteria)
6	Environmentally sustainable management of living natural resources and land use, Circular economy	Food, agriculture, forestry, and fisheries industry	(No applicable projects in this Bonds)
		Resource circulation	- (GI)Achieving carbon neutrality in the waste and resource recycling field ((GI) Development of fuel manufacturing technology using CO_2 etc. also falls under the relevant criteria)

* (GI) indicates that the project is funded by the Green Innovation Fund (GI Fund).

The Figure 11, Figure 12 and Table 5 show the planned allocation amount of the proceeds from this Bonds and the classification based on CBI's sector standards. Regarding the GI Fund, the total amount scheduled to be allocated from this Bonds has been determined and it will be scheduled to be executed to the New Energy and Industrial Technology Development Organization (NEDO), an implementation entity of GI Funds at once. Meanwhile, some R&D projects' detailed design and project scale, etc. shall be determined afterwards. Therefore, the amount of appropriation may be determined from the projects for which the detailed content of projects has been decided. In addition, the Government of Japan plans to allocate the funds raised from this Bonds from the projects for which the details of the projects and the scale of the projects have been decided, including the projects for which the amount has already been stated in Table 5. In other words, since the funds will be allocated from the projects for which the details of the projects have been

finalized, if the total amount of the appropriation reaches the planned amount of the GI Fund (756.4 billion yen), the funds will be allocated from this Bonds to the projects of the GI Fund. There is a possibility that some projects will not be allocated. The Government of Japan plans to disclose the results in the post-issuance Reporting on the allocation of proceeds.

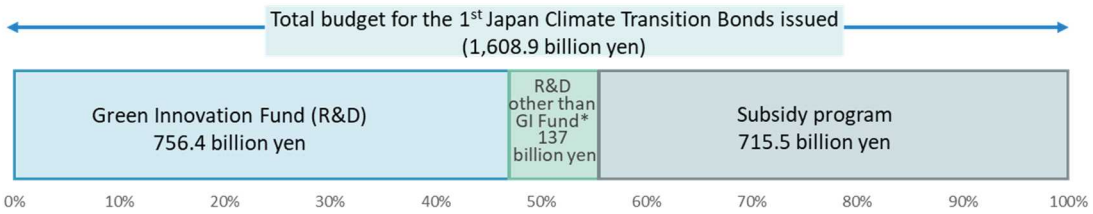


Figure 11: The amount-based breakdown of the use of proceeds for the Bonds (type of fund)

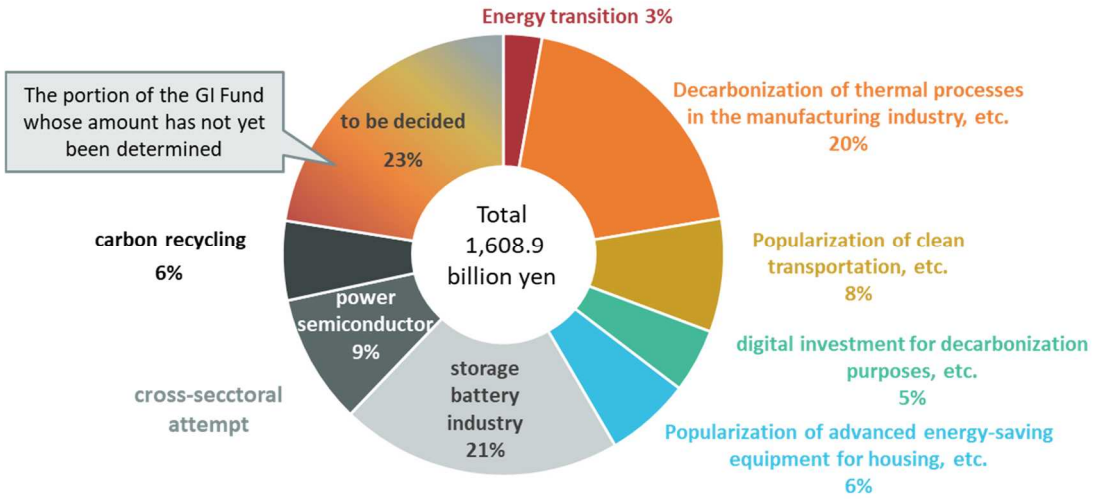


Figure 12: The amount-based breakdown of the use of proceeds for the Bonds (Use of proceeds)

Table 5: Projects allocated to this Bonds[231]

	budget year	Business type	Appropriation projects (including some appropriation candidate projects)	Sector	Planned amount to be allocated (JPY billion)
(1)GI Fund	2022 2023	R &D	1. Development of next-generation solar cells	Electricity	15
	2022	R &D	2. Lowering the cost of offshore wind energy generation	Electricity	*1
	2022	R &D	3. Building a large-scale hydrogen supply chain (Demonstration of hydrogen energy generation technology (high co-firing) using large gas turbine)	Electricity	15

[31] Created by JCR from materials provided by the Ministry of Economy, Trade and Industry.

	2022	R &D	4. Development of next-generation aircraft	Transport	30.6
	2022	R&D	5. Development of next-generation ship	Transport	*1
	2022	R &D	6. Development of fuel manufacturing technology using CO_2 etc.	Transport	*1
	2022	R &D	7. Hydrogen utilization in the steelmaking process (Expansion of demonstration scale of hydrogen reduction ironmaking technology)	Heat Manufacturing	256.4
	2022	R &D	8. Decarbonization of thermal processes in the manufacturing sector	Heat Manufacturing	32.5
	2022	R &D	9. Building a large-scale hydrogen supply chain (commercialization demonstration of liquefied hydrogen/MCH supply chain, research and development of dehydrogenation technology from ammonia for large-scale hydrogen transportation)	Electricity and heat Manufacturing	*1
	2022	R &D	10. Hydrogen production through water electrolysis using electricity derived from renewable energy, etc.	Electricity and heat Manufacturing	*1
	2022	R &D	11. Achieving carbon neutrality in the waste and resource recycling field	Waste	44.5
	2022	R &D	12. Development of plastic raw material manufacturing technology using CO_2 etc.	Waste Manufacturing (Chemical)	*1
	2022	R &D	13. Promoting carbon recycling using CO_2 as a direct raw material using bio-manufacturing technology	Manufacturing (Chemical)	*1
Subtotal					756.4
(2) R&D other than GI Funds	2022	R &D	14. Among the post-5G information and communication system infrastructure reinforcement research and development projects, research and development of future technologies that are essential for realizing GX such as optoelectronic convergence	ICT	75
	2022	R &D	15. Innovative GX technology creation project	Transport Electricity and heat	49.6
	2023	R &D	16. Fast reactor demonstration reactor development project	Electricity	7.6
	2023	R &D	17. High temperature gas reactor demonstration reactor development project	Electricity and heat	4.8
subtotal					137
	budget year	**Business type**	**Appropriation projects (including some appropriation candidate projects)**	**CBI sector criteria**	**Planned amount to be allocated (JPY billion)**
(3) Subsidy program	2022	Subsidy	18. Among the support projects for strengthening the supply chain of important materials in response to changes in the economic environment, the project supports strengthening the semiconductor supply chain to achieve GX by improving energy performance.	1. Solar v2.3 2. Wind v1.3 3. Low carbon transport (Rev2.2) 4. Electrical Grids and	152.3

				Storage (March 2022)	
	2022	Subsidy	19. Among the support projects for strengthening supply chains for important materials in response to changes in the economic environment, support for strengthening supply chains for manufacturing storage batteries, which are essential for a green society.	1. Low Carbon Transport (Rev2.2) 2. Electrical Grids and Storage (March 2022)	331.6
	2022	Subsidy	20. Project to promote the introduction of advanced equipment to improve the insulation performance of houses	Buildings (White list for Low Carbon Building Technology Rev1.0)	100
	2022	Subsidy	21. Energy saving investment promotion/demand structure transformation support project subsidy	No CBI criteria available.	25
	2022 2023	Subsidy	22. Subsidy to promote the introduction of clean energy vehicles (BEV, PHEV, FCV)	Low Carbon Transport (Rev.2.2)	90
	2023	Subsidy	23. Commercial vehicle electrification promotion project	Low Carbon Transport (Rev2.2)	13.6
	2023	Subsidy	24. Subsidy for promoting regional decarbonization (independent line micro grid project subsidy)	Electrical Grids and Storage (March 2022)	3.0
subtotal					715.5
total					**1608.9**

*1 Detailed plans for these seven projects have not been determined at this time. The actual allocation results of GI Fund will be disclosed in the post-issuance Reporting on the allocation of proceeds.

2. Project overview and impact (environmental improvement effect)

The use of proceeds from this Bonds consists of (1) R&D funding provided by the GI Fund, (2) R&D funding other than the GI Fund, and (3) subsidy programs. The outline and environmental improvement effects of each project are detailed below, and it confirm that the use of proceeds from this Bonds falls under the eligibility criteria, whose eligibility and environmental improvement effects were also confirmed in the JCR's framework evaluation report. Therefore, JCR evaluates that all of the planned uses of the proceeds from this Bonds are important projects for Japan's 2030 GHG reduction goals and Japan's transition to a decarbonized society.

(1) Research and development projects provided by the GI Fund

The GI Fund was established in 2021 to provide continuous support for 10 years, from research and development and demonstration to social implementation, to companies that are committed to ambitious goals in order to achieve carbon neutrality in 2050. The total amount of funds created is JPY 2.8 trillion. An overview of the GI Fund is shown below[32].

[The goal]

Setting ambitious 2030 targets for each project (performance, cost, etc.)

⇒ Cross-sectional indicator setting and monitoring for the entire fund project, international competitiveness, practical application stage (TRL, etc.), private investment inducement amount[33]

⇒As a result, the following items are estimated and confirmed at the planning stage, CO_2 reduction effect, economic ripple effect

[Support target]

Priority areas for which action plans have been formulated in the Green Growth Strategy, or key areas where the future path is indicated based on the "Basic Policy for Realizing GX"5

Areas where policy effects are large and require long-term continuous support with an eye toward social implementation.

[Efforts to maximize results]

It ask corporate managers to make a commitment to persistently tackle long-term management issues.

① Business suspension, partial refund of outsourcing fees, etc., if efforts are insufficient

② Introduction of a system (incentive measures) that allows the country to pay more depending on the degree of goal achievement

[32] "Basic policy of Green Innovation Fund" https://www.meti.go.jp/policy/energy_environment/global_warming/gifund/pdf/basicpolicies_230627.pdf

[33] A metric created by NASA that is used to assess the maturity level of a particular technology. Technology maturity levels of TRL1~9 are set depending on the stage of commercialization of the technology. 1 is the closest to basic research, and 9 is the closest to commercialization.

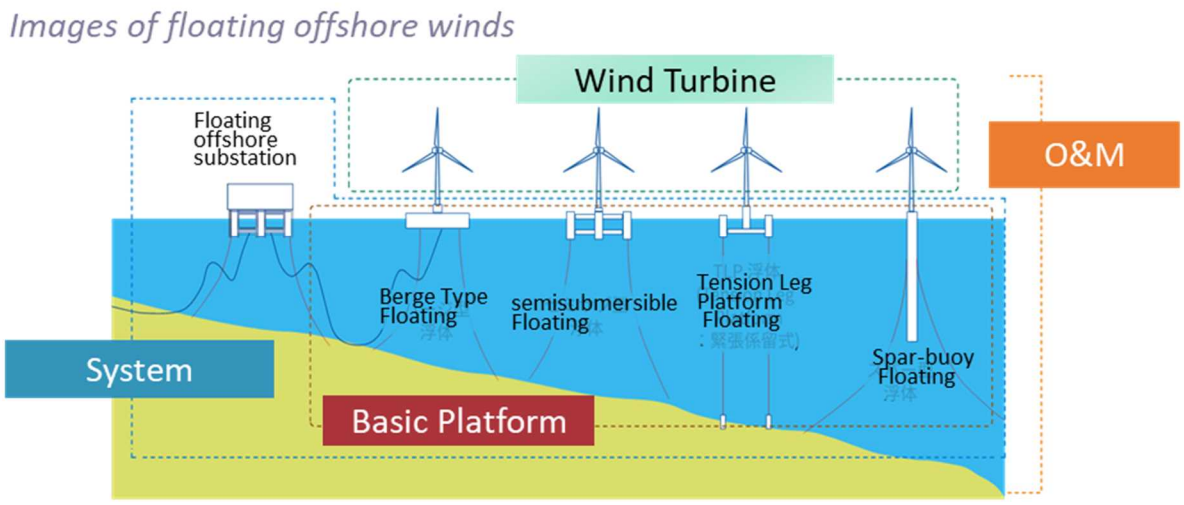
Use of proceeds 1: (GI) Development of next-generation solar cells (expansion of demonstration scale of perovskite solar cells)

ICMA GBP classification	"Renewable energy"	
GB guidelines	"Projects for renewable energy"	
Sector	Electricity	
Issue recognition	In Japan, where there is little flat land, it is already number one among major countries in the amount of solar energy generation per unit of land area, but there is a lack of suitable land for solar energy generation where projects can be carried out at low cost while coexisting with the local community. Concerns have been voiced by energy generation companies and other parties about the fact that the use of renewable energy is increasing, and securing suitable land is one of the major challenges for expanding its introduction. As a mean to overcome this issue, it is expected that solar energy generation will be introduced in places where existing technology cannot be installed (factory roofs with low load capacity, building walls, etc.). However, to achieve this, it will be necessary to develop next-generation solar cells that are light, flexible enough to be installed on curved surfaces such as walls, and comparable in performance (conversion efficiency, durability, etc.) to existing batteries is necessary.	
Business summary	1) Improving efficiency at laboratory size: [Research and development details 1] Development of optimal material composition to further improve conversion efficiency, etc. Development of elemental technology related to crystal structure, etc. necessary to establish durability that maintains stable performance over a long period of time Establishment of technical methods to appropriately evaluate battery performance, etc. 2) Larger size/improved durability: [Research and development details 2] Development of material application and solvent sealing technologies necessary to increase product size and modularize while maintaining performance. Development of elemental technology to realize a manufacturing process that utilizes the above developed technology 3) Implementation and practical application: [Research and development content 3] Adjustment and development according to the specifications of user companies, etc., including the development of building material-integrated modules that take into account improved design as a building material and efficient construction methods. Development of technology necessary to maintain quality and reduce costs during mass production	
development goals	Achieve an energy generation cost of 14 yen/kWh or less under certain conditions (solar radiation conditions, etc.) by 2030.	
Technology maturity goals	TRL6-7 (2023-2030)	
impact	■CO_2 reduction effect (number of global sales by Japanese companies) 2030: approximately 0.6 million t-CO_{2e}/year 2050: approximately 100 million t-CO_{2e}/year	■Economic ripple effect (number of global sales by Japanese companies) 2030: 12.5 billion yen 2050: 1.25 trillion yen
Related Links	https://www.meti.go.jp/policy/energy_environment/global_warming/gifund/pdf/gif_02_randd_r.pdf	

Use of proceeds 2: (GI) Cost reduction of offshore wind energy generation (development of common infrastructure related to integration of wind turbines, floating bodies, etc. in floating offshore wind energy, floating offshore wind energy demonstration project)

ICMA GBP classification	"Renewable energy"
GB guidelines	"Projects for renewable energy"
Sector	Electricity

Issue recognition	Aiming for the large-scale introduction of offshore wind energy in Japan, the "Act on the Promotion of Sea Area Utilization for the Development of Marine Renewable Energy Generation Facilities" (hereinafter referred to as the "Renewable Energy Sea Area Utilization Act") was enacted in April 2019. Public recruitment of business operators began in 2020. However, the maximum bid price for ground-mounted systems is 29 yen/kWh, and the maximum bid price for floating systems is 36 yen/kWh, which is higher than in other countries. Furthermore, in Japan, there are no wind turbine manufacturers or wind turbine manufacturing bases in the country, and the potential of domestic parts manufacturers, which have technical capabilities based on experience in onshore wind energy, cannot be fully utilized. ・ In light of this situation, in order to achieve a virtuous cycle of expanding the introduction of offshore wind energy and strengthening industrial competitiveness in Japan, the "Offshore Wind Industry Vision (1st Phase)" and the "Green Growth Strategy for Carbon Neutrality in 2050" have been formulated. ``First, by committing as a government to creating an attractive domestic market, it will attract domestic and foreign investment, and by promoting investment through measures such as improving the business environment, it will build a competitive and resilient domestic supply chain. Furthermore, with an eye on expansion into Asia, Japan will work on next-generation technology development and international collaboration to create next-generation industries that can survive international competition.'' ・ Unlike Europe, in order to achieve the high goal of ``forming projects of 30 to 45 million kW by 2040'' in Japan, where there are few shallow waters, the cost of floating structures, which have a lot of room for introduction even in deep waters, is particularly important. , it is necessary to significantly reduce it in the future through technological development and mass production. This project aims to reduce the cost of offshore wind energy generation, mainly floating type, at an early stage and expand its introduction, based on the knowledge gained from the demonstration projects that it have undertaken so far.	
Business summary	A design method for integrally designing wind turbines, floating bodies, etc. in a form suitable for mass production in order to achieve cost reduction ahead of overseas competition in order to capture the globally expanding market for floating offshore wind energy generation. Develop and standardize etc. In the demonstration phase, consideration will be given to negative impacts on the environment and society, such as requiring businesses to implement impact assessments and consultation systems for local communities and stakeholders, as well as appropriate environmental impact assessments and countermeasures in the public recruitment guidelines.	
development goals	By 2030, achieve the following goals Establish technology to commercialize floating offshore wind energy at an internationally competitive cost level under certain conditions (wind conditions, etc.)	
Technology maturity goals	TRL6 (2023-2030)	
impact	■CO_2 reduction effect (Japanese market) 2030: Approximately 3 to 7 million t-CO_{2e}/year 2050: Approximately 90 million t-CO_{2e}/year	■Economic ripple effect (world market size) 2030: Approximately 1 trillion yen 2050: Approximately 2 trillion yen
Related URL	https://www.nedo.go.jp/content/100937771.pdf	



Use of proceeds 3: (GI) Construction of large-scale hydrogen supply chain (demonstration of hydrogen energy generation technology (high co-firing) using large gas turbines)

ICMA GBP classification	"Circular economy adapted products, production technologies and processes and/or certified eco-efficient products"
GB guidelines	“Projects concerning eco-efficient products, production technologies, and processes”
Sector	Electricity
Issue recognition	Hydrogen energy generation using large gas turbines is a zero-emission energy source that does not emit CO_2 even when burned, and is thought to play an important role in supplying energy, regulating energy, and inertia for the grid in the carbon-neutral era. , in its green growth strategy, envisages that hydrogen and ammonia will cover approximately 10 per cent of energy generation in 2050. Regarding large-scale hydrogen gas turbine energy generation, Japan has completed the development of a 30 per cent mixed combustion combustor and are currently developing higher dedicated combustion system. Currently, since the early stages of the GI Fund project, actual demonstrations of co-firing and single-firing have been underway with the aim of commercialization. For reference, the European Taxonomy has established a threshold value for gas-fired energy generation with a CO_2 emission coefficient of less than 270g/kWh, and efforts are underway to develop combustors that meet the standard by more than 30 per cent. In this research and development, in parallel with the actual demonstration of 30 per cent vol. co-firing and single-firing, it will proceed with the actual demonstration of a high co-firing device exceeding 30 per cent, thereby improving the effectiveness of thermal energy generation field with the aim of achieving carbon neutrality in 2050. By providing a gradual range of conversion rates from fossil fuels, the aim is to provide a wide range of options and gain an advantage in the international market.
development goals	In order to socially implement highly co-firing energy generation equipment that meets the standards of the European Taxonomy by 2030, combustion stability will be verified through demonstration using actual equipment, and continuous operation will be achieved while varying the output. *Please note that this project is research and development on the stable combustibility of gas turbines, and is not research and development on hydrogen production, so JCR does not request this project to calculate the carbon intensity of the hydrogen used in the research stage. For reference, in accordance with the Basic Hydrogen Strategy, the Government of Japan is conducting research and development and support programs to reduce the carbon intensity of hydrogen used to 3.4kg-CO_{2e}/kg-H2 by 2030 and zero by 2050, and to build a supply chain to scale up the demand and supply to lower the cost. When commercializing this technology of

	hydrogen gas-turbine system, it is assumed that low-carbon and/or decarbonized hydrogen in line with the basic hydrogen strategy will be used.	
Technology maturity goals	TRL6 or higher (2026-2030)	
impact	■CO_2 reduction effect (world market) 2030: approximately 7 million t-CO_{2e}/year 2050: approximately 400 million t-CO_{2e}/year	■Economic ripple effect (world market size) 2050: Maximum of approximately 23 trillion yen (Hydrogen power generation turbine market, cumulative)
Related URL	https://www.meti.go.jp/shingikai/sankoshin/green_innovation/energy_structure/pdf/015_04_00.pdf https://www.nedo.go.jp/content/100932374.pdf	

Use of proceeds 4: (GI) Development of next-generation aircraft (development of electric aircraft)

ICMA GBP classification	"Clean transportation"
GB guidelines	“Projects for clean transportation”
Sector	Transport
Characteristics of electric aircraft	Several measures are envisaged for the development of aircraft bodies and engines to decarbonize aircraft, but they should be used appropriately depending on payload weight, cruising range, etc., taking into account the characteristics of each technology. Electric aircraft are considered to be suitable for small and short-distance flights (about 1,000 km), as there are limits to the performance of batteries and motors. In addition, electric aircraft are expected to significantly reduce noise by replacing the propulsion system with an electric system, and in addition to eliminating noise originating from the combustor and turbine in the engine, compared to existing engines. There is a high possibility that the exhaust noise will be reduced because the exhaust speed is reduced. In fact, in the recent development of small electric aircraft overseas, noise reductions of around 20-30 per cent have been confirmed. Japan is also actively aiming to reduce noise through technology development related to storage batteries and electric motors. It will continue to contribute to the realization of passenger aircraft.
Issue recognition	Currently, the range of applications for aircraft electrification is limited, such as installing storage batteries for auxiliary energy and energy supply while on the ground, but in the future, it will be used for energy during flight and for internal system operation. It is expected that the use will expand to include other uses. In order to achieve this, it is necessary to dramatically improve the performance of batteries, motors, etc. In addition, international competition in technology development related to these fields has become active and is expected to intensify in the future, so there is a need to strengthen Japan's international competitiveness. In order to establish aircraft electrification technology, aircraft-related manufacturers and electronics-related manufacturers will continue to conduct research in collaboration, utilizing the knowledge of national research and development agencies such as the Japan Aerospace Exploration Agency (JAXA). The proposers will promote development and aim to have domestic manufacturers meet the required technological level by the time the technology to be installed in future aircraft is selected. Specifically, it will accelerate research and development of core technologies for aircraft energy, such as batteries for aircraft, motors, inverters, etc., with the aim of gradually introducing the technology from 2030 onwards.
development goals	By the end of the project, TRL6 or higher (technical level set by NASA. Note: IEA (equivalent to TRL 6 or higher). In addition, the aim is to achieve the following target values for each technology. The numerical targets will be revisited as appropriate in response to future international regulatory trends. ✓ Energy control and heat/air management systems: - With regard to the energy control and heat/air management systems that will support the future electrification of aircraft, it has established a concept that improves fuel efficiency by more than 5 per cent compared to conventional aircraft, and it has developed a single-aisle aircraft (100 to 250 seats, same applies hereafter). It will demonstrate the feasibility of the aircraft size and operating conditions based on the evaluation.

	- Energy control system core technology: Achieve a generator with an output of 1 MW or more that is compatible with hybrid electric propulsion systems, and an energy density that is more than twice that of conventional aircraft. - Heat and air management system core technology: Realize an electric turbomachine equipped with a motor with the world's largest output (over 55kW) for aircraft. ✓ Technology to improve the electrification rate: For major functions that consume large amounts of fuel such as aircraft taxiing (ground driving). This R&D aims to: (1) improve fuel efficiency by approximately 3 per cent from existing functions to the entire aircraft level, improve impact resistance and reach TRL 6 or above level while satisfying safety standards.	
Technology maturity goals	TRL6 or higher (2030)	
impact	■CO_2 reduction effect (potential estimation) 2050: 680 million t-CO_{2e}[34]	■Economic ripple effects (including the global market size and the effects of other next-generation aircraft such as hydrogen aircraft) 2050: 2.1 trillion yen
Related URL	https://www.meti.go.jp/policy/energy_environment/global_warming/gifund/pdf/gif_16_randd_r.pdf	

Use of proceeds 5: (GI) Development of next-generation ships (development of zero-emission ships)

ICMA GBP classification	"Clean transportation"
GB guidelines	“Projects for clean transportation”
Sector	Transport
Business summary	In order to achieve carbon neutrality, it is expected that the industrial and supply chain structures of both small and large ships have to be changed. For short-distance and small ships, hydrogen fuel cell ships and battery-propelled ships are in the demonstration stage for commercialization, while for long-distance and large ships, there are limitations such as output, weight, size, etc. of fuel cells and storage batteries. Therefore, it is necessary to develop an engine that can directly burn hydrogen and ammonia. Therefore, this project aims to acquire technological capabilities and international competitiveness related to the development of next-generation ships in order to fully popularize zero-emission ships in 2050 in order to achieve zero emissions in international shipping. It is uncertain whether an international fuel supply infrastructure for hydrogen and ammonia will be built in the 2030s, when zero-emission ships will be introduced in earnest. There are two scenarios in which hydrogen, ammonia and methane/methanol It is not clear which fuel (bio or carbon recycled) will be the mainstream. For this reason, there is a problem that it is difficult for private businesses to start development, and in order to reduce this uncertainty, it is necessary to proceed with the development of each of the multiple options that are candidates for zero-emission ships.
Issue recognition	In order to achieve zero emissions in international shipping, it is necessary to develop engines compatible with CO_2-free fuel and establish technology that can be used on all types of ocean-going ships. Japan's marine industry boasts approximately 20 per cent of the world's share of 2-stroke diesel engines (3rd place in the world) and 20 per cent of the world's share of 4-stroke diesel engines (2nd place in the world), with its high technological capabilities. Therefore, it is necessary to maintain and strengthen competitiveness by acquiring technological capabilities related to the development of hydrogen, ammonia, LNG, and other gas-fueled vessels, which are essential to achieving zero emissions, and establishing a production base. Ships are larger than cars, so they require high output, and load fluctuations are large due to the influence of waves, and it is also necessary to deal with problems unique to ships, such as salt damage. In the development of next-generation ships, there are marine manufacturers with superior domestic technologies such as stratified injection technology for engines, and the fund

[34]Calculated by JCR from the R&D and Social Implementation Plan for the GI Fund Project "Development of Next-Generation Aircraft" Project p.16-17.

	will support the technological development of ships together with the shipbuilding industry, which has excellent technological capabilities worldwide. By doing so, Japan could gain experience for the social implementation of next-generation ships. It is believed that this will enable early acquisition and lead the international competition. There is a high possibility that hydrogen infrastructure will be established in Japan earlier than in the rest of the world, and in addition to already having a supply chain for ammonia for fertilizer, the fund is also considering building an ammonia fuel supply chain. It is assumed that the social implementation of hydrogen and ammonia fueled ships will become possible earlier than the rest of the world, and from this point of view as well, it is thought that Japan will be able to lead the international competition. Furthermore, by developing technology related to infrastructure such as bunkering ships ahead of the rest of the world, it hope to capture overseas markets in the future.	
development goals	1. Develop hydrogen-fueled engines, fuel tanks, and fuel supply systems, and complete demonstration operations of hydrogen-fueled ships by 2030 (TRL8 or above (IEA TRL (11 levels); note: equivalent to HORIZON 2020 TRL7)) 2. Development of ammonia fuel engines, fuel tanks and fuel supply systems, and marine ammonia fuel By building a supply system, achieve commercial operation12 as early as possible by 2028 (TRL9 or higher (Note: equivalent to TRL8 in HORIZON 2020))	
Technology maturity goals	Hydrogen fuel engine TRL 8 or higher (2030), ammonia fuel engine TRL 9 or higher (2028)	
impact	■CO_2 reduction effect (potential estimation) 2030: approximately 330,000 t-CO_{2e}/year 2050: approximately 560 million t-CO_{2e} /year[35]	■Economic ripple effect (world market size) 2030: approximately 0.17 trillion yen 2050: approximately 6.8 trillion yen
Related URL	https://www.meti.go.jp/policy/energy_environment/global_warming/gifund/pdf/gif_17_randd_r.pdf	

Use of proceeds 6: (GI) Development of fuel manufacturing technology using CO_2***, etc. (Development and demonstration of control technology that responds to raw material fluctuations in synthetic fuel (transportation fuel) production)***

ICMA GBP classification	"Clean transportation"
GB guidelines	“Projects for clean transportation”
Sector	Transport
Issue recognition	Although it is possible to produce e-fuel from CO_2 and hydrogen on a trial basis by combining existing technologies (chemical reactions), it is difficult to create e-fuels from both an academic (science) and engineering perspective. There are many R&D elements. In order to enable mass-production of it in Japan, it also has the advantage of being a liquid at room temperature and pressure, making it possible to store it for long periods of time compared to hydrogen and other fuels. Producing fuel domestically is also an advantage in the perspective of ensuring energy security. Technology development related to improving the yield of synthetic liquid fuels is already being undertaken as part of the GI Fund project. On the other hand, in the public-private council aimed at promoting the introduction of synthetic fuel (e-fuel), the current goal of "commercialization by 2040" has been set by the government, which aims to have 100 per cent electric vehicles in new passenger car sales by 2035. Based on opinions from various quarters that the commercialization target should be brought forward due to the inconsistency with the timeline. In order to achieve this goal, it will be necessary to add efforts to accelerate commercialization in the technology development undertaken in the GI Fund project, so this project aims to implement the following: i. Establishment of integrated predictive model technology that takes into account raw material fluctuations ii. Establishment of upgrading

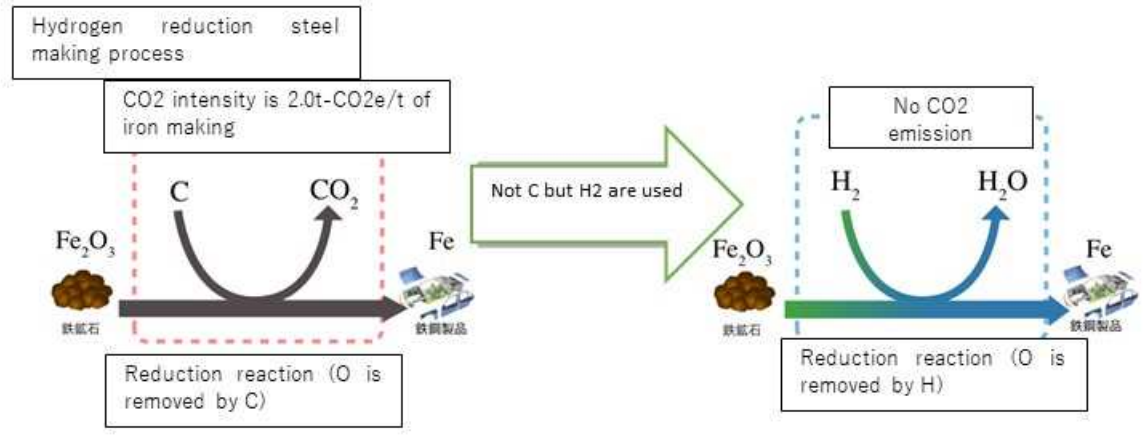
[35]Calculated by JCR from the R&D and Social Implementation Plan for the GI Fund Project "Development of Next-Generation Aircraft" Project p.16-17.

	technology compatible with commercial scale	
development goals	1 By 2028, achieve a liquid fuel yield of 80 per cent at pilot scale (assuming 300 BPD scale). 2 While responding to changes in the composition of synthetic fuels, reduce CO_2 emissions during the fuel usage stage of passenger cars (in the evaluation, the low-carbon effects of synthetic fuels are excluded) from the current level (110kg-CO_2/km). By 2027, it will establish fundamental technologies to achieve net thermal efficiency (maximum) of 55 per cent or more for internal combustion engines (heavy vehicles).	
Technology maturity goals	TRL8-9 (2040)	
Impact	■CO_2 reduction effect (potential estimation) 2030: Approximately 45,000 t-CO_{2e}/year 2050: Approximately 120million t-CO_{2e}/year	■Economic ripple effect (Japanese market) 2050: Approximately 7.1 trillion yen/year
Related URL	https://www.meti.go.jp/press/2021/01/20220120005/20220120005-2.pdf	

Use of proceeds 7: (GI) Utilization of hydrogen in the steelmaking process (expansion of demonstration scale of hydrogen reduction steelmaking technology)

ICMA GBP classification	"Energy efficiency", " Circular economy adapted products, production technologies and processes and/or certified eco-efficient products "
GB guidelines	"Projects for energy efficiency", " Projects concerning eco-efficient products, production technologies, and processes"
Sector	Heat, Manufacturing
Issue recognition	CO_2 emitted by the steel industry accounts for 40 per cent of Japan's entire industrial sector. In order to achieve carbon neutrality in the steel manufacturing process by 2050, it is necessary to specifically develop the following technologies. Taking into consideration the status of efforts by overseas companies and the uncertainty of future technology and market trends, this project will develop both technologies in parallel, and will respond flexibly to changes in the domestic and international environment. i. Hydrogen reduction technology using a blast furnace (blast furnace hydrogen reduction technology) ii. Technology that directly reduces low-grade iron ore with hydrogen (direct hydrogen reduction technology) In i., while building on COURSE50 technology, it will utilize external hydrogen to increase the hydrogen reduction ratio in order to further reduce CO_2 emissions in the blast furnace method. Furthermore, by developing technology that separates and captures CO_2 and converts the recovered CO_2 into a reducing agent for use in blast furnaces, it will be possible to achieve significant reductions in CO_2 emissions while making use of existing blast furnaces. ii. is a technology that directly reduces iron ore with hydrogen, and although the technical hurdles are high, it does not physically emit CO_2 because it does not use a blast furnace or coke. In order to produce high-grade steel using this method, it is necessary to develop direct reduction furnace heat compensation technology necessary for iron ore reduction, direct reduction furnace operation stabilization technology based on the use of low-grade iron ore, impurity removal technology, reduced iron It is necessary to develop advanced electric furnace technology such as melting technology. *Please note that this project is research and development to increase the hydrogen reduction ratio of blast furnaces, and is not research and development related to hydrogen production, so there is no question about the carbon intensity of the hydrogen used at the research stage. However, in accordance with the Basic Hydrogen Strategy, the Government of Japan is conducting research and development to reduce the carbon intensity of hydrogen used to 3.4kg-CO_{2e}/kg-H_2 by 2030 and zero by 2050, and to build a supply chain. Separate measures are being taken.

Subproject 1 Establishment of blast furnace hydrogen reduction technology that reduces CO_2 emissions by more than 50 per cent		
development goals	i. By 2030, it will confirm the technical elements of hydrogen reduction technology in blast furnaces that utilize in-house hydrogen, etc., and the utilization of CO_2 after separation and capture. ii. By 2030, demonstrate technology that will reduce CO_2 emissions from the steelmaking process by 50 per cent or more in a medium-scale test blast furnace (more than 1/5 scale of an actual furnace).	
Technology maturity goals	TRL6-7 (2030)	
Subproject 2 Establishment of direct hydrogen reduction technology that reduces CO_2 emissions by more than 50 per cent		
development goals	i. By 2030, technology that directly reduces low-grade iron ore with hydrogen will reduce CO_2 emissions by 50 per cent or more in medium-scale direct reduction furnaces (more than 1/5 scale of actual furnaces) compared to the current blast furnace method. Demonstrated technology to achieve reduction. ii. By 2030, it will use a large-scale experimental electric furnace (approximately 300 tons capacity) to produce high-grade steel that can be used for automobile exterior panels, etc. through an integrated process of hydrogen direct reduction of low-grade iron ore and an electric furnace. Demonstrated technology to control impurity concentration on par with blast furnace method.	
Technology maturity goals	TRL6-7 (2030)	
impact	■CO_2 reduction effect (potential estimation) 2030: Approximately 2 million t-CO_{2e}/year (in Japan) 2050: Approximately 1.3 billion t-CO_{2e}/year (Global)	■Economic ripple effect (world market size) 2030: approximately 320 billion yen/year 2050: approximately 40 trillion yen/year
Related URL	https://www.meti.go.jp/policy/energy_environment/global_warming/gifund/pdf/gif_05_randd_r.pdf	

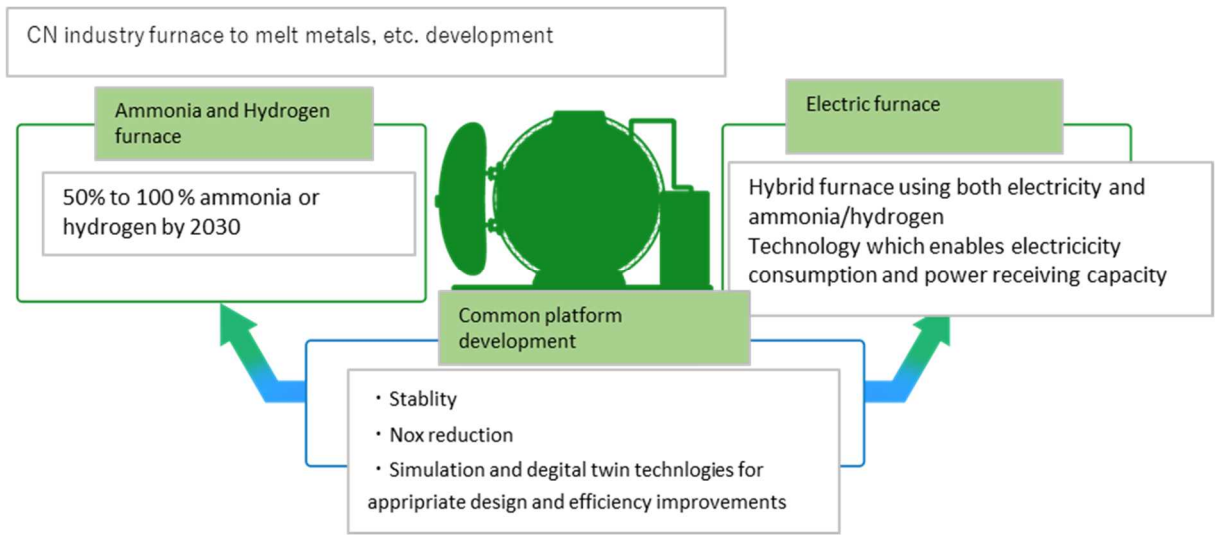


Use of proceeds 8: (GI) Decarbonization of thermal processes in the manufacturing sector

ICMA GBP classification	"Energy efficiency", " Circular economy adapted products, production technologies and processes and/or certified eco-efficient products "
GB guidelines	"Projects for energy efficiency", " Projects concerning eco-efficient products, production technologies, and processes"
Sector	Heat, Manufacturing
Issue recognition	Domestic shipments in the material and formed materials industry, which occupies the midstream of the supply chain, essential metal parts supply to Japan's core industries such as automobiles and industrial machinery, such as pig iron casting manufacturing, forging manufacturing, and

	metal heat treatment. 16 trillion yen and 710,000 employees, which greatly contributes to the local economy and employment. However, a lot of CO_2 is emitted from the industrial furnaces used to heat metals, and many of them are small and medium-sized enterprises (51,000 businesses). As a result, consideration and response to decarbonization are delayed. There are 37,000 industrial furnaces in Japan used for thermal processes, mainly in these industries, and the CO_2 emitted exceeds 40 per cent of the industrial sector (approximately 154 million tons as of FY 2019). Therefore, it is necessary to carry out research and development as soon as possible toward the commercialization of carbon-neutral industrial furnaces.
Business summary	To decarbonize thermal processes that handle metals, it is essential to decarbonize the fuel and electricity used in industrial furnaces. Currently, combustion furnaces that use natural gas as fuel are converted to ammonia or other fuels that do not emit CO_2 during combustion. The use of zero-emission fuels such as hydrogen is promising. On the other hand, ammonia and hydrogen have the property of causing chemical changes in metal products, such as nitriding (hardening of the surface layer by nitrogen) and hydrogen embrittlement (decreasing toughness), and are important for combustion technology such as combustion stability and NOx reduction. In addition, it is necessary to clarify the impact on metal products, furnace materials, etc., and take measures accordingly. When converting a combustion furnace to an electric furnace, additional capital investment is required to install a new furnace, and a contract for special high-voltage energy and the installation of energy receiving equipment are required. It may be difficult to introduce the electric furnace 100 per cent to these industrial processes, the challenge remains to minimize the energy receiving capacity and improve the efficiency of the electric furnace as a whole.
Subproject 1 Development of common basic technology for carbon neutral industrial furnaces	
development goals	By FY2026, it will establish common platform technologies necessary to achieve the R&D goals listed in subproject 2 to subproject 4 below, and ensure that the common platform technologies will be used to achieve each R&D goal by FY2031. The goal is to be develop technology that achieves the same level or higher quality of existing industrial furnaces in terms of quality of metal products, NOx emissions reductions, combustion stability/control accuracy, and long-term operational stability, etc. In order to realize the goal of high percentage of ammonia/hydrogen combustion, general-purpose simulation/digital twin technology that enables optimal design and operational efficiency, hybrid operation technology that combines ammonia/hydrogen combustion technology and electric heating, etc.
Technology maturity goals	TRL6 or higher (2031)
Subproject 2 Establishment of technology for ammonia-burning industrial furnaces that handle metal products	
development goals	i. By 2031, establish an industrial furnace that co-fires 50 per cent ammonia with existing fuels such as natural gas. Specifically, it will develop technology that achieves the same level or higher compared to existing industrial furnaces in terms of quality of metal products, NOx emissions, combustion stability/control accuracy, long-term operational stability, etc. When applied to industrial furnaces, establish general-purpose simulation and digital twin technologies that enable prediction of impacts, optimal design, and operational efficiency. ii. By FY2031, 100 per cent ammonia combustion technology that achieves the same level or higher of metal product quality, NOx emissions, combustion stability/control accuracy, long-term operation stability, etc. when compared with existing industrial furnaces will be approved for TRL6. Achieve the above (conduct demonstrations in an environment equivalent to IEA TRL 6 or higher: system model or prototype (assuming a scale of a fraction of the actual machine; the same applies hereinafter)).
Technology maturity goals	TRL6 or higher (2031)
Subproject 3 Establishment of technology for hydrogen-burning industrial furnaces that handle metal products	
development goals	i. By 2031, establish an industrial furnace that co-fires 50 per cent hydrogen with existing fuels such as natural gas. Specifically, it will develop technology that achieves the same level or higher compared to existing industrial furnaces in terms of quality of metal products, NOx emissions, combustion stability/control accuracy, long-term operational stability, etc., and It will establish general-purpose simulation and digital twin technologies that enable impact prediction, optimal design, and operational efficiency when applied to industrial furnaces. ii. By FY 2031, 100 per cent hydrogen combustion technology that achieves the same or higher quality of metal products, NOx emissions, combustion stability/control accuracy, long-term

	operation stability, etc. when compared with existing industrial furnaces will be approved for TRL6. Achieve the above (equivalent to IEA TRL 6 or higher: carry out demonstration in an equivalent environment of system model or prototype).	
Technology maturity goals	TRL6 or higher (2031)	
Subproject 4 Establishment of technology to reduce electric furnace energy receiving equipment capacity and improve efficiency		
development goals	i. By 2031, by establishing hybrid operation technology that combines ammonia/hydrogen combustion technology and electric heating, general-purpose thermal process simulation, digital twin technology, etc., compared to replacing combustion furnaces with existing electric furnaces. Establish technology to reduce peak energy consumption and energy receiving equipment capacity by 30 per cent or more. ii. By FY2028, establish energy saving technology of 15 per cent or more compared to existing electric furnaces by establishing technology to utilize waste heat from electric furnaces, high-output heaters, and technology to prevent deterioration and extend the life of resistors.	
Technology maturity goals	TRL6 or higher (2031)	
Impact	The main technological development results covered by this project are aimed at social implementation and gradual dissemination after 2032, so they are calculated as targets for 2040 and 2050. 2040: Approximately 20 million t-CO_{2e}/year (domestic) 2050: Approximately 80 million t-CO_{2e}/year (domestic)	The main technological development results covered in this project are aimed at social implementation and gradual dissemination after 2032, so they are calculated as targets for 2040 and 2050. 2040: approximately 4.2 trillion yen (world market size, cumulative total) *Economic effects due to metal products, etc. produced from carbon-neutral industrial furnaces is approximately 46 trillion yen 2050: approximately 10.0 trillion yen (world market size, cumulative total) *Economic effects due to metal products, etc. produced from carbon-neutral industrial furnaces is approximately 205 trillion yen
Related URL	https://www.nedo.go.jp/content/100958684.pdf	



Use of proceeds 9: (GI) Building a large-scale hydrogen supply chain (commercialization demonstration of liquefied hydrogen/MCH supply chain, research and

development/demonstration of dehydrogenation technology from ammonia related to large-scale hydrogen transportation)

ICMA GBP classification	"Circular economy adapted products, production technologies and processes and/or certified eco-efficient products"	
GB guidelines	"Projects concerning eco-efficient products, production technologies, and processes"	
Sector	Electricity and heat, Manufacturing	
Subproject 1. Liquefied hydrogen/MCH supply chain commercialization demonstration		
Issue recognition	In order to achieve a hydrogen supply cost that is sufficiently competitive with fossil fuels (less than 20 yen/Nm^3), it will commercialize the construction of a large-scale hydrogen supply chain using hydrogen carriers' liquefied hydrogen and MCH (methylcyclohexane). It will develop innovative liquefaction technology and direct MCH electrolytic synthesis technology that will contribute to the reduction of hydrogen supply costs. The target cost for 2030 (30 yen/Nm^3) is set as the minimum value required at that time in order to reduce the price of hydrogen to a level that is sufficiently competitive with fossil fuels (20 yen/Nm^3 or less) in 2050. Liquefied hydrogen has high hydrogen purity and can be used in fuel cells that require high purity without additional equipment on the demand side, while MCH is a liquid at room temperature and pressure and has excellent stockpiling properties. Since hydrogen carriers are available and the expected uses are different, it is thought that long-term differentiation will take place, so the technology method will not be narrowed down midway.	
development goals	Marine transportation technology to achieve hydrogen supply cost of 30 yen/Nm^3 in 2030, infrastructure development and innovative hydrogen transportation technology to aim for 20 yen/Nm^3 or less in 2050	
Technology maturity goals	TRL6 or higher (2030)	
Subproject 2. Development and demonstration of dehydrogenation technology from ammonia for large-scale hydrogen transportation		
Issue recognition	(As this project has not officially completed the formalities as a GI project, the following details are based on current assumptions and may change in the future.) From the beginning of the GI Fund project, it have supported the development of technologies related to hydrogen carriers such as liquefied hydrogen and MCH, with the aim of creating a large-scale hydrogen supply chain. On the other hand, ammonia, for which production and transportation technology has been established, is promising as a hydrogen carrier once dehydrogenation technology (cracking technology) is established, and competition among hydrogen carriers is expected, providing incentives for reducing hydrogen procurement costs. Additionally, if it establish ammonia cracking technology ahead of the rest of the world, it may be able to export the cracking technology to countries where ammonia supply chains are established (Europe, America and Asia); The movement is becoming more active. Currently, large-scale ammonia cracking technology is still under development, and there have been no confirmed cases of it reaching the stage of demonstration, so the aim is to advance demonstrations toward large-scale expansion as soon as possible and capture the international market for ammonia cracking.	
development goals	Currently, there are two cracking technologies that are being considered for large-scale expansion in Japan: (1) external heating method, and (2) ATR (auto thermal reaction) method. Proceed with early demonstration of cracking technology and achieve social implementation of cracking technology by 2030.	
Technology maturity goals	TRL6 or higher (2030)	
Impact	■CO_2 reduction effect (worldwide, throughout the project) 2030: approximately 7 million t-CO_{2e}/year 2050: approximately 400 million t-CO_{2e}/year	■Economic ripple effect (world market size) 2030: approximately 0.3 trillion yen 2050: approximately 5.5 trillion yen
Related URL	https://www.nedo.go.jp/content/100932374.pdf	

Use of proceeds 10: (GI) Hydrogen production through water electrolysis using electricity derived from renewable energy, etc.

ICMA GBP classification	"Circular economy adapted products, production technologies and processes and/or certified eco-efficient products"	
GB guidelines	"Projects concerning eco-efficient products, production technologies, and processes"	
Sector	Electricity and heat, Manufacturing	
Issue recognition	In order to promote the social implementation of hydrogen, it is necessary to simultaneously create large-scale demand for hydrogen by reducing supply costs by increasing the size of supply facilities, etc. Since it is the early stages of hydrogen-based decarbonization technologies development, the long-term demand for hydrogen is uncertain, making it difficult for private businesses to make large-scale infrastructure investments. It is necessary to build a social implementation model that makes it possible to maximize hydrogen supply and create hydrogen demand. In this project, it will build such a model, solve the technical issues of each element, and aim to develop future infrastructure and achieve efficient nationwide dissemination of hydrogen. Specific measures The core of the project will be the use of water electrolysis equipment for domestic hydrogen production. Regarding the types of equipment, two types, ``alkaline type'' and ``PEM type,'' are at a technological level close to commercialization. (TRL5 at the time of business start). It have already demonstrated a maximum output of 10MW for the alkaline type and 2.3MW for the PEM type. However, costs remain high, so it is necessary to aim for cost reduction. This project will carry out the following three activities. i. Research and development aimed at reducing costs of water electrolysis equipment, such as increasing size ii. Establishment of evaluation infrastructure for water electrolysis equipment with an eye on overseas markets iii. Demonstration of utilization of hydrogen produced through decarbonization of heat demand and production of basic chemicals such as ammonia	
development goals	Realization of technology that allows equipment costs to be reduced by 2030 to 52,000 yen/kW for alkaline water electrolysis equipment and 65,000 yen/kW for PEM water electrolysis equipment A performance evaluation board for water electrolysis equipment will be prepared by 2025.	
Technology maturity goals	TRL6 or higher (2030)	
Impact	■CO_2 reduction effect (world) 2030: 40 million t-CO_{2e}/year 2050: 1.52 billion t-CO_{2e}/year	■Economic ripple effect (world market size) 2030: Approximately 0.4 trillion yen (cumulative total) 2050: Approximately 4.4 trillion yen/year
Related URL	https://www.meti.go.jp/policy/energy_environment/global_warming/gifund/pdf/gif_04_summary_r.pdf	

Use of proceeds 11: (GI) Achieving carbon neutrality in the waste and resource circulation field

ITRLCMA GBP classification	"Prevention and control of pollution"
GB guidelines	“Projects for pollution prevention and control”
Sector	Waste

Issue recognition	Approximately 40 million tons (3.4 per cent) of Japan's GHG emissions come from the waste sector, making it the third largest sector after the energy sector and industrial processes and product use. Approximately 80 per cent of GHG emissions in Japan's waste sector come from waste incineration, etc. (simple incineration, heat recovery, and use of raw materials and fuels). Japan has a small land area, and in order to secure the remaining capacity of final disposal sites (landfills), it is necessary to reduce the amount of waste. In addition, if organic waste is disposed of as is in landfills, methane, whose global warming potential is 25 times of CO_2 will be emitted due to biodegradation. In addition, there are infectious and other hazardous wastes, and from the perspective of proper disposal, heat treatment (incineration treatment and pyrolysis treatment) is necessary, and the 3Rs (reduce, reuse, recycle) are necessary. Even after further promotion, emissions from this sector cannot be reduced to zero. In order to reduce emissions from this sector to net zero, it is considered essential to shift to CN-type treatment, which replaces conventional incineration methods that emit CO_2 into the atmosphere.
Subproject 1 Development of waste incineration treatment facility based on CO_2 separation and recovery	
Business summary	In order to increase the carbon recovery rate while suppressing the increased cost when CO_2 separation and recovery is assumed, in addition to the development of new elemental technologies (component equipment including separation and recovery equipment) that need to be introduced into incineration facilities. In order to develop the technological base for the entire incineration facility (equipment process technology, operation technology, etc.), this R&D will address the following two themes. Subproject 1 CN type waste incineration facility based on chemical absorption method Subproject 2 CN type waste incineration facility based on oxygen enrichment (combustion)
development goals	By 2030, a waste incineration facility with CO_2 separation and recovery that meets the following requirements: Established technology to realize ・Stable recovery rate of carbon contained in waste of 90 per cent or more* * Facility size is approximately 300t/day (150t/day x 2 furnaces), net processing cost increase within approximately 10,000 yen/t-waste from conventional incineration treatment (assuming waste energy generation, same applies below)
Technology maturity goals	TRL6-7 (2027-2030)
Subproject 2 Large-scale demonstration of high-efficiency pyrolysis treatment facility	
Business summary	In order to utilize carbon in waste that cannot be utilized with the current state of technology, it will develop innovative pyrolysis technologies that are compatible with each pyrolysis treatment method, and also reduce processing costs, which remain high (particularly in order to reduce them). It will also develop the necessary elemental technologies, such as the establishment of a thermal decomposition process that prevents facility deterioration, leading to reductions in maintenance costs).
development goals	By 2030, demonstrate large-scale effectiveness in real environments for waste pyrolysis treatment facilities that meet any of the following requirements* ・In the case of gasification: Maximizing the effective carbon utilization rate (while expecting a utilization rate of 80 per cent or more of the carbon contained in the waste for the entire system. It is also possible to convert the carbon in the waste into commercialized carbon such as ethanol). (utilization rate is 27 per cent or more) ・In the case of conversion to oil: Maximize the recovery rate of calorific value (while expecting a utilization rate of 80 per cent or more of the carbon contained in the waste as a whole, 48 per cent or more of the calorific value recovered with oil) *For both gasification and oil conversion, the facility scale is approximately 300t/day (150t/day x 2 furnaces), and the net processing cost from conventional incineration treatment is approximately 10,000 yen/t. numerical value
Technology maturity goals	TRL6-7 (2027-2030)
Subproject 3 Development and processing of highly efficient biomethane conversion technology	
Business summary	In order to convert target organic waste into biomethane and other fuels at a high rate and with excellent energy efficiency, it will develop new reactors that are optimal for improving hydrogen reaction efficiency and the quantity and quality of biogas. It will develop elemental technologies such as processes that can respond to fluctuations in methane fermentation,

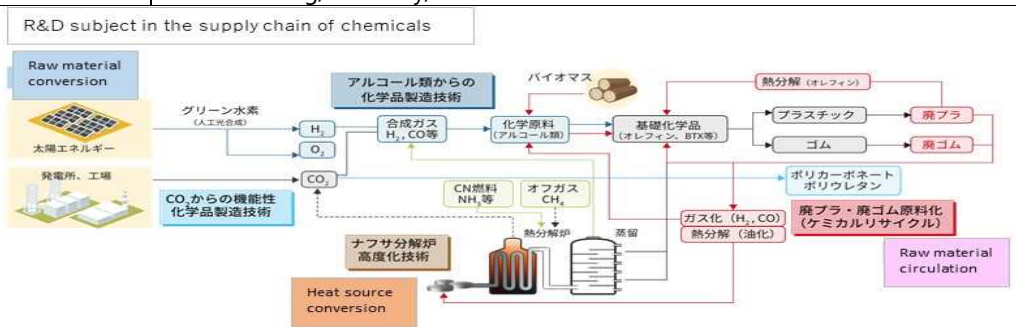
	technology to improve the decomposition rate in methane fermentation, technology to improve the methane/hydrogen ratio in generated gas, and technology to convert methane fermentation residue into fuel, etc. It will conduct demonstrations as a series of systems ranging from waste reception to the use of biomethane, etc.	
development goals	By 2030, establish technology to realize a regionally distributed treatment system that converts organic waste into biomethane, etc. that satisfies the following two points. ・Demonstration of direct methanation of methane fermentation biogas on pilot scale (methane concentration of 97 per cent or more including purification) ・Methane production rate by methanation is 50NL/Lr・d or more under low temperature (several tens of degrees) and low pressure (~0.8MPa) conditions	
Technology maturity goals	TRL6-7 (2028-2030)	
Impact	■CO_2 reduction effect (domestic) 2030: Approximately 10.5million t-CO_{2e}/year 2050: Approximately 1,244milliont-CO_{2e}/year	■Economic ripple effect (world market size) 2030: Approximately 0.5 trillion yen/year 2050: Approximately 5.2 trillion yen/year
Related URL	https://www.nedo.go.jp/content/100966165.pdf	

Use of proceeds 12: (GI) Development of technology for manufacturing plastic raw materials using CO_2, etc.

ICMA GBP classification	"Energy efficiency", " Circular economy adapted products, production technologies and processes and/or certified eco-efficient products "
GB guidelines	"Projects for energy efficiency", " Projects concerning eco-efficient products, production technologies, and processes"
Sector	Waste, Manufacturing (Chemical)
Issue recognition	Of Japan's CO_2 emissions by sector, the industrial sector and industrial processes account for 29.3 per cent of the total (2019). Of this, 18.6 per cent (60.18 million tons per year) is emitted from the chemical industry, and drastic measures are needed to achieve carbon neutrality in 2050. Currently, most plastics are made from naphtha (crude gasoline) obtained through petroleum refining (12.4per cent of petroleum products are naphtha for petrochemical use). As demand for petroleum products declines, consumption of naphtha, a raw material for plastics, remains flat. Since carbon components are essential to plastics, it is expected that a certain amount of naphtha will continue to be used for the time being. Basic chemicals (olefins) such as ethylene, propylene, and butadiene, which are raw materials for plastics and rubber, are produced by thermally decomposing naphtha at a high temperature of approximately 850°C, and the manufacturing process produces 31 million tons of CO_2 is emitted annually and drastic measures are required, especially regarding the heat source of naphtha cracking furnaces. For example, if CO_2, etc. can be effectively used as a resource during the production of basic chemicals and functional chemicals (oxygen-containing compounds) such as polycarbonate and polyurethane, CO_2 emissions can be significantly reduced. Expectations are high. Approximately 84 per cent of the 8.91 million tons of waste plastic produced each year is recycled, and 57 per cent of this is used as a heat source for waste incineration energy generation and cement manufacturing (thermal recycling). As approximately 16 million tons of CO_2 is emitted per year, including simple incineration, there is a need to establish technologies such as chemical recycling that returns waste plastic to its original plastic raw material.
Subproject 1 Heat source conversion	
Business summary	When naphtha is cracked, in addition to olefins such as ethylene, propylene, and butadiene, off-gases such as methane are generated, which are used as a heat source in the cracking furnace, but are ultimately emitted in large quantities as CO_2. It is important to focus on carbon-free fuels such as ammonia and hydrogen as a heat source for naphtha cracking furnaces to replace off-gas, and to reduce CO_2 emissions by switching the heat source. It will develop advanced naphtha cracking furnace technology (equivalent to current TRL6-4) using carbon-free fuel and retrofit it to domestic facilities. In addition, it will aim to expand Japan's advanced technology overseas by licensing it to emerging countries such as China and ASEAN, which have new plans.
development goals	By 2030, it will develop burners and furnaces that thermally decompose naphtha using CO_2-free heat sources such as ammonia (hydrogen), and achieve yields of basic chemicals such as

	ethylene and propylene and energy consumption during production that are the same as current naphtha cracking furnaces. Achieved technology to reduce the level of Expect to achieve production costs comparable to current levels using a tens of thousands of tons/year scale test reactor	
Technology maturity goals	TRL7 (2027-2030)	
Subproject 2 Raw material circulation		
Business summary	Chemical recycling of waste plastics and waste rubber includes a method of gasifying it in the presence of oxygen to produce basic chemicals from synthesis gas, and a method of thermally decomposing it under oxygen-free conditions to synthesize olefins or convert it into oil. The proportion of chemical recycling remains at around 4 per cent, and its uses are limited, so it is important to increase this proportion in order to reduce CO_2 emissions. It will aim to establish and socially implement promising chemical recycling technology (equivalent to current TRL4) in which Japan can demonstrate its strengths, and ensure Japan's superiority over other countries through international standardization of recycled plastics.	
development goals	By 2030, it will produce basic chemicals such as ethylene, propylene, and butadiene from waste plastics and waste rubber at a yield of 60 to 80 per cent, and reduce CO_2 emissions during production to 0.8 and 1.2 kg-CO_2/kg, respectively. Established technology to make it less than olefin. Aiming to reduce manufacturing costs by 20 per cent compared to current chemically recycled plastics through demonstration on a scale of several thousand to tens of thousands of tons/year	
Technology maturity goals	TRL6 (2028-2030)	
Subproject 3 Raw material conversion		
Business summary	Technology to produce plastic raw materials from CO_2 is a key to significantly reducing CO_2 emissions, and is also important from the perspective of moving away from petroleum resources. Oxygen-containing compounds10 such as polycarbonate and polyurethane are functional chemicals that do not require hydrogen and can be synthesized using CO_2 as a raw material (equivalent to current TRL5). In addition to reducing CO_2 emissions, it will also work to further improve functionality, such as electrical, optical, and mechanical properties, which will lead to expanded applications, and develop new markets. Japanese companies are currently developing artificial photosynthesis technology that uses photocatalysts to produce plastic raw materials from water and CO_2. It has already been successful at the basic research (laboratory) level (equivalent to the current TRL4), and in the future it aim to achieve both higher efficiency and improved mass production for social implementation.	
development goals	By 2030, reduce CO_2 emissions during the production of toxic raw materials by improving the functionality of polycarbonate, polyurethane, etc. and eliminating the need for toxic raw materials such as phosgene, and further reduce CO_2 emissions of 0.3 kg-CO_2/kg* or more as raw materials. Achieving technology that can It aim to achieve the same price as ready-made products through demonstration on a scale of hundreds to thousands of tons/year. (*Varies depending on the target.) By 2030, it aim to establish technology for manufacturing chemicals from alcohol that has the following efficiency and durability. ○Developing a photocatalyst with a conversion efficiency of 10 per cent or more and demonstrating artificial photosynthesis on a scale of several hectares will bring the hydrogen production cost to 30 yen/Nm^3 or less. ○After establishing a technology to produce basic chemicals such as ethylene and propylene from hydrogen and CO_2 via alcohols, etc. with a yield of 80-90 per cent, and to eliminate CO_2 emitted during production, it will be able to produce products from several thousand to Through demonstration on a scale of tens of thousands of tons per year, it will have a durability of over 10,000 hours and will reduce manufacturing costs by 20 per cent compared to current methanol to olefin (MTO) products.	
Technology maturity goals	TRL6-7 (2025-2030)	
Impact	■CO_2 reduction effect (world) 2030: 40 million t-CO_{2e}/year 2050: 1.1 billion t-CO_{2e}/year	■Economic ripple effect (world market size) 2030: 10 trillion yen/year 2050: 360 trillion yen/year

Related URL	https://green-innovation.nedo.go.jp/project/development-plastic-raw-material-manufacturing/summary/



Use of proceeds 13: (GI) Promotion of carbon recycling using CO_2 as a direct raw material using bio-manufacturing technology

ICMA GBP classification	"Circular economy adapted products, production technologies and processes and/or certified eco-efficient products "
GB guidelines	"Projects concerning eco-efficient products, production technologies, and processes"
Sector	Manufacturing (Chemical)
Issue recognition	1) Sophistication of microorganism modification platform technology to accelerate the development of useful microorganisms, etc. By supporting the development of platform technology for modifying microorganisms that integrates basic biotechnology, digital technology such as IT/AI, and automation technology such as robotics, it can rotate the DBTL cycle[36] faster and absorb and absorb CO_2 with high efficiency. It aims to expand the variety of useful micro-organisms that can be immobilized and produce substances, and to contribute to reducing the time and cost required for modification. 2) Development and improvement of useful microorganisms that can produce substances using CO_2 as raw material In this R&D item, it will promote joint development between microorganism modification platform operators, who play a central role in bio-manufacturing, and businesses in other fields such as innovative materials and fuels. First, it will develop microbial strains with improved productivity by optimizing the metabolic pathways for substance production. 3) Development and demonstration of manufacturing technology using microorganisms that can produce substances using CO_2 as raw material In order to produce substances using CO_2 as a carbon raw material, it is necessary to cultivate a microbial strain that uses carbon raw materials and reducing energy that are supplied in a different way from conventional methods. Additionally, it is necessary to develop separation and purification technologies that are optimized for each substance produced. In order to use the produced substances industrially, it is also necessary to develop material processing technology and quality evaluation methods that also take into account the final product.
development goals	1) By 2030, it will develop technology to shorten the time per DBTL cycle, and also establish technology to reduce the number of cycles and reduce costs, reducing the development period for useful microorganisms to up to 1/10th. Established technology to shorten the time. 2) By 2030, increase the ability to produce substances or fix CO_2 compared to general natural strains. Develop a microorganism (commercial strain) that can produce substances at a commercial level by improving the production capacity by about 5 times, or perform genome editing on microorganisms that already have a high substance production function or CO_2 fixation ability, and maintain the production function while maintaining production functions. Developed microorganisms (commercial strains) that can use different raw materials and target substances.

[36]DBTL cycle: Refers to the workflow of Design, Build, Test, and Learn.

	3) By 2030, it will develop technology that uses microorganisms, etc. to make the manufacturing cost of substances produced from CO_2 as raw materials less than 1.2 times that of alternative candidate products in 2030.	
Technology maturity goals	TRL7-9 (2040)	
Impact	Since the results of this project are intended to be put into practical use from around 2040, the outcome goals are CO_2 reduction effects and economic ripple effects in 2040 and 2050. CO_2 reduction effect (potential estimation) 2040: approximately 1.35 billion t-CO_2e/year 2050: approximately 4.21 billion t-CO_2e/year	■Economic ripple effect (world market size) 2040: approximately 65.4 trillion yen/year 2050: approximately 199.4 trillion yen/year
Related URL	https://www.meti.go.jp/policy/energy_environment/global_warming/gifund/pdf/gif_19_randd.pdf	

(2) Research and development support other than GI Fund

Use of proceeds 14: Research and development of future technologies essential for realizing GX such as optoelectronic convergence among the post-5G information and communication system infrastructure reinforcement research and development projects

ICMA GBP classification	"Energy efficiency"
GB guidelines	“Projects for energy efficiency”
Sector	ICT
Issue recognition	Optoelectronic convergence technology is a technology that combines circuits that handle electrical signals and circuits that handle optical signals. Traditional computers perform calculations using binary numbers by turning electricity on and off. When electricity flows through a circuit, it generates unnecessary heat, and when electricity is generated, the resistance of the path through which the electricity flows increases, leading to a decrease in calculation speed. Therefore, research is underway to replace calculations that used to be performed using electricity with processes that use light. By connecting the internal circuits of a computer with light and minimizing heat usage, it achieves energy savings and low latency. The first goal is to establish technology for optically connecting chips used for calculations and peripheral components by 2024. By 2025, it will be possible to connect chips using light, and at the final stage in 2030, it will be possible to connect chips using light. Next, it aims to commercialize optoelectronic integrated chips for calculation. By 2030, the widespread adoption of optoelectronic convergence technologies will result in energy savings of more than 40 per cent compared to today's state-of-the-art data centers, by some estimates.
Business summary	Development of implementation technology and deterministic delay computing platform technology related to optoelectronic convergence technologies necessary to realize new architectures such as semiconductor devices in which multiple circuit chips are optically connected within a package and optical disaggregated computing, as well as software that can reduce latency and improve delay determinism. Development of computational infrastructure technology.
Development goals/impact	Band density must be 1Tbps/mm or more. In addition, the energy usage per unit communication volume of semiconductor devices developed using optical chiplet mounting technology shall be reduced by more than 40 per cent compared to equivalent technologies or products. The optical communication speed of the memory module using the photoelectric conversion device as an interface must be a band of 512 Gbps or higher (physical speed). In addition, the energy consumption must be reduced by 30 per cent or more compared to the equivalent technology or product that was in use at the time the research and development began.

Technology maturity goals	TRL6 (2030)
Related URL	https://www.meti.go.jp/policy/mono_info_service/joho/post5g/pdf/20230925001.pdf

Use of proceeds 15: Innovative GX technology creation project

ICMA GBP classification	"Clean transportation", "Energy efficiency", "Renewable energy", "Circular economy adapted products, production technologies and processes and/or certified eco-efficient products"	
GB guidelines	"Projects for clean transportation", "Projects for energy efficiency", "Projects for renewable energy", "Projects concerning eco-efficient products, production technologies, and processes"	
Sector	Transport Electricity and heat	
Issue recognition	It will make full use of the high potential and accumulation of basic research capabilities in Japanese academia, support R&D and human resource development at universities, national research institutes, etc., and work towards realizing GX from the perspective of creating innovative technology seeds and producing human resources. It aims to contribute to create innovative technologies that will lead to the realization of GX, it is necessary not only to conduct basic research on elemental technologies, but also to break down the silos of research, such as materials development, engineering, evaluation and analysis, data operation and analysis, etc. It is essential to build a system in which various laboratories and researchers come together to conduct research and development in an integrated manner as a "team" in order to achieve research and development goals. Therefore, it has set ``Storage Batteries'', ``Hydrogen'', and ``Bio-manufacturing'' as areas that are connected to the 14 fields specified in the Green Growth Strategy of the government and where it can expect great future contributions from Japanese academia. This fund supports research and development carried out in an all-Japan, integrated "team-type" manner. Furthermore, the development goals of this research and development include content that will contribute to resolving issues faced by similar research and development that has been conducted by the GI Fund, etc. In addition, the same development goals are set for the same areas as the GI Fund.	
development goals	The storage battery is assumed to be for renewable energy electricity or EV vehicles. For hydrogen, it assumes "hydrogen production technology," "hydrogen storage technology (including storage technology that contributes to transportation)," and "fuel cell technology." Bio-manufacturing is aimed at applying bio-manufacturing technology to a wide range of industries such as chemicals, textiles, and food and beverage manufacturing, which emit 80.9 million t-CO_2e annually. Aiming to improve the types and production efficiency, diversify, and expand the functions of next-generation fuels such as SAF (Sustainable Aviation Fuel) and other next-generation fuels (raw materials for chemical fibers, etc.), and improve CO_2 fixation ability. , promoting research that will lead to the foundation of next-generation bio-manufacturing systems using microorganisms and plants.	
Technology maturity goals	Storage battery: TRL6 or higher (2040) Hydrogen: TRL6 or higher (2030) Bio-manufacturing: TRL6 or higher (2040)	
Impact *Since all of this research is basic research, it shows the effects of social implementation of the results of this project.	Storage batteries ■CO_2Reduction effect of (domestic) 2042: Approximately 10 million t-CO_{2e}/year 2047: Approximately 15 million t-CO_2e/year	Economic ripple effect (world market size estimation) Innovative storage battery 2030: Approximately 33 trillion yen 2050: Approximately 53 trillion yen (7,546GWh on a capacity basis) Stationary storage battery 2050: Approximately 47 trillion yen (3,400GWh on a capacity basis)
	Hydrogen ■CO_2 reduction effect	

	2030: approximately 5 million t-CO_{2e}/year (domestic) 2050: approximately 400 million t-CO_{2e}/year (world)[37]
	Bio manufacturing ■ CO_2 reduction effect (potential estimation) 2040: Approximately 1.35 billion t-CO_{2e}/year 2050: Approximately 4.21 billion t-CO_{2e}/year
Related URL	https://www.jst.go.jp/gtex/index.html

Use of proceeds 16: Fast reactor demonstration reactor development project

ICMA GBP classification[38]	"Low carbon/decarbonized energy"
GB guidelines	N.A.
Sector	Electricity
Issue recognition	A fast reactor is a nuclear reactor in which the fission chain reaction is sustained by high-energy neutrons (fast neutrons). Since fast neutrons cause nuclear fission of the fuel, in order to avoid deceleration of fast neutrons as much as possible, moderators like those in light water reactors are not required, and fuel with increased fuel density in the fuel assembly is used. Fast reactors utilize fast neutrons to further enhance the effectiveness of the nuclear fuel cycle by reducing the volume and toxicity of such high-level radioactive waste and making effective use of resources. Fast reactors do not require moderators, but use liquid metals, mainly sodium, as coolants for fuel assemblies. Furthermore, after a light water reactor finishes generating electricity, the spent fuel contains resources that can be recycled, such as uranium and plutonium. By collecting and reprocessing these and reusing them as fuel for fast reactors, a long-term stable supply of energy becomes possible. When reprocessed fuel is used in light water reactors (light water reactors pullthermal), the less flammable plutonium (high-grade plutonium) gradually increases, so it can be reused as fuel only a few times, whereas fast reactors also burn the less flammable plutonium. It plays an extremely important role in the effective use of resources. In addition, fast reactors are expected to further enhance the effectiveness of the nuclear fuel cycle in reducing the volume and potential toxicity of radioactive waste and in effectively utilizing resources.
Business summary	A sodium-cooled fast reactor (SFR) is a moderator-less fast reactor that uses liquid metal sodium as a coolant. In the fast reactor strategic roadmap revised in December 2022, a fast reactor technology evaluation committee was established under the strategic working group established by the government, manufacturers, electric energy companies, and research institutions. As a result of the committee's consideration of sodium-cooled reactors, light water-cooled fast reactors, and molten salt fast reactors as candidates, sodium was selected as the coolant that should be prioritized for development. The liquid metal sodium used as a coolant reacts violently with water and burns, so it must be handled with great care. The milestones for this project are as follows. 1） Summer 2023: Select specifications for the reactor concept and core companies for conceptual design from 2024 onwards Based on the coolants that should be prioritized for development in FY2022, and based on the results of subsequent technical studies, the international situation, and domestic market needs, from among the sodium-cooled reactors, conceptual design will begin in FY2024. In addition to selecting the specifications for the new reactor concept, it will also reselect a core company that will be responsible for the design of the concept, associated technological development, and

[37] The value for 2050 is the value of the GI Fund "Building a large-scale hydrogen supply chain" because the assumed hydrogen society is same.
[38] Since there is no example of the green project classification for the use of this fund in ICMA's GBP, it was established at the time of formulating Japan Climate Transition Framework.

	future manufacturing and construction, and clarify the development system. In addition, measures to maintain human resources, technology, and supply chains will be implemented. 2） FY2024 to FY2028: Conceptual design of demonstration reactor and necessary research and development The core companies will conduct the conceptual design of the demonstration reactor. First, it will carry out the conceptual design of the plant, while conducting necessary research and development (evaluation of a decay heat removal system that can respond to various situations, evaluation of the conclusion of a core meltdown accident inside the reactor vessel, irradiation tests for advanced fuel, standards for new materials) It will carry out data maintenance, etc.) and gain knowledge through research and development results and international cooperation around 2026.Based on this, it will conduct specific studies on fuel technology and develop the system as a whole, including plants and fuel. The conceptual design will be carried out by around 2028. 3) Around FY2028: Decision to move to Step 3 based on the results of the reactor conceptual design and the status of system development, etc. In moving to Step 3, in addition to creating a common understanding among related parties to build a system, it will fulfill its accountability to ensure that the technology is accepted by society, and it will also take specific measures regarding location measures and regulatory responses. It is necessary to consider how to respond. It is also essential that an appropriate business management system be established. If the market mechanism does not work properly, it is necessary to verify that the long-term interests of the people can be secured, and then, as with other energy sources, appropriate institutional measures to supplement the market are needed. It is appropriate that various adjustments with the location area should be carried out by the established business management system, in collaboration with the government and electric utilities with experience in locating light water reactors. The government will provide institutional support in cooperation with electric utilities and the location regions. In addition, it is important to build a mechanism that can raise development funds in an appropriate business management system in collaboration with electric utilities, who are the final users of nuclear energy generation technology, and the government is creating an environment in which such a mechanism can function. Based on the status of these considerations, it will make a decision to move to Step 3 around FY2028, and proceed with the outlook and consideration of activities from around FY2030 onwards.
development goals	Goals by 2028 a. Technology maturity level (TRL) ・Present an evaluation plan that will contribute to licensing regarding the safe design of fast reactors. In addition, the technological maturity of the elemental technologies for fast reactors and fast reactor cycles shall be at the technology demonstration stage (TRL6) or higher. b. Economical aspects ・In a cost evaluation assuming a plant that is a large reactor and takes into account learning effects, etc., it is considered to be equivalent to a light water reactor. - Continuous operation period of 13 months or more, availability rate of 80 per cent or more, net energy efficiency of 35 per cent or more, and plant life of 60 years. ・At a breeding ratio of 1.03, the average extraction burnup of the entire core will be 80 GWd/t. c. Reducing the volume of radioactive waste and reducing its potential toxicity ・The average MA content in the core is approximately 3wtper cent (the maximum MA content in the fuel assembly is 5 per cent or less). d. sustainability ・While ensuring a breeding ratio of 1.03, taking into account the uncertainty of Pu supply and demand, secure the potential to operate a core configuration with a breeding ratio of 1.1 to 1.2. e. flexibility - Flexibly respond to output scale and location conditions. ・Consider specific operational methods (heat storage, etc.) that can coexist with variable renewable energy such as solar and wind energy. f. In preparation for regulatory compliance and consultation with regulations, clarify important issues, begin exchanging opinions, and present research and development plans for Step 3 and beyond.

Technology maturity goals	TRL6 or higher (2028)
Impact	・Technology maturity level at which transition to Step 3 can be determined. ・It expect to rebuild the supply chain through the development of fast reactors and fast reactor cycles in the conceptual design, and to cultivate skills and promote employment in the industrial world after Step 3. ・Obtain permit data and present an acquisition plan so that the business management system from Step 3 onward can make construction decisions.
Related URL	https://www.meti.go.jp/shingikai/enecho/denryoku_gas/genshiryoku/kakushinro_wg/pdf/007_01_00.pdf

Use of proceeds 17: High-temperature gas reactor demonstration reactor development project

ICMA GBP classification	"Low carbon/decarbonized energy"
GB guidelines	“Projects concerning eco-efficient products, production technologies, and processes”
CBI Criteria	Electricity and heat
Issue recognition	A high-temperature gas reactor is a nuclear reactor that uses ceramic materials, mainly graphite, as the main constituent material of the reactor core, and uses helium gas as a coolant to extract the heat generated by nuclear fission. A high-temperature gas furnace with an outlet coolant temperature of 700°C to 950°C is called a high-temperature gas furnace. By using a ceramic material with excellent heat resistance, it is possible to extract energy from high-temperature heat of over 700°C, which has the potential to be used for energy generation or to produce hydrogen using a high-temperature gas furnace. Regarding hydrogen production, which is attracting attention for decarbonization in industrial fields including steelmaking and chemicals, it has the potential to decarbonize a shaft furnace that can perform complete hydrogen reduction steelmaking with a single high-temperature gas furnace. There is. Comparing hydrogen production using a high-temperature gas furnace and solar energy generation, the required site area is approximately 1/1,600th. In Japan, JAEA owns the High Temperature Engineering Test and Research Reactor (HTTR). The test research reactor HTTR achieved 50 days of continuous high-temperature operation at the world's highest temperature of 950°C, and conducted tests simulating an accident in which coolant was lost, similar to the TEPCO Fukushima Daiichi Nuclear Energy Plant accident. It has the world's leading technology, including ensuring that water cools naturally. Utilizing the test and research reactor HTTR, in addition to international demonstrations of safety, it plan to develop the technology necessary to produce large quantities of carbon-free hydrogen at low cost by 2030. It also plan to conduct research and development on carbon-free hydrogen production methods that utilize ultra-high temperature heat, including the IS method and methane thermal decomposition method. In order to achieve the government's goal of carbon neutrality in 2050, it is essential to reduce emissions from the industrial sector, including steel and chemicals, which account for approximately 25 per cent of total domestic emissions. As mentioned above, high-temperature gas reactors are expected to be used for high-temperature heat utilization of 800°C or higher, which is higher than conventional light water reactors, and for industrial applications such as hydrogen production. In Japan, the aforementioned test and research reactor HTTR has been restarted, and it are now at the stage where it can develop a demonstration reactor with the aim of commercialization as a means of decarbonizing heat demand and hydrogen production. Through this project, it aim to provide a stable supply of large amounts of hydrogen at approximately 12 yen/Nm^3 by 2050 using decarbonized high-temperature heat over 800°C and carbon-free hydrogen production methods. The ultimate goal is to connect it to industrial use.
Business overview/development goals	This project will conduct a feasibility study of carbon-free hydrogen production methods that utilize high temperatures of 800℃ or higher (IS method, methane pyrolysis method, high-temperature steam electrolysis, etc.) by 2030. The goal is to establish connection technology and evaluation methods that achieve high safety using a decarbonized high-temperature heat source and hydrogen production technology using the commercially available methane steam reforming method. At that time, in order to develop hydrogen production evaluation technology, hydrogen production tests will be conducted using the

	High Temperature Gas Reactor Test and Research Reactor HTTR, which has achieved the world's highest temperature of 950°C as a high-temperature heat source. In addition, it will design and construct a high-temperature gas reactor demonstration reactor, develop elemental technologies, and consider supply chains such as fuel production. In FY2020, it will prepare the manufacturer's system and design work for the conceptual design of the demonstration reactor, basic design of the hydrogen plant connected to the HTTR, equipment development, and elemental technology development for carbon-free hydrogen. It will conduct procurement feasibility studies for ultra-high temperature materials that have been found to be impossible to procure.
Technology maturity goals	TRL6 or higher (2030)
impact	By 2030, it will establish connection technology between high-temperature heat sources and hydrogen production plants and demonstrate that hydrogen production is possible. It will also gain an outlook on the technological feasibility of carbon-free hydrogen production methods (IS method, methane pyrolysis method, high-temperature steam electrolysis, etc.). ・Achieve the tasks set for each FY year to confirm the connection technology between ultra-high temperature heat sources and hydrogen production facilities. ・By the end of the project in FY2022, technology for evaluating hydrogen production should be established, and the design tolerance should be within ±10 per cent of the error between predicted and measured values.
Related URL	https://www.meti.go.jp/main/yosan/yosan_fy2023/pr/gx/gx_denga_02.pdf

(3) Subsidy program

Use of proceeds 18: Support project for strengthening the semiconductor supply chain to realize GX by improving energy performance, part of the support for strengthening the supply chain of important materials in response to changes in the economic environment.

ICMA GBP classification	"Clean transportation", "Renewable energy"
GB guidelines	“Projects for clean transportation”, “Projects for renewable energy”
Sector	CBI sector criteria: 1. Solar v2.3 2. Wind v1.3 3. Low carbon transport　(Rev2.2) 4. Electrical Grids and Storage (March 2022)
Purpose of subsidy	As the functions played by semiconductors in people's lives are increasing due to digitalization and green innovation, energy semiconductors, which control current and voltage, are being used as energy control devices for all kinds of equipment, including EVs and wind energy generation. It is essential for achieving neutrality and is also extremely important for economic security. The semiconductor companies in Japan have to survive intensifying international competition, leverage the technological advantages of individual companies, support the strengthening of domestic production capacity for energy semiconductors, etc., proceed with steady investment toward the realization of GX, and strengthen the supply chain.
Business details eligible for subsidies	Based on the Economic Security Promotion Act, a company who intends to get a subsidy from this funds and to secure a stable supply of semiconductors must prepare a plan to secure a stable supply of semiconductors, etc. (supply security plan) and submit it to the Minister of Economy, Trade and Industry. The projects eligible for this subsidy system are as follows. <Energy semiconductors> It must be a significant investment (as a general rule, business size of 200 billion yen or more) that is considered necessary to maintain international competitiveness into the future, mainly in SiC energy semiconductors. In addition, when making certifications, consideration will be given to the content of initiatives aimed at procuring important parts and materials.

	The performance of the equipment and equipment to be introduced must be cutting-edge.
Characteristics of energy semiconductors and SiC semiconductors	●About power semiconductors Power semiconductors are semiconductors used to control and supply electrical energy, such as converting alternating current to direct current or dropping voltage. It has a wide range of applications, including in-vehicle storage batteries, energy transmission and distribution, electrical trains, and home appliances (air conditioner inverters), and has the effect of reducing electricity loss and improving energy efficiency in products. The switching function of energy semiconductors is primarily used for energy conversion. The market size of energy semiconductors is expected to continue to steadily expand. One of the factors contributing to the market expansion is the shift to electric vehicles. Energy semiconductors are often used for input and output of electric energy such as batteries and motor drives. In addition, large amounts of energy semiconductors will be needed for data centers, solar energy generation, wind energy generation, stationary storage batteries, etc., where investment is increasing. Anticipating this demand, energy semiconductor manufacturers are increasing capital investment and hastening development. ●About SiC semiconductors Energy semiconductors handle large voltages and currents, so "loss'', where electricity is turned into heat internally, becomes a problem. SiC semiconductors are expected to be a technology that eliminates this loss. SiC semiconductor refers to a 1:1 compound of Si (silicon) and carbon, and is made by solidifying silicon and black smoke in an electric furnace and carbonizing it. SiC, a next-generation energy semiconductor material, has lower energy loss than traditional silicon (Si) materials. For example, research results have shown that energy semiconductors using SiC materials have succeeded in reducing energy loss (on-resistance) by approximately 70 per cent compared to types using conventional silicon materials at the prototype stage.
Subsidy rate	Subsidy for 1/3 of the procurement plan for components and materials for SiC energy semiconductors.
Related URL	https://www.meti.go.jp/policy/economy/economic_security/semicon/index.html

Use of proceeds 19: Support project to strengthen the manufacturing supply chain of storage batteries, which are essential for a green society, as part of the support for strengthening the supply chain of important materials in response to changes in the economic environment

ICMA GBP classification	"Energy efficiency", "Renewable energy", "Clean transportation"
GB guidelines	"Projects for energy efficiency", "Projects for renewable energy", "Projects for clean transportation"
Sector	CBI sector criteria: 1. Low Carbon Transport (Rev2.2) 2. Electrical Grids and Storage (March 2022)
Purpose of subsidy	Storage batteries will be used to maintain the foundations of the future electrified and digitalized society by electrifying mobility such as cars, adjusting supply and demand of electricity with the aim of making renewable energy the main energy source, and as a backup energy source for 5G communication base stations, etc. essential to. Based on this background, this project aims to strengthen the domestic storage battery manufacturing supply chain, including small and medium-sized enterprises, by providing support for capital investment and technological development of storage batteries, parts and materials, etc. do.
Business details eligible for subsidies	In order to strengthen the storage battery manufacturing supply chain and ensure stable supply, it will take the following initiatives. (1) Support for capital investment in storage batteries, parts and materials, etc. Businesses that develop large-scale manufacturing bases, manufacturing bases for parts and materials whose production is currently limited in Japan, manufacturing bases using unique technologies, etc., in order to strengthen the domestic manufacturing base for storage batteries, parts and materials, etc. Subsidization will be provided for this purpose. (2) Support for technological development of storage batteries, parts and materials, etc.

	Development of technologies to establish the superiority and indispensability of storage batteries, component materials, etc., technologies to decarbonize manufacturing processes, and digital technologies to manage data in manufacturing processes and improve productivity. Subsidies will be provided to businesses that carry out such activities.
Subsidy rate	Manufacturing equipment investment for automotive storage batteries and stationary storage batteries, R&D support equipment investment = 1/3, R&D = 1/2
Related URL	https://www.meti.go.jp/policy/economy/economic_security/battery/

Use of proceeds 20: Project to promote the introduction of advanced equipment to improve the insulation performance of houses

ICMA GBP classification	"Energy efficiency"
GB guidelines	“Projects for energy efficiency”
Sector	CBI sector criteria: Buildings (White list for Low Carbon Building Technology Rev1.0)
Purpose of subsidy	The Plan for Global Warming Countermeasures sets a goal for the residential sector to reduce GHG emissions by 66 per cent by FY 2030, but approximately 90 per cent of existing homes do not meet current energy-saving standards, and energy-saving measures for homes are urgently needed. In particular, insulation renovations that reduce the transfer of heat inside and outside the home directly lead to improved operational efficiency of heating and cooling systems, which account for the majority of CO_2 emissions in the residential sector, and contribute significantly to reducing energy consumption. By improving the insulation performance of windows in existing homes, which have a large amount of heat loss (70 per cent of the heat loss in the entire home comes from windows), the burden on heating and cooling costs will be reduced, reducing the burden on the home. It aims to reduce the total CO_2 emissions of existing homes by approximately 70 per cent (compared to 2013) and ensure energy-saving performance at the 2050 stock average ZEH standard*1 level.
Business details eligible for subsidies	Subsidy criteria Renovation of insulation windows in existing houses to meet ZEH*1 exterior skin standards ・Subsidy amount: Fixed amount depending on the construction details ・Target: Window (glass/sash) insulation repair work (Those that exceed the Building Materials Top Runner System 2030 target standard value *2 and meet certain standards such as heat transmission coefficient (Uw value) of 1.9 or less) *1 Definition of ZEH ZEH is a system that "significantly improves the insulation performance of the outer skin, maintains the quality of the indoor environment by introducing highly efficient equipment systems, achieves significant energy savings, and then introduces renewable energy, etc." This refers to a house that meets the following four conditions and aims to achieve zero annual primary energy consumption. 1）After clearing the ZEH reinforced outer skin standards (*2016 energy saving standards for regions 1 to 8 (pay attention to ensuring ηAC value, airtightness, dew-proofing performance, etc.)), UA value [W/m2K] 1.2 regions: 0.40 3rd area: 0.50 equivalent or less, 4th to 7th area: 0.60 equivalent or less) 2）Reduce primary energy consumption excluding renewable energy, etc. by 20 per cent or more from the standard primary energy consumption. 3）Introduction of renewable energy (regardless of capacity) 4）Reduce primary energy consumption by 100 per cent or more from standard primary energy consumption by adding renewable energy, etc. *ZEH reinforced outer skin standard

	Area 1 (Asahikawa City)	Area 2 (Sapporo City)	Area 3 (Morioka City)	Area 4 (Sendai City)	Area 5 (Niigata City)	Area 6 (Tokyo)	Area 7 (Miyazaki City)
Average heat transfer coefficient of the outer skin	0.4	0,4	0.5	0.6	0.6	0.6	0.6
Window heat transfer limits	1.9	1.9	1.9	2.33	2.33	2.33	2.33

*2 Standards for insulation repair

	glass	inner window	outside window (cover method)	outside window (Chisel method)
Detached houses/low-rise apartments	Uw1.9 or less	Uw1.9 or less	Uw1.9 or less	Uw1.9 or less
Mid-to-high rise apartment	Uw1.9 or less	Uw1.9 or less	Uw2.3 or less	Uw1.9 or less

Subsidy rate	Subsidy equivalent to 1/2 (up to 2 million yen) for individuals
Related URL	https://www.meti.go.jp/policy/mono_info_service/mono/jyutaku/dannetsujigyou.html

Use of proceeds 21: Energy saving investment promotion/demand structure transformation support project subsidy

ICMA GBP classification	"Energy efficiency"
GB guidelines	“Projects for energy efficiency”
Sector	No CBI criteria available
Purpose of subsidy	The 6th Strategic Energy Plan set a goal of reducing energy consumption by approximately 62 million kl by 2030 through energy conservation. Recognizing that it is necessary to further dig deeper into energy conservation in these two sectors, the ``Technology Evaluation Committee for Advanced Energy Conservation Technologies, etc.'' established by the Agency for Natural Resources and Energy in FY2020 concluded that high energy conservation potential is expected. The government announced a policy to discover advanced technologies in the market and provide intensive support through subsidies and other means. This project will support the upgrading of equipment and equipment with high energy-saving performance in factories and workplaces, cooperation among multiple businesses, and the introduction of equipment and equipment related to more advanced energy-saving technology. The aim is to contribute to achieving the "Outlook of Supply and Demand". Provide support in response to companies' multi-year investment plans and cultivate demand for energy-saving investments, especially among small and medium-sized enterprises. Furthermore, by promoting the upgrading of facilities and equipment with high energy-saving performance in factories, etc., it will both reduce greenhouse gas emissions and strengthen Japan's industrial competitiveness. As a goal, it plans to promote the implementation of measures centered on energy-saving equipment investment among the energy-saving measures (approximately 27 million kl) in the industrial and business sectors based on the

	energy supply and demand outlook for FY2030, and will include the effects of this budget project. , aiming to achieve energy savings of 21.55 million kl.	
Subsidy target classification	(A) Supporting the introduction of advanced equipment that can achieve significant energy savings at advanced business factories and workplaces	(B) Support for updating energy-saving equipment and process renovations, including the introduction of custom-made equipment that requires individual design.
Business details eligible for subsidies	For each application, equipment costs, design costs, and construction costs for projects that meet any of the following requirements on a crude oil equivalent basis (1) Energy saving rate + non-fossil ratio increase rate: 30per cent or more (2) Energy saving amount + non-fossil use Amount: 1,000kl or more (3) Energy consumption unit improvement rate: 15per cent or more	For each application, equipment costs, design costs, and construction costs for projects that meet any of the following requirements on a crude oil equivalent basis (1) Energy saving rate + non-fossil ratio increase rate: 10per cent or more (2) Energy saving amount + non-fossil use Amount: 700kl or more (3) Energy consumption unit improvement rate: 7per cent or more
Subsidy rate	SMEs, etc.: within 2/3 Large companies and others: within 1/2 [Subsidy limit per FY year] Upper limit (energy saving) 1.5 billion yen (non-fossil) 2 billion yen Lower limit 1 million yen	SMEs, etc.: within 1/2 Large companies and others: within 1/3 [Subsidy limit per year] Upper limit (energy saving) 1.5 billion yen (non-fossil) 2 billion yen Lower limit 1 million yen
Related URL	https://sii.or.jp/senshin04r/overview4.html	

Use of proceeds 22: Subsidy to promote the introduction of clean energy vehicles (BEV, PHEV, FCV)

ICMA GBP classification	"Clean transportation"
GB guidelines	“Projects for clean transportation”
Sector	CBI sector criteria: Low Carbon Transport (Rev.2.2)
Purpose of subsidy	The transportation sector accounts for about 20per cent of Japan's carbon dioxide emissions. The automobile sector accounts for approximately 90per cent of the transportation sector, and in order to achieve carbon neutrality in 2050, it is important to popularize clean energy vehicles with excellent environmental performance. It is also important to capture overseas markets by strengthening the competitiveness of the automobile industry while leveraging the spread of electric vehicles in the domestic market. The aim is to strengthen industrial competitiveness and reduce carbon dioxide emissions by supporting the cost of introducing electric vehicles, etc.
Business details eligible for subsidies	Based on the purpose of GX support, and from the perspective of integrating regulations and systems with support, in addition to having an external energy supply function as a requirement for adding on the upper limit of the subsidy amount, EV/PHEV passenger cars must be top runners under the Energy Saving Act. Added that the vehicle is subject to the system's 2030 fuel economy standards (type-designated vehicle). – From the perspective of promoting price reduction, for high-priced vehicles (8.4 million yen or more excluding tax), the calculated subsidy amount is multiplied by a price coefficient of 0.8. For PHEVs that directly emit CO_2, CBI has set a tank-to-wheel (fuel tank to tire drive) threshold of 50g-CO_2/km/vehicle/person. JCR has confirmed that none of the vehicles eligible for this subsidy program under this Bonds exceeds the threshold of GHG emission.

Subsidy rate	Individuals, corporations, local governments, etc. who purchase eligible vehicles will receive subsidies for each of the following items. EV Upper limit: 650,000 yen /Upper limit(Conventional): 850,000 yen Light EV Upper limit: 450,000 yen /Upper limit(Conventional): 550,000 yen PHEV Upper limit: 450,000 yen /Upper limit(Conventional): 550,000 yen FCV Upper limit: 2.3 million yen /Upper limit(Conventional): 2.55 million yen
Related URL	https://www.meti.go.jp/policy/mono_info_service/mono/automobile/cev/r4hosei_cev.html

Use of proceeds 23: Commercial vehicle electrification promotion project

ICMA GBP classification	"Clean transportation"
GB guidelines	“Projects for clean transportation”
Sector	CBI sector criteria: Low Carbon Transport (Rev.2.2)
Purpose of subsidy	The transportation sector accounts for approximately 20per cent of Japan's total CO_2 emissions, of which emissions from commercial vehicles such as trucks account for approximately 40per cent.), the electrification of commercial vehicles (BEV, PHEV, FCV, etc.) is essential. For this reason, this project will provide subsidies for the electrification of commercial vehicles (trucks, taxis, and buses) and support the acceleration of its introduction in the early stages of widespread use, thereby strengthening industrial competitiveness through lower prices, promoting economic growth, and reducing greenhouse gas emissions. Together it can reduce emissions. This project aims to increase domestic investment over the next 10 years by providing subsidies for the introduction of vehicles and charging equipment for the electrification (BEV, PHEV, FCV, etc.) of commercial vehicles (trucks, taxis, buses). 2030 target for commercial vehicles: less than 8 tons: electric vehicles will account for 20-30per cent of new car sales; over 8 tons: advance introduction of a cumulative 5,000 electric vehicles; support will be provided for the introduction of passenger cars, etc. At the same time, it will promote decarbonization of the transportation sector as a whole. In addition, it will improve price competitiveness by reducing vehicle prices and accelerating innovation.
Contents of the subsidy project	Introduction of vehicles and charging equipment for electrification (BEV, PHEV, FCV, etc.*) of commercial vehicles (trucks, taxis, buses) for the following businesses that have plans to introduce non-fossil energy vehicles. Provide assistance to ① Truck transportation business operators ② Persons who use private commercial vehicles (trucks, etc.) for business (limited to vehicles with a gross vehicle weight of over 2.5 tons) ③ Persons whose business is to rent out commercial vehicles (trucks, etc.) (① , ②) ④ Local governments ⑤ Others with the approval of the Minister of the Environment and as deemed appropriate by the executive body. For PHEVs that directly emit CO_2, CBI has set a tank-to-wheel (fuel tank to tire drive) threshold of 50g-CO_2/km/vehicle/person. JCR has confirmed that none of the vehicles eligible for subsidy for which the proceeds of this Bonds exceeds the threshold of the emission.
Subsidy rate	[Trucks] EV trucks/vans FCV trucks Subsidy rate: 2/3 of the difference from standard fuel efficiency vehicles, etc. [Taxi] EV taxi/FCV taxi/PHEV taxi Subsidy rate: 1/4 of the vehicle price, etc. [Bus] EV bus/FCV bus Subsidy rate: 2/3 of the difference from standard fuel efficiency vehicle, etc. [Charging equipment] Subsidy rate: 1/2 etc. *As a general rule, limited to those that are installed integrally with the vehicles mentioned above.
Related URL	(Truck) https://www.levo.or.jp/fukyu/evhojo/2023/ev_index.html (Taxi) https://ataj.or.jp/efv-f_taxi_r5/

Use of proceeds 24: Grant for promoting regional decarbonization (independent line micro grid project grant)

ICMA GBP classification	"Renewable energy"
GB guidelines	"Projects for renewable energy"
Sector	CBI sector criteria: Electrical Grids and Storage (March 2022)
Purpose of subsidy	“Regional Decarbonization Roadmap” (decided on the 3rd National/Local Decarbonization Realization Conference on June 9, 2021), Plan for Global Warming Countermeasures (Cabinet decision on October 22, 2021), and Basic Policy for the Realization of GX (determined by the GX Implementation Council on December 22, 2021), etc., it will provide local governments, etc. that are actively working on decarbonization in collaboration with the private sector as an investment in the decarbonization transition of the region. This grant will be provided to provide continuous and comprehensive support over multiple years. As a result, in conjunction with the Act on Promotion of Global Warming Countermeasures, proactive efforts will be carried out in at least 100 "decarbonization leading regions" according to regional characteristics, etc. toward decarbonization, and It will implement key measures that will serve as a foundation nationwide, and promote decarbonization efforts in local areas under national and local cooperation.
Contents of the subsidy project	Local governments in which private line micro grids have been constructed to benefit private operators in decarbonization-leading regions are eligible for subsidies. In Japan, a private line micro grid is a project that aims to build a micro grid with a view to entering the energy distribution business. Targeting businesses looking to enter the electricity distribution business, etc., who meet conditions such as planning to construct a micro grid that can operate even during long-term energy outages due to disasters etc.
Subsidy rate	2/3
Related URL	https://wwitnv.go.jp/content/000098973.pdf

2. Negative Impacts on the Environment

Among the uses of funds covered by this Bonds, for research and development funds, it will check for potential negative impacts on the environment and society during the project selection and evaluation process at the time of review when contributing to each R&D expense. It will also confirm mitigation measures as necessary. In addition, when implementing subsidy programs, individual business operators identify negative impacts on the environment and society based on laws and regulations such as environmental impact assessment, and ensure that necessary mitigation measures are taken. It is guaranteed.

As stated in Chapter 2 of this report, avoidance of lock-in to fossil fuels, consideration for a fair transition, and consideration of DNSH will be appropriately considered, and additional measures and mitigation measures will be considered as necessary.

In consideration of the impact on the environment and society, the Climate Transition Bond Framework has established the following exclusion criteria. JCR has confirmed that the use of proceeds from this Bonds does not fall under these exclusion criteria.

- Businesses aimed at manufacturing, selling, or distributing weapons of mass destruction such as nuclear weapons, chemical weapons, or biological weapons, or inhumane weapons such as anti-personnel landmines; Businesses that manufacture products and provide services that support the manufacture or sale of non-human weapons
- Businesses related to coal mining, refining, and transportation
- Business related to owning or operating gambling facilities/businesses
- Businesses related to forced labor that do not comply with the laws and regulations of the country where the business is located and involve inappropriate relationships such as bribery, corruption, extortion, embezzlement, etc.
- Businesses related to transactions that may cause social issues such as human rights and the environment

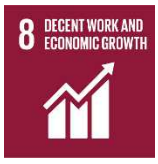
Based on the above, JCR evaluates that the negative impact on the environment and society has been taken into account and appropriate measures have been taken regarding the use of the proceeds of this Bonds.

3. Consistency with SDGs

JCR evaluated the use of proceeds contributes to the following SDGs' goals and targets in reference to ICMA's SDGs mapping.

Goal 7: Affordable and clean energy

Target 7.2: By 2030, increase substantially the share of renewable energy in the global energy mix
Target 7.3: By 2030, double the global rate of improvement in energy efficiency



Goal 8: Decent work and economic growth

Target 8.2: Achieve higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors

Target 8.4: Improve progressively, through 2030, global resource efficiency in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-Year Framework of Programmes on Sustainable Consumption and Production, with developed countries taking the lead

Goal 9: Industry, innovation and infrastructure

Target 9.1: Develop quality, reliable, sustainable and resilient infrastructure, including regional and transborder infrastructure, to support economic development and human well-being, with a focus on affordable and equitable access for all

Target 9.2: Promote inclusive and sustainable industrialization and, by 2030, significantly raise industry's share of employment and gross domestic product, in line with national circumstances, and double its share in least developed countries

Target 9.4: By 2030, upgrade infrastructure and retrofit industries to make them sustainable, with increased resource-use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes, with all countries taking action in accordance with their respective capabilities

Target 9.5: Enhance scientific research, upgrade the technological capabilities of industrial sectors in all countries, in particular developing countries, including, by 2030, encouraging innovation and substantially increasing the number of research and development workers per 1 million people and public and private research and development spending

Goal 11: Sustainable cities and communities

Target 11.6: By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management

Goal 12: Responsible consumption and production

Target 12.5: By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse

Goal 13: Climate action

Target 13.1: Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

Goal 15: Life on land

Target 15.2: By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally

Goal 17: Partnerships for the goals

Target 17.17: Encourage and promote effective public, public-private and civil society partnerships, building on the experience and resourcing strategies of partnerships

Evaluation Phase 2: Management, Operation and Transparency Evaluation

m1

I. Selection Criteria and Processes of the Use of Proceeds

JCR's Key Consideration in This Factor

In this section, JCR will confirm the objectives to be achieved through this evaluation target, the adequacy of the green project selection criteria and processes, and whether a series of processes will be appropriately disclosed to investors.

▶▶▶ Current Status of Evaluation Targets and JCR Evaluation

An organization was established with cross-ministerial expertise for the goals, green project selection criteria and processes in this Bonds and the GX Implementation Council, chaired by the Prime Minister under the leadership of the Cabinet Office is appropriately involved, and all disclosures were made about these conference bodies and their operations; therefore, JCR has evaluated that the transparency is also ensured.

1. Goal

Basic Policy for the Realization of GX[39]

The main plans and laws and regulations to achieve carbon neutral in 2050 and a 46 per cent reduction in GHG emissions in 2030 (from FY 2013) are as follows:

- Plan for Global Warming Countermeasures
- The 6th Strategic Energy Plan
- Basic Policy for the Realization of GX (GX Implementation Council)
- Act for Promoting a Smooth Transition to a Decarbonized Growth-Oriented Industrial Structure (GX Promotion Act)
- Act for Partial Revision of the Electricity Business Act and Other Acts for Establishing Electricity Supply Systems for Realizing a Decarbonized Society (GX Decarbonization Electricity Act)
- Strategy for Promoting Transition to a Decarbonized, Growth-Oriented Economic Structure (GX Promotion Strategy, included sector-specific investment strategies (roadmaps))

It is important for the Government of Japan to reduce CO_2 emissions from energy sources, which account for roughly 90 per cent of GHG reductions. The Government of Japan discussed its specific reduction efforts in the GX Implementation Council, and the GX Promotion Act was enacted. The issuance of Japan Climate Transition Bonds, including this Bonds, is a measure stipulated in Article 7 of the GX Promotion Act, and is clearly positioned as part of the Government of Japan's policy toward the realization of decarbonized society.

[39]Created by JCR from the basic policy for the realization of GX

2. Selection Criteria

In the framework evaluation published in the evaluation report on November 7, 2023, JCR confirmed that the selection criteria set by the Government of Japan in the Japan Climate Transition Bond Framework are consistent with the content stipulated in the GX Promotion Strategy. The project is evaluated as being appropriate and has an environmental improvement effect.

The use of proceeds set out in this Bonds was included in the sector-specific investment strategies (roadmaps) however, the individual eligibility criteria (environmental benefits) will be examined in the working group with experts invited hereafter. JCR has evaluated that the project selection criteria are appropriate.

3. Process

In selecting projects for which the proceeds of this Bonds, the alignment is to be confirmed in the liaison meeting with relevant ministries and agencies; therefore, JCR has evaluated that the process is appropriate.

The Government of Japan's goals, selection criteria and processes for this Bonds are disclosed in the Japan Climate Transition Framework and this evaluation report. The Government of Japan plans to disclose the target projects on its website when issuing this Bonds based on the Japan Climate Transition Framework. Therefore, JCR has evaluated that transparency to investors is ensured.

II. Management of proceeds

JCR's Key Consideration in This Factor

It is usually assumed that the method of managing the proceeds financed widely varies depending upon the finance raisers. JCR will confirm that the proceeds financed based on this evaluation target are surely allocated to green projects, and that mechanisms and internal systems are in place so that the allocation can be easily tracked and managed.

JCR will emphasize whether the proceeds financed by this evaluation target are scheduled to be early used for green projects and it will also give importance to the evaluation of the management/operation methods of unallocated proceeds.

▶▶▶ Current Status of Evaluation Targets and JCR's Evaluation

JCR has evaluated that the Government of Japan's proceeds management system has been properly established and is highly transparent since the method of managing the proceeds financed will be disclosed in this evaluation report and the framework has been already disclosed on its website.

The proceeds financed by this Bonds are managed separately from other accounts in the energy supply and demand account of the special account for energy measures. Of the use of proceeds, the GI Fund will be transferred from the special account for energy measures to NEDO, which is the implementing entity. At this point, the appropriation of funds for the GI Fund will be completed. After that, the GI Fund will be allocated to the projects listed as candidate projects in sequence, depending on the adoption status of the R & D projects. In the case of other R & D projects and the allocation of funds to the fund, the allocation method is the same as that of the GI Fund. The subsidy program will be implemented from the special account for energy measures each time the project is finalized. All management of the fund allocation status is carried out in the accounting system dedicated to GX economy transition bonds, and the execution status is carried out in the Cabinet GX Office established in the Cabinet Office.

The plan for proceeds allocation is, in principle, subject to projects whose operations will begin in and after the fiscal period concerned or proceeds was already allocated and all proceeds will be allocated in the fiscal period in question and in cases where unallocated proceeds are generated, they shall be managed in cash. Accordingly, JCR has evaluated the plan as adequate.

The management of proceeds financed will be inspected by the Audit Office, an independent body, in the same way as the normal budget process. The decision on the use of proceeds and the allocation will be confirmed in the liaison meeting with relevant ministries and agencies. The ledger on the management of proceeds financed will be retained until the repayment of the target Bonds and the retention period based on laws and regulations.

Consequently, JCR has evaluated that the Government of Japan's proceeds management system has been properly established, and that the management method of the proceeds financed will be disclosed in this evaluation report; therefore, it is highly transparent.

III. Reporting

JCR's Key Consideration in This Factor

JCR will evaluate whether the disclosure system to investors before and after financing based on this evaluation target is planned in a detailed and effective manner in this section.

▶▶▶ Current Status of Evaluation Targets and JCR Evaluation

JCR has evaluated that the Government of Japan's reporting will be appropriately disclosed for both the allocation of proceeds and the environmental benefits to investors.

Reporting on the allocation of proceeds

The Government of Japan will annually disclose the contents set out in Japan Climate Transition Framework regarding the allocation of proceeds financed by Climate Transition Bonds on its website. In cases where any significant change is made in the financial situation after the full amount of the proceeds financed were allocated, the disclosure shall be made in a timely manner.

Reporting on environmental benefits

The Government of Japan plans to annually disclose the contents set forth in Japan Climate Transition Framework on its website as reporting on the environmental benefits of eligible projects. These disclosure items will quantity the progress and the expected CO_2 reduction effects for R & D and the environmental benefits, such as the expected CO_2 reduction effects by implementing the subsidy program for the program in refining sectorial investment strategy and the disclosure will be made within the realm of possibility. The progress and environmental benefits for impact reporting will be updated at least until the end of the individual projects, and the information will be disclosed on the website for the repayment period.

Accordingly, JCR has evaluated that the reporting system by the Government of Japan is adequate.

IV. Efforts to Address Organizational Environmental Issues

JCR's Key Consideration in This Factor

JCR will evaluate whether the top finance raiser positions environmental issues as important issues with high management priority, or whether policies/processes/criteria for selecting eligible projects are clearly positioned by establishing divisions that specialize in environmental sectors or collaborating with external organizations in this section.

▶▶▶ Current Status of Evaluation Targets and JCR Evaluation

JCR has confirmed that the Government of Japan has positioned the realization of decarbonized society as one of Japan's important issues and has stipulated laws and regulations for the decarbonization of GX and energy sources, and is working on it as an important priority issue for the government. JCR has evaluated in practical that a liaison meeting with relevant ministries and agencies has been established under the initiative of the GX Implementation Council, headed by the Prime Minister, and the government as a whole is working on it, and the GX Implementation Council and the working group responsible for the concrete examination of sector-specific investment strategies has invited experts from academic, financial and industrial sectors to build a system for repeated multifaceted examinations.

Please refer to Chapter 2 2.1 and 2.2 in this evaluation report for details on the current status of this evaluation target.

Evaluation Phase 3: Evaluation Result (Conclusion)

Green 1(T)

JCR assigned "gt1" to the preliminary appraisal of "Greenness/Transition Evaluation (Use of Proceeds,)" "m1" to the preliminary appraisal of "Management, Operation and Transparency Evaluation" based on JCR Green Finance Evaluation Methodology. As a result, JCR assigned "Green 1(T)" to the "JCR Preliminary Climate Transition Bond Evaluation" for this Bonds. This Bonds meet the criteria for the items required in the Green Bond Principles, the Green Bond Guidelines, the Climate Transition Finance Handbook, and the Basic Guidelines on Climate Transition Finance.

		Management/operation/transparency evaluation				
		m1	m2	m3	m4	m5
Greenness/ Transition Evaluation	gt1	**Green 1(T)**	Green 2(T)	Green 3(T)	Green 4(T)	Green 5(T)
	gt2	Green 2(T)	Green 2(T)	Green 3(T)	Green 4(T)	Green 5(T)
	gt3	Green 3(T)	Green 3(T)	Green 4(T)	Green 5(T)	N/A
	gt4	Green 4(T)	Green 4(T)	Green 5(T)	N/A	N/A
	gt5	Green 5(T)	Green 5(T)	N/A	N/A	N/A

Responsible Analyst: Atsuko Kajiwara, Kosuke Kajiwara, Tomohiko Inamura, Takuto Toda, Haruna Goto

Important Explanation on this Evaluation

1. Assumptions, Significance, and Limitations of JCR Climate Transition Finance Evaluation

   JCR Climate Transition Finance Evaluation provided by Japan Credit Rating Agency (hereinafter referred to as "JCR") covers the policies set out in the JCR Climate Transition Finance Evaluation as an evaluation target and states JCR's comprehensive opinion on the extent to which allocation is made to the Green/Transition Project defined by JCR and on the degree to which the efforts to ensure the management, operation and transparency on the use of proceeds at present. It is therefore not intended to evaluate the specific environmental benefits and the management/operation system/transparency on the use of proceeds, such as individual bonds or borrowings implemented based on the policies. JCR, in principle, does not directly measure the environmental benefits of proceeds financed through the green/transition finance although JCR confirms that the environmental benefits are quantitatively and qualitatively measured by an issuer or borrower (hereinafter the issuer and borrower are collectively referred to as a "finance raiser") or the third parties requested by the finance raiser.

2. Methodology Used in this Evaluation

   The methodology used to make this evaluation is posted as JCR Green Finance Evaluation Methodology in the Sustainable Finance/ESG section on the JCR's website at https://www.jcr.co.jp/

3. Relation with Conduct for Credit Rating Business

   The conduct of assigning and providing JCR Green Finance evaluation is performed by JCR as its related business and is different from the conduct for the credit rating business.

4. Relation with Credit Rating

   This evaluation is different from a credit rating and does not commit to providing a predetermined credit rating or make available for inspection.

5. Impartiality when Evaluating JCR Green Finance

   There are no capital or personnel relationships that could create a conflict of interest between this evaluation target and JCR.

Points to Consider

The information contained in this document was obtained by JCR from finance raisers and accurate and reliable sources. Such information however may be mistaken for artificial, mechanical or other reasons. Therefore, JCR makes neither representation nor warranty, express or implied, as to the accuracy, result, eligibility, timeliness, completeness, merchantability, or fitness for any particular purpose of such information, and JCR assumes no responsibility for any errors, omissions or consequences of using such information. JCR shall not be liable for any loss of opportunity and extraordinary, indirect, incidental or consequential damage of any kind, including any loss of money, which result from any use of such information under any circumstances, whether contractual liability, tort liability, negligence or other causes of liability, and whether such damage is foreseeable or unforeseeable. JCR Green Finance Evaluation does not express any opinion on various risks (credit risk, price fluctuation risk or market liquidity risk) on the green finance that is the subject of evaluation. JCR Green Finance Evaluation is a comprehensive opinion of JCR at present and does neither represent facts nor make any recommendation regarding risk assessments or decisions on the purchase, sale or holding of individual bonds or commercial paper. JCR Green Finance Evaluation may be modified, suspended or withdrawn due to changes in information or lack of information. All rights pertaining to this document, including data from the JCR Green Finance Evaluation is prohibited from being reproduced, modified or otherwise altered without the permission of JCR.

Terminology

JCR Climate Transition Finance Evaluation: The assessment of the extent to which proceeds financed by the Climate Transition Finance are allocated to green/transition finance defined by JCR and the degree of management, operation and transparency related to the use of proceeds for the green/transition finance. The evaluation is made on a scale of five in the order from top to bottom with evaluation symbols, Green 1 (T), Green 2 (T), Green 3 (T), Green 4 (T), Green 5 (T)

Status of Registration as External Evaluator of Sustainability Finance

- Ministry of the Environment: Registered as External Reviewer of Green Finance
- ICMA (observer registration as an external evaluator with the International Capital Market Association)
- UNEP FI Positive Impact Financial Principles Working Group Member
- Climate Bonds Initiative Approved Verifier

Other Registration Status as Credit Rating Agency

- Credit Rating Agency: the Commissioner of the Financial Services Agency (Credit Rating) No. 1
- EU Certified Credit Rating Agency
- NRSRO: JCR registered with the following four of the five credit rating classes of the Nationally Recognized Statistical Rating Organization ("NRSRO") as defined by the U.S. Securities and Exchange Commission: (1) financial institutions, broker/dealers, (2) insurance companies, (3) general business corporations and (4) national/local governments. In cases where disclosure is required based on Rule 17g-7(a) of the Securities Exchange Act, such disclosure is attached to News Release on the JCR webpage at https://www.jcr.co.jp/en/.

For inquiries, please contact us below

TEL: 03-3544-7013 FAX: 03-3544-7026
Information Service Department

Japan Credit Rating Agency, Ltd.
Jiji Press Building, 5-15-8 Ginza, Chuo-ku, Tokyo 104-0061, Japan
Tel. +81 3 3544 7013, Fax. +81 3 3544 7026