

Toranomon Hills Forum, Tokyo (and Web)

March 8th, 2024

FY2023 ALPS International Symposium

— For achieving the carbon neutral and green economy policies in the US, EU and Japan —

**Research Institute of Innovative Technology
for the Earth (RITE)**



Backgrounds and Objectives of ALPS IV

- ◆ As global warming is bound to have severe impacts on the whole planet, there are high expectations for solutions to this issue. However, while global warming affects various sectors in every country of the world, its impacts are not uniform. Mitigation measures and associated costs that countries can afford to take and pay may differ to very large extent. Therefore, model development and model-based analysis and evaluation for global warming countermeasures and policies considering the status of each country/region and industry are needed in order to build truly effective climate policies.
- ◆ Within this project, we assess mitigation and adaptation measures, climate finance and climate policy in a consistent and comprehensive manner, taking into account the latest scientific knowledge on the subject, recent trends in international negotiations, and cooperating with international research organizations. Our goal is to contribute to the discussions in international negotiations, e.g., IPCC and COP, and to the development of an international framework and of a national strategy for green growth, namely, a virtuous cycle of environment and growth in the long-term strategy.

Risk management strategy for climate change responses

- Understanding uncertainties, e.g., climate change science, damages and adaptations, countermeasures and mitigation costs, socioeconomics and international framework.
- Analysis on long-term target and the emission pathways for 2050, 2100 and further (global CO₂ net zero emissions).
- Evaluation of impacts of mitigation costs and international competitiveness regarding short-and-mid-term target up to 2030 (NDCs) and evaluation of Border Carbon Adjustment.
- Research on damages and adaptations and model development to be reflected on risk management strategy.
- Evaluation of long-term low emission scenarios of NETs (BECCS, DACS, etc.) to be reflected on risk management strategy.
- Evaluation of Solar Radiation Management (SRM).
- Evaluation of innovation.
- Synergies and trade-offs with SDGs.

Modeling and Analysis in systematic and quantitative manner

- Improvement of DNE21+, DEARS, and GLaW and analysis using those models.
- Participation in international model comparison projects mainly in Europe & US and presentation of model analysis results.

Evaluation of Green Growth in economic perspective

- Evaluation of Green Growth (decoupling) and data-based analysis.
- Estimation of CO₂ emissions based on consumption.
- Analysis on energy efficiency of Japan and major countries.
- Evaluation of equity of burden by income class due to FIT or other policies.
- Issues regarding CO₂ emission reduction policies under electricity deregulation (learning from Europe).

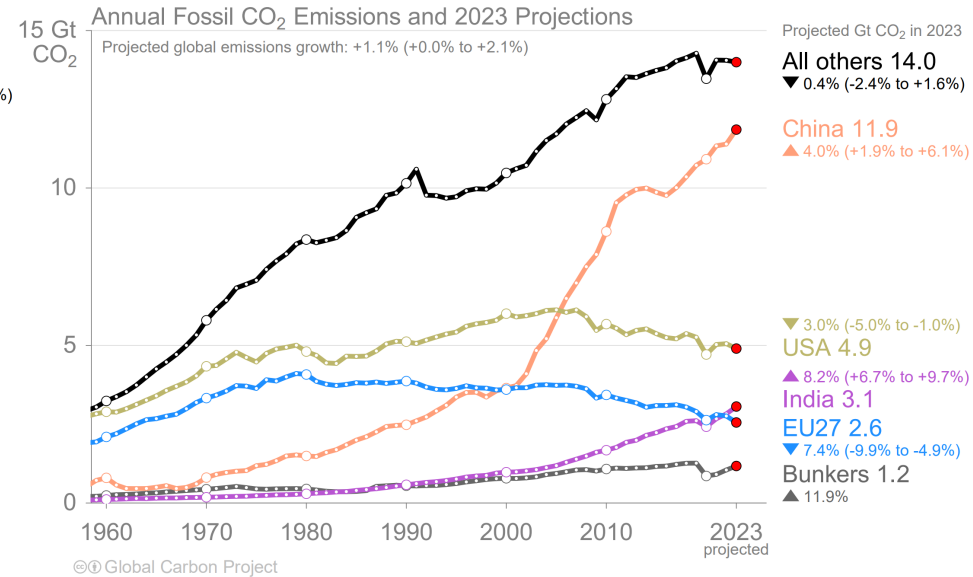
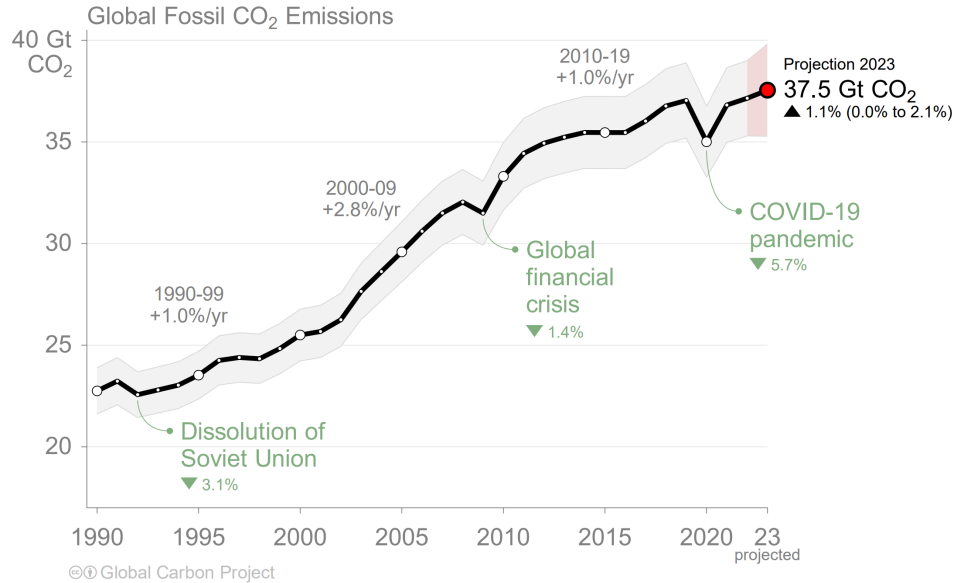
Technological evaluation in cross-sectoral perspective

- Integrated evaluation of social changes, such as acceleration of sharing economy induced by IoT & AI and reduction in embodied goods by improving demand-supply efficiency.
- Evaluation of hydrogen use including CCUS and whole system of oil refinery, petrochemical, shale gas and biorefinery.
- Evaluation of food system.
- Research on other technologies.

Evaluation of innovation and investment

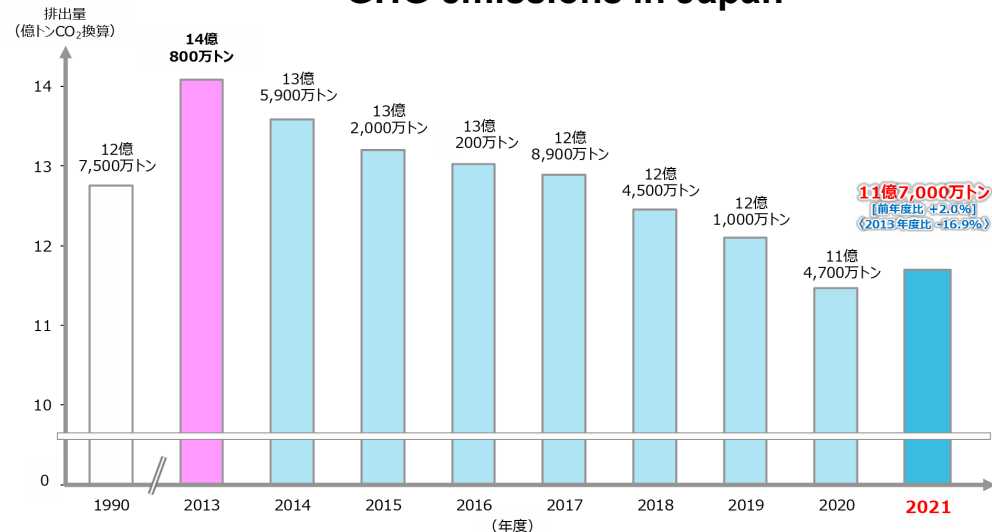
- Evaluation of the role of general-purpose technologies (e.g., ICT, material technology).
- Evaluation of innovation inducing policies.
- Research on the trend of ESG investment and green finance analysis.

CO₂ emission trajectories in the world and major countries



Source) Global Carbon Project, 2023

GHG emissions in Japan

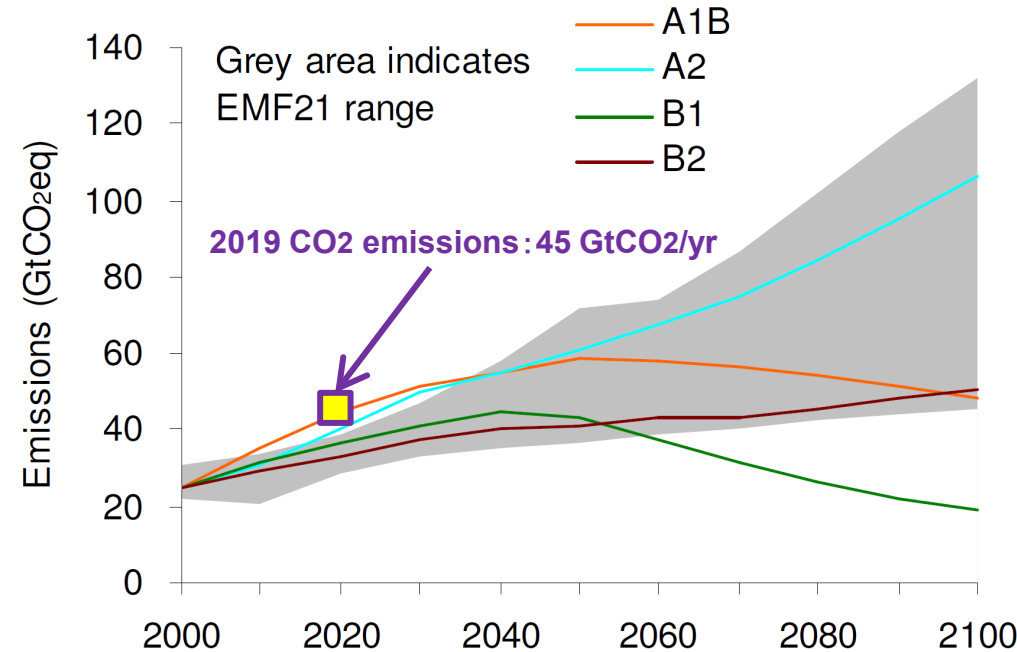


Source) The Government of Japan (Ministry of Environment), 2023

- The coupling between the economy and CO₂ emissions continues on the global level. When CO₂ emissions decrease significantly, economic conditions (GDP, income) worsen.
- Manufacturing industries, with high CO₂ intensity in particular, are being transferred from developed to developing countries.

The estimated baseline emissions in the IPCC AR4 (2007) and AR5 (2014) v.s. the actual emissions in 2019

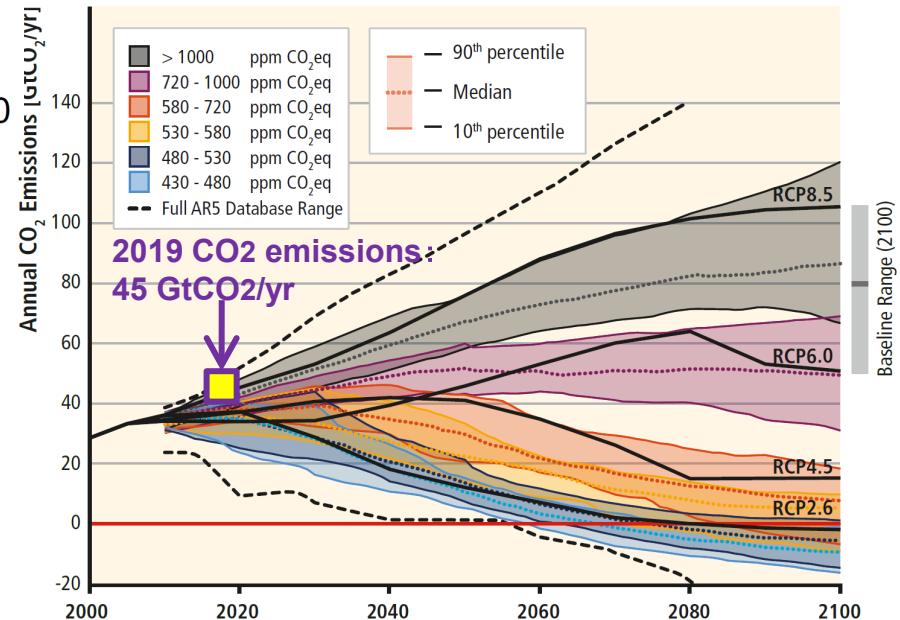
AR4 (2007): baseline CO₂ emissions



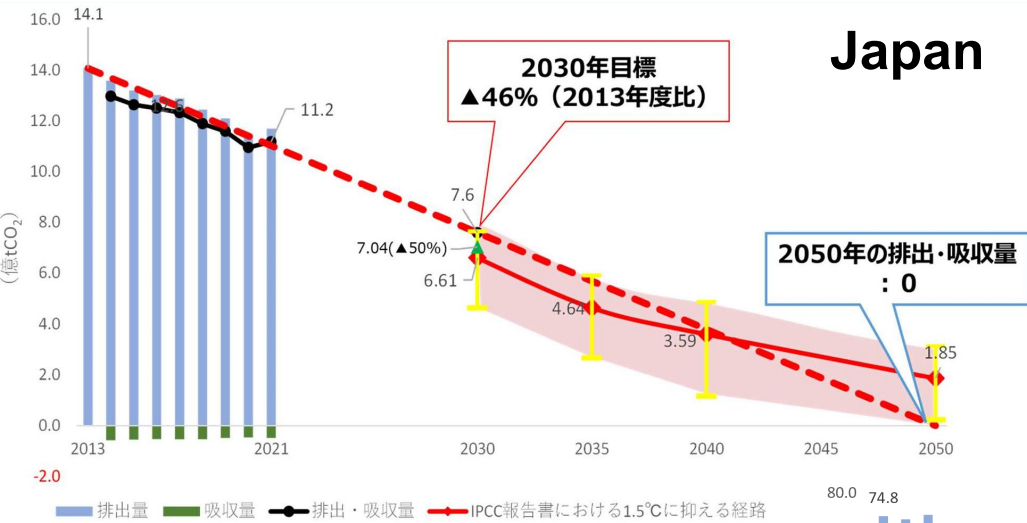
- ✓ The actual emission in 2019 was nearly the upper range of the all of the baseline emissions estimated by IAMs in the IPCC AR5 and AR6, while large efforts for emissions reduction have been conducted.
- ✓ It can be afraid that CO₂ intensive industries had moved from developed countries to developing countries more than those that IAMs had estimated.

AR5 (2014): all pathways including baseline emissions

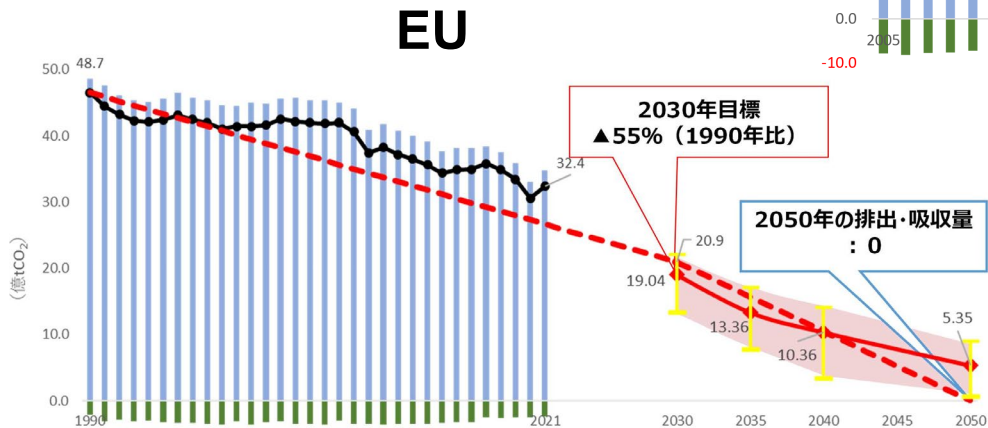
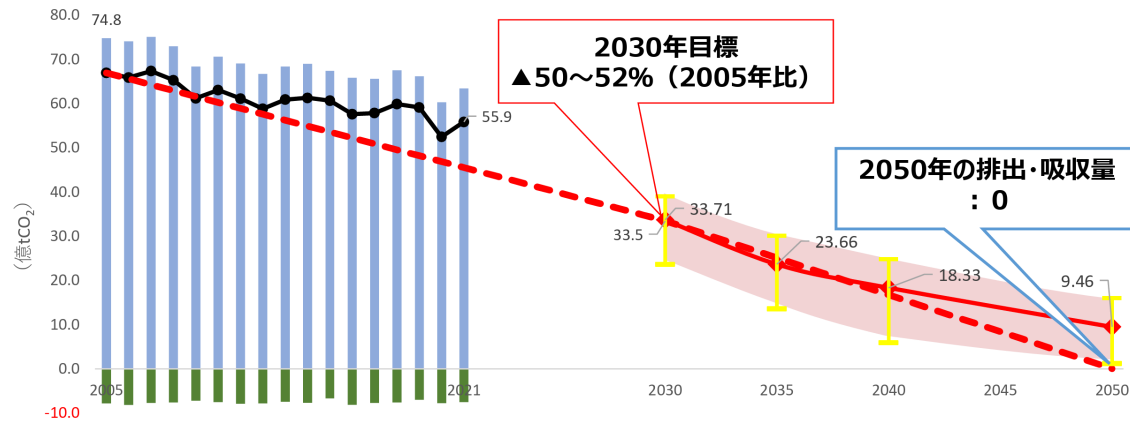
Total CO₂ Emissions in all AR5 Scenarios



The trends of emissions reduction in Japan, US, and EU



Even major developed countries are not making steady progress in emissions reduction to achieve the NDCs.



- **Recognizes the finding in the Synthesis Report of the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, based on global modelled pathways and assumptions, that global greenhouse gas emissions are projected to peak between 2020 and at the latest before 2025 in global modelled pathways that limit warming to 1.5 °C with no or limited overshoot... Also recognizes that limiting global warming to 1.5 °C with no or limited overshoot requires deep, rapid and sustained reductions in global greenhouse gas emissions of 43 per cent by 2030 and 60 per cent by 2035 relative to the 2019 level...**
- **... calls on Parties to contribute to the following global efforts, in a nationally determined manner, taking into account the Paris Agreement and their different national circumstances, pathways and approaches:**
 - (a) Tripling renewable energy capacity globally and doubling the global average annual rate of energy efficiency improvements by 2030;
 - (b) Accelerating efforts towards the phase-down of unabated coal power;
 - (c) Accelerating efforts globally towards net zero emission energy systems, utilizing zero- and low-carbon fuels well before or by around mid-century;
 - (d) Transitioning away from fossil fuels in energy systems, in a just, orderly and equitable manner, accelerating action in this critical decade, so as to achieve net zero by 2050 in keeping with the science;
 - (e) Accelerating zero- and low-emission technologies, including, inter alia, renewables, nuclear, abatement and removal technologies such as carbon capture and utilization and storage, particularly in hard-to-abate sectors, and low-carbon hydrogen production;
 - (f) Accelerating and substantially reducing non-carbon-dioxide emissions globally, including in particular methane emissions by 2030;
 - (g) Accelerating the reduction of emissions from road transport on a range of pathways, including through development of infrastructure and rapid deployment of zero- and low-emission vehicles;
 - (h) Phasing out inefficient fossil fuel subsidies that do not address energy poverty or just transitions, as soon as possible;
- **Recognizes that transitional fuels can play a role in facilitating the energy transition while ensuring energy security;**

1

US

Inflation Reduction Act (Aug, 2022): approx. 50 trillion yen of government support

- ✓ 10年間にわたる政府支援へのコミットにより、予見可能性確保
- ✓ 初期投資支援だけでなく、生産量に比例した形での投資促進策
(例.蓄電池セル：35\$/kWhの生産比例型投資減税)

2

EU

EU-ETS (2005-), Green Deal Industrial Plan (Feb, 2023), Net-Zero Industry Act / Critical Raw Materials Act (Mar, 2023), etc.:

Approx. 140 trillion yen of public & private investments

- ✓ EU-ETS (排出量取引制度) 等の有効活用
- ✓ 日米等の政策動向を踏まえた、域内投資の拡大に向けたネット・ゼロ産業法案等の発表
(例. 再エネ・蓄電池等の重要技術の域内自給率を40%超とする目標等)

3

Korea

K-ETS (2015-), Investment / R&D tax reduction (sectors expanded in 2023): More than 7 trillion yen of public & private investments

- ✓ アジア諸国に先駆けて排出量取引制度 (ETS) を導入
- ✓ 大企業・中堅企業・中小企業それぞれに対する大規模な税額控除。2023年には水素関連技術やEV関連システムを対象に追加。(例. 半導体、EV等に15%~35%の投資減税 等)

4

Germany

Climate and Transformation Fund (KTF) [draft] (Aug, 2023):

Approx. 33 trillion yen of government support [unpublished]

- ✓ ヒートポンプ等の導入 (2024年約2.9兆円)、産業と商業におけるエネルギー効率化 (同年0.1兆円) 等について、2024年から2027年までの大規模な支援策を検討中。また、企業の脱炭素の取組に対する炭素価格を踏まえた補助 (気候保護契約) を検討中。

Japan's GX (Green Transformation) policy

- Carbon Pricing and Investment Promotion Measures -

- To enhance the predictability for businesses and maximize GX investments:
 - 1) At the end of last year, government compiled a sectoral investment strategy for the next 10 years.
 - 2) Within these strategies, **develop a "5-year Action Plan" focusing on achieving carbon neutrality by 2050.**
- The GX Implementation Council and the expertise of specialists will be utilized to compile these plans and implement specific measures based on them.

Energy Supply Side:

Approx. 50 trillion yen~

<GX in the Energy Transformation Sectors>

- Renewable Energy*¹: Approx. 20tn yen~
- Next-generation Networks*¹: Approx. 11tn yen~
(Grid and balancing capabilities)
- Next-generation innovative reactors: Approx. 1tn yen~
- Hydrogen and ammonia: Approx. 7tn yen~
- Carbon recycling fuels: Approx. 3tn yen~
- CCS: Approx. 4tn yen~

And more

Long-term decarbonized power source auctions will be newly established to promote investment in decarbonized power sources.

Energy Demand Side:

Approx. 100 trillion yen~

<GX in Sectors related to people's lives> Approximately 60 trillion yen~

- Housing and buildings: Approx. 14tn yen~
- Automobiles and energy storage batteries: Approx. 34tn yen~
- Digital investments for decarbonization purposes: Approx. 12tn yen~

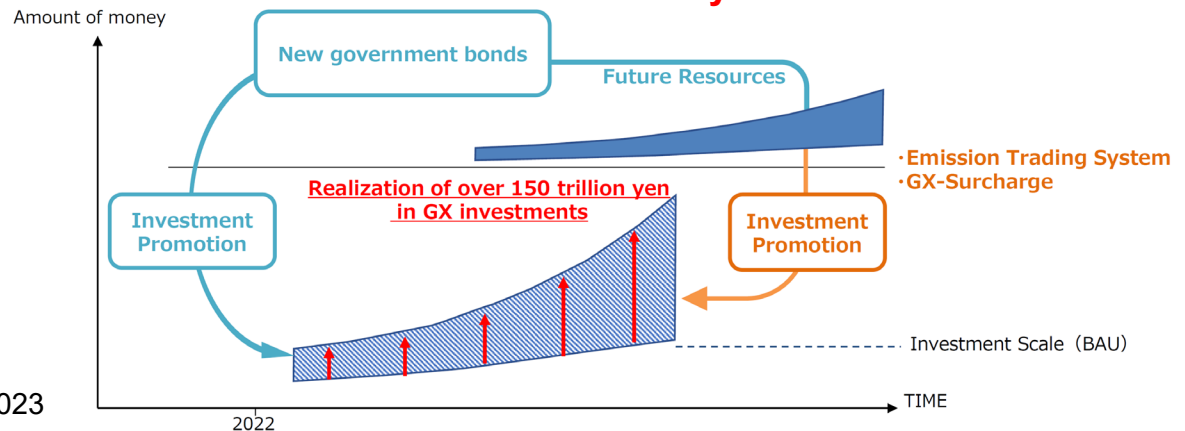
<GX in Industrial Sectors> Approx. 70 trillion yen~

- Materials (Iron and steel, chemical, cement and paper): Approx. 8tn yen~
- Automobiles and energy storage batteries: Approx. 34tn yen~ (repeated)
- Digital investments for decarbonization purposes: Approx. 12tn yen~ (repeated)
- Zero-emission ships (Maritime): Approx. 3tn yen~

And more

Note: The amounts provided are provisional values and have been mechanically calculated based on certain assumptions. They may change in the future, and there may be increases or decreases depending on the progress of projects, etc.

GX Economy Transition Bonds: 20 trillion yen



Some of the major topics of this symposium

- ◆ **The world had tried to increase the ambitions of 2030 emissions targets by the 2022 COP27; however, the increases are very limited. The GST decision of the 2023 COP28 expressed a desire to continue striving for the 1.5 °C target, but in reality, the world is already approaching 1.5 °C rise, making it very difficult to achieve the goals. Even major developed countries are not making steady progress in emissions reduction.**
- ◆ **While most of the countries set ambitious long-term goals, the real global emissions are still increasing. Our emissions reduction efforts have been unsuccessful. Why?**
- ◆ **There are growing concerns about the impact on international competitiveness and carbon leakage due to the differences between more stringent targets of developed countries and more moderate targets of developing countries.**
- ◆ **The policies to reduce emissions by strengthening subsidies have been actively implemented, such as the Inflation Reduction Act (IRA) in the US and the Green Deal Industrial Policy in Europe.**
- ◆ **The Government of Japan formulated the “Basic Policy for the Realization of GX” and “Sector-specific Investment Strategies.” What should be implemented to achieve them? How to cooperate with the US and Europe by learning from them?**
- ◆ **The transition toward CN is important for near-term real emissions reduction, and what should governments and private companies implement?**
- ◆ **Are any changes in climate response measures required under divided worlds?**

Today's Symposium Program

10:00	Welcome Remarks	Kenji Yamaji, President, RITE
10:05	Introductory Remarks	Izuru Kobayashi, Deputy Director-General for Environment, Energy and Innovation, Ministry of Economy, Trade and Industry (METI)
10:15	Introduction	Keigo Akimoto, Group Leader, Systems Analysis Group, RITE
10:30	Panel Discussions	<p>“Climate and Energy policies including US IRA, GX Policies in Japan, and EU green deals and CBAM”</p> <p>Moderator: Dr. Nebojsa Nakicenovic, Distinguished Emeritus Research Scholar, International Institute for Applied Systems Analysis (IIASA)</p> <p>Panelist : Dr. Robert Stavins, A.J. Meyer Professor of Energy & Economic Development, Harvard University Dr. David Victor, Professor, UC San Diego Dr. Massimo Tavoni, Director, European Institute on Economics and the Environment (EIEE) Dr. Jun Arima, Project Professor, Graduate School of Public Policy, University of Tokyo</p>
12:20	Lunch break	
13:20	Lecture	Mr. Takahiro Ueno, Senior Researcher, Central Research Institute of Electric Power Industry “Next NDCs for the U.S. and China”
14:40	Lecture	Dr. Nebojsa Nakicenovic, Distinguished Emeritus Research Scholar, IIASA “EU policies to be the first carbon-neutral continent in the transforming world”
15:00	Lecture	Dr. Stéphanie Bouckaert, Head of Demand Sectors Unit, World Energy Outlook, IEA “Energy security in clean energy transitions: Insights from the World Energy Outlook 2023”
15:50	Lecture	Keigo Akimoto, Group Leader, Systems Analysis Group, RITE “Perspectives of Climate Change Response Measures with Understanding the Gaps between the Paris Long-term Goals and the Real World”
16:40	Closing Remarks	Takashi Honjo, Senior Managing Director, RITE