Pathways to Japan’s Green Transformation (GX)

2050 CARBON NEUTRAL

Ministry of Economy, Trade and Industry, JAPAN
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Overview of Transition Finance
What is transition finance?


- Brown Economy
  - (example)
    - Internal combustion engine
    - Coal-fired power etc

- Transition Stages
  - (1) Transition Technology
    - (example)
      - Internal combustion engine
      - Coal-fired power etc
  - (2) Discontinuous Innovation Technologies
    - (example)
      - 100% Electric Vehicles
      - Renewable energy, nuclear energy etc

- Decarbonized Society

- All industries do not jump in the leap

Time line
- Present
- 2030
- 2050
In the World Energy Outlook, 2021 IEA reported that the combination of i) retiring from dirty early ii) make dirty cleaner iii) build low emissions iv) behavioral change and avoided demand is essential for filling the gap of STEPS and Net Zero Emission trajectory.

It is stated that the middle ground of actions that “make dirty cleaner” is crucial in determining the speed and scope of energy transitions, and delivers the largest share of emissions reductions.
Importance of “Transition” in the Whole-of-Economy Decarbonization

- Realizing GX requires electrification and shifting away from fossil fuels. Material manufacturing industries (accounting for 30% of CO2 emissions in Japan) have a high ratio of heat demand, indicating the need for decarbonizing heat processes.
- For that vast and long-term investments for new technologies are needed, and should be prioritized. Transition finance supporting these efforts must be promoted along with green finance.

**Need for Innovative Technologies**

**<Global CO2 Emissions by Sector>**

Electrification cannot address:
1. high heat demand
2. steel reduction
3. fossil-originated materials (e.g. naphtha)

**<IEA's Net Zero Scenario2023>**

- Clean energy innovation has been accelerating in the last few years, yet more RD&D is needed to the next generation of low-emissions technologies.

**Percentage of Heat Usage in Energy Usage (Japan, Manufacturing)**

- Roughly 30% of entire CO2 emissions
- Based on ANRE Energy Statistics
To realize carbon neutrality, efforts as listed below (①～④) are needed in the power and industry sectors.

① Increasing energy efficiency
② Decarbonization of electricity
③ Decarbonization of heat (fuel)
   Hydrogen, Ammonia, SAF, Synthetic Fuels, etc. are still under development
④ Decarbonization of manufacturing processes and materials
   Hydrogen reduction ironmaking, naphtha alternatives are still under development.

Electrifying heat processes are candidates for technology development.

- Commercialized Technology Available
- Technology still being developed toward commercialization
Japan’s 4 step policy tools on Climate Transition Finance

<table>
<thead>
<tr>
<th>G7 Leaders Summit (May 2023, Hiroshima)</th>
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<tbody>
<tr>
<td><strong>Transition finance</strong>, in line with keeping a limit of 1.5°C temperature rise within reach, avoiding carbon lock-ins and based on effective emissions reduction, <strong>has a significant role in advancing the decarbonization of the economy as a whole.</strong></td>
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- Although green projects have attracted investment, transition to net zero requires more.
- To encourage private finance flow for transition, Japanese government take 4-step-policy.
- Companies are expected to show their credible transition strategy. They can account for their plan by referring to the technologies and pathway of the roadmap.

<table>
<thead>
<tr>
<th>1. Basic Guidelines</th>
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<tbody>
<tr>
<td>✓ FSA, MOE and METI formulated the Guidelines to establish transition finance in line with the ICMA transition handbook.</td>
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<thead>
<tr>
<th>2. Sector Roadmaps</th>
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<tr>
<td>✓ Roadmaps with technologies for transition is formulated for 8 sectors: <strong>iron &amp; steel, chemical, electricity, gas, oil, cement and paper &amp; pulp, and automobiles.</strong></td>
</tr>
<tr>
<td>✓ The roadmaps can be referred by companies to formulate their strategies and pathways, and by financial entities to evaluate those of clients</td>
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<tr>
<th>3. Model Projects</th>
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<tr>
<td>✓ 21 model projects from shipping, steel, aviation, chemical, energy and heavy industry sectors.</td>
</tr>
<tr>
<td>✓ <strong>The market of transition finance has reached 1.6 trillion yen cumulatively.</strong></td>
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<tr>
<th>4. Follow-up Guidance</th>
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<tbody>
<tr>
<td>✓ <strong>Guidance for financiers (especially bond issuers)</strong> in following up after the issuance of transition finance was released in June 2023</td>
</tr>
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</table>
The cumulative amount of transition-labeled bonds and loans in Japan has grown and surpassed 1.6 trillion JPY (≒ over USD10 Billion).

Initiatives for the Realization of GX

Green Transformation (GX) delivers both emission reduction and economic growth. Successful GX initiatives enhance competitiveness of companies and nations.

**Basic Policy for the Realization of GX, 2023**
- Create new demand and markets in the fields of stable energy supply and decarbonization, leading to the improved competitiveness of its industries and economic growth.
- ¥150 trillion+ of public/private investments over next decade
- Pro Growth Carbon Pricing Concept.

**Green Growth Strategy, 2020**
- Focuses on 14 priority fields with green growth potential
- Achieving carbon neutrality through innovation

**Strategic Energy Plan, 2021**
- Presents Japan’s Energy mix by 2030
- Supply-side focused energy policy
- The target is less than 10 years away, and the need to utilize existing technologies is presented.

46% emissions reduction
Pro-Growth Carbon Pricing Concept

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

1. Japan Climate Transition Bonds (New Type of JGB)

- 20 Trillion Yen (≒USD133 bil.)
  Investment promotion from Japan Climate Transition Bond over 10 years

- 150 Trillion Yen (≒USD1 trillion)
  Public Private investment for decarbonization

2. Carbon Pricing

①Emissions trading system in high emission industries operating from FY2026
  + Allowance auctioning to be phased in gradually to power generation companies, from FY2033

②GX-Surcharge on fossil fuel supply from FY2028

Pro-Growth Carbon Pricing Concept

To promote the GX investment as described above, a "Pro-Growth Carbon Pricing Concept" will be embodied and implemented as soon as possible.
### Japan Climate Transition Bond: where the funding is going

#### Examples of Use of Proceeds

<table>
<thead>
<tr>
<th>Transformation of the manufacturing industry</th>
<th>✓ Development and introduction of innovative technologies such as hydrogen reduction ironmaking, transition to a carbon circular production system</th>
</tr>
</thead>
</table>
| GX of the transportation sector             | ✓ Support to the introduction of next-generation vehicles.  
|                                             | ✓ Development of next-generation aircraft and zero-emission vessels |
| Promotion of carbon recycling / CCS         | ✓ Support to R&D on carbon-recycled fuel |
| Promotion of energy saving                  | ✓ Introduction of insulated windows |
| Mainstreaming of renewable energy           | ✓ Support for next-generation solar cells (perovskite) and floating offshore wind |
| Next-generation innovative reactor          | ✓ Next-generation innovative reactors incorporating new safety mechanisms |
| Promotion of introducing hydrogen and ammonia | ✓ Establishment of domestic and international supply chain  
|                                             | ✓ R&D and support for hydrogen production from surplus renewable energy |
| Development of the electricity and gas markets | ✓ Promotion of zero-emission thermal power generation  
|                                             | ✓ Establishment of submarine DC power transmission |

Supervision by an expert ‘**GX Implementation Council**’ chaired by Prime Minister
In order to address global climate change issues and achieve economic growth, it is extremely important to realize GX in Asia. Social stability, including energy security, is also important. On the other hand, Asia faces challenges such as limited renewable energy reserves and a surge in electricity demand in the future.

Therefore, it is important to utilize "transition finance" to support the gradual transition to CN as well as green finances.

Specifically, it is important to (1) disseminate transition-related technologies, (2) support the formulation of rules related to transition finance, and (3) provide transition funds.

### The Importance of Transition in Asia

- **Asia's emissions are higher than the rest of the world's** which occupies more than half by 2050. The size of the economy is about 3 times*
- **Compared to Europe and Africa, the amount of renewable energy available is small**
- **Population growth and economic growth will increase electricity demand by approximately tripling by 2050***

### Examples of Initiatives to Promote the Use of "Transition Finance"

- **Technology is widespread**
  - Expanding the results of GX investment in Japan to Asia
    - Compiled a list of technologies to make it easier for financial institutions to provide funding
    - Joint demonstration of transition technology

- **Rule formation**
  - Establishment of rules for the Asian version of transition finance
    - Bringing in global funds for GX
    - It is estimated that the cumulative total will be 40 trillion $ by 2050.

- **Fund provisioning**
  - Expand the provision of funds by the Japanese government and private financial institutions for transition technologies and projects such as ammonia, LNG, and CCUS.
  - Achieving economic growth and decarbonization together with Asia

Source: Created based on IEA's World Energy Outlook 2021, etc. *Outlook for Southeast Asia
Although many ASEAN countries have announced their intention for carbon neutrality, many of them heavily depend on coal- and natural gas-fired power generation.

As the demand for electricity further increases in line with economic growth, it is essential to steadily promote decarbonization in a practical manner. To this end, cooperation through Japanese technology, finance and experiences under AZEC platform are also important.

*The amount of electricity in ASEAN has doubled in the past decade and is expected to triple in the next 3 decades.

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**CN goals set by Southeast Asian countries**

<table>
<thead>
<tr>
<th>Country</th>
<th>CN Target</th>
</tr>
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<tbody>
<tr>
<td>Indonesia</td>
<td>CN by 2060</td>
</tr>
<tr>
<td>Viet Nam</td>
<td>CN by 2050</td>
</tr>
<tr>
<td>Thailand</td>
<td>CN by 2065</td>
</tr>
<tr>
<td></td>
<td>※ If it's only CO2, then by 2050.</td>
</tr>
<tr>
<td>Malaysia</td>
<td>CN by 2050</td>
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<tr>
<td>Philippines</td>
<td>CN by 2050</td>
</tr>
<tr>
<td>Singapore</td>
<td>CN by 2050</td>
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<tr>
<td>Lao PDR</td>
<td>CN by 2050</td>
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<tr>
<td>Cambodia</td>
<td>CN by 2050</td>
</tr>
<tr>
<td>Brunei Darussalam</td>
<td>CN by 2050</td>
</tr>
<tr>
<td>Myanmar</td>
<td>CN by 2050</td>
</tr>
</tbody>
</table>

*Ref. China: Coal 64%, Natural Gas 3%, India: Coal 72%, Natural Gas 4%*
Global Distribution of Solar Power Potential

Global annual average global horizontal irradiation

*Ref: How to refer “Global Atlas”  https://globalatlas.irena.org/help
Global Distribution of Wind Power Potential

Global annual average wind speed at 100m height


*Ref: How to refer “Global Atlas”  [https://globalatlas.irena.org/help](https://globalatlas.irena.org/help)
- We see many in common between the circumstances in Japan and the ones in ASEAN region.
- By developing key technologies and putting them into practice, we, the government of Japan will continue to contribute to the region on this matter, too!

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References
- Japan Climate Transition Bond Framework
- Transition Finance (Ministry of Economy, Trade and Industry website)
Overview of Japan Climate Transition Bonds
About the Climate Transition Bond Framework

- When issuing transition bonds that have received a third-party SPO, it is important to formulate a "framework" that summarizes Japan's transition strategy and the use of funds based on it, and to demonstrate to the market the eligibility and reliability of transition bonds.

- On November 7, the government released the Climate Transition Bond Framework.

(1) Items in the framework (based on ICMA Standards)

- Issuer’s transition strategy
- Use of proceeds
- Management of proceeds
- Reporting (Allocation reporting + Impact reporting)

(2) Decision making process for the formulation of the framework

- Ministries and Agencies Liaison Conference on GX Economy Transition Bond Issuance
  - Chaired by the Director of the Cabinet Office’s GX Promotion Office with participation from FSA, MOF, METI and MOE.
  - The intergovernmental committee discusses policies of Japan climate transition bond, and create the draft framework

- GX Implementation Council
  - Chaired by Prime Minister with participation of relevant ministers and experts to discuss and confirm the content of the framework
Overview of the Climate Transition Bond Framework

- For the alignment with international standards such as the Green Bond Principles and Climate Transition Finance Handbook, the framework clarifies the climate transition strategy, use of proceeds, reporting, etc.

- The framework prioritizes investments in sectors that contribute to reducing GHG emission and enhancing industrial competitiveness and economic growth, focusing on projects that are truly difficult for the private sector alone to make investment decisions, as described in the “GX Promotion Strategy”.

Overview of the Framework

 ✓ Climate Transition Strategy:

To achieve the international commitment of the 46% reduction in GHG emission by 2030 (compared to 2013 levels) and carbon neutrality by 2050, and to enhance industrial competitiveness and promote economic growth in our country, the “Green Transformation Promotion Strategy” was formulated in July 2023 based on the “GX Promotion Act”.

 ✓ Use of Proceeds:

Based on the “Green Transformation Promotion Strategy”, the framework categorizes projects under “Eligibility Criteria” and “Representative Use of Proceeds” such as the promotion of energy efficiency, structural transformation of the manufacturing industry, and the mainstreaming of renewable energy. For more details, refer to the next page.

 ✓ Reporting:

After issuance, annual reporting will be conducted on ① Allocation Reporting, which summarizes the allocation status of proceeds to GX budget projects, and ② Impact Reporting, which provides information on environmental impacts and case studies. ② will be conducted within two years from issuance, as the effects and impacts of the projects may take time to become apparent.
### Overview of the Climate Transition Bond Framework ②

#### Classification of Use of Proceeds

<table>
<thead>
<tr>
<th>Major categories</th>
<th>Eligibility Criteria</th>
<th>Representative Use of Proceeds (Eligible Projects)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Energy efficiency</td>
<td>Promotion of thorough energy efficiency improvement</td>
<td>- Promote the spread of energy-efficient appliances</td>
</tr>
<tr>
<td></td>
<td>Houses and buildings</td>
<td>- Support for building new houses and buildings with high energy efficiency and retrofitting to improve energy efficiency</td>
</tr>
<tr>
<td></td>
<td>Digital investment aimed at decarbonization</td>
<td>- Facilitating the development of and investment in energy efficient semiconductors, photonics electronics convergence technologies, etc.</td>
</tr>
<tr>
<td></td>
<td>Battery industry</td>
<td>- Investments in plants manufacturing batteries together with their material and components</td>
</tr>
<tr>
<td>2 Renewable energy</td>
<td>Making renewable energy a major power source</td>
<td>- Floating offshore wind</td>
</tr>
<tr>
<td></td>
<td>Infrastructure</td>
<td>- Next-generation solar cells (perovskite)</td>
</tr>
<tr>
<td>3 Low-carbon and Decarbonized energy</td>
<td>Utilization of nuclear power</td>
<td>- Next-generation advanced reactors with built-in new safety mechanisms</td>
</tr>
<tr>
<td></td>
<td>Establishing electricity and gas markets to achieve carbon neutrality</td>
<td>- Promoting zero-emission thermal power</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Development of cities and communities that will help decarbonization</td>
</tr>
<tr>
<td>4 Clean transportation</td>
<td>GX in transport sector</td>
<td>- Support for the introduction of next-generation vehicle</td>
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<tr>
<td></td>
<td></td>
<td>- Developing demonstration aircraft by 2030s and spreading the use of zero-emissions ships, etc.</td>
</tr>
<tr>
<td></td>
<td>Infrastructure (repeat)</td>
<td>- Development of cities and communities that will help decarbonization</td>
</tr>
<tr>
<td>5 Circular economy adapted products, production technologies and processes</td>
<td>Restructuring the manufacturing industry (fuel and feedstocks transition)</td>
<td>- Development and introduction of innovative technologies such as hydrogen reduction for steelmaking</td>
</tr>
<tr>
<td></td>
<td>Facilitating introduction of hydrogen and ammonia</td>
<td>- Conversion to Carbon-Recycling production systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Building supply chain both domestically and internationally</td>
</tr>
<tr>
<td></td>
<td>Carbon Recycling and CCS</td>
<td>- Research and development as well as the introduction support of both production and usage of hydrogen derived from excess renewable energy sources</td>
</tr>
<tr>
<td>6 Environmentally sustainable management of living natural resources and land use and Circular economy</td>
<td>Food, agriculture, forestry, and fisheries</td>
<td>- Decarbonization of agriculture, forestry and fisheries</td>
</tr>
<tr>
<td></td>
<td>Resource circulation</td>
<td>- Investment to accelerate the resource circulation such as plastics, metals, sustainable aviation fuel (SAF), etc</td>
</tr>
</tbody>
</table>
Overview of GX budget programs (2022–2023)

1. R&D of innovative technologies to capture the market<approx893 billion yen>
   - **Green Innovation funds**: approx756 billion yen (addition to existing 2 trillion yen)
     - Support for R&D of innovative technologies such as hydrogen reduction steelmaking on the condition that companies commit to social implementation investment
   - **Innovative GX Technology Creation Project (Gtex)**: approx50 billion yen
     - Supporting basic research leading to GX, such as solid-state batteries, fuel cells (hydrogen-related technologies), and biomanufacturing
   - Development of innovative technologies for semiconductors such as photonics-electronics convergence to drastically reduce consumption: approx75 billion yen
   - R&D support for high-temperature gas-cooled reactors and fast reactors: approx12 billion yen

2. Capital investment that contributes to both reduction and growth<approx508 billion yen>
   - Support for the manufacture of storage batteries: approx330 billion yen
   - Support for the manufacture of power semiconductors that contribute to improving the energy-saving performance of automobiles: approx150 billion yen
   - Advanced energy-saving investment support with non-fossil conversion and disaster recovery measures: approx25 billion yen
   - Support for the construction of microgrids through private lines in collaboration between the public and private sectors: approx3 billion yen

3. Nationwide demand measures that contribute to growth <approx204 billion yen>
   - Expand support for the introduction of clean energy vehicles
     - a) Private car: approx90 billion yen,
     - b) Commercial vehicles (trucks, taxis): approx14 billion yen
   - Support for the introduction of extremely high-efficiency equipment that improves housing insulation performance: approx100 billion yen

Total about 1.6 trillion yen
JAPAN CLIMATE TRANSITION BOND