

Carbon Recycling Fund Institute

Progress Report 2023

— Paving the Way for a Sustainable Carbon Recycling System —

September 2023

Carbon Recycling Fund Institute

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Outline

■ Trends in carbon recycling

- * Measures against climate change, as well as trend setting and actions to achieve carbon neutrality, are in progress though energy and resources supply chain risks persist. The Sharm el-Sheikh Implementation Plan to call for the strengthening of measures in each field of climate change remedies and the Mitigation Work Programme were adopted at COP27 (November 2022, Sharm el-Sheikh in Egypt). The Conference decided to take measures to compensate for loss and damage, establish a fund as part of these efforts, and set up a migration committee to make recommendations on starting the operation of these financial measures in the lead-up to COP28.
- *The Sixth Assessment Report published by the IPCC in March 2023 points out that the greenhouse gas emissions reduction targets set by national governments are not enough, and suggests CO₂ reduction of 65% by 2035 and 80% by 2040 (compared with FY2019) as targets after 2030 to control the average global temperature increase to 1.5°C. Current actions are not enough to achieve NDCs and further actions such as investment expansion are required. Meanwhile, the Report clearly shows that the 1.5°C target can be achieved by implementing inclusive long-term plans and adaptation activities, that the implementation costs are falling, and that measures selected and implemented over the next ten years are highly likely to have impact from now until several thousand years ahead.
- * To realize green transformation (GX), the Japanese government has launched Tokyo GX Week since 2022 (scheduled to be held from September to October in 2022 and 2023) to organize international conferences related to energy and the environment. The government hosted international meetings such as the International Conference on Carbon Recycling and the Asia CCUS Network Forum during GX Week to deepen discussions and promote the implementation and realization of policies leading to GX. Furthermore, the government is stimulating dialogue among businesses in the GX League. The GX League comprises businesses that are trying to accomplish GX and aim for sustainable growth now and in the future with an eye to realizing carbon neutrality and social change by 2050, and that can collaborate with companies having the same ambition as well as with government and academia.
- * Summary of the communique at the G7 Hiroshima Summit in May 2023: Alignment and reconsideration of nationally determined contribution (NDC) goals for the 1.5°C target and goals in long-term low-GHG emissions strategies, fund raising including private capital for further implementation and development of clean technologies and activities, importance of transition finance, shift to a nature-positive economy, and pursuit of safe, healthy, and low-cost sustainable clean energy supply chains.
- * The GX Promotion Act (Act on the Promotion of a Smooth Transition to a Decarbonized Growth-Oriented Economic Structure) was passed in Japan in May 2023. Policies for carbon neutrality such as clean energy strategies have been formulated and updated and businesses, municipalities, and academia are taking measures accordingly.
- * The Japanese government revised the Carbon Recycling Roadmap in June 2023. Carbon recycling is positioned to reduce CO₂ emissions throughout the supply chain of products, etc. and contribute to realizing a carbon-neutral society by 2050. The potential of CO₂ recycling through carbon recycling is

estimated to be about 200 to 100 million tons as of 2050 (equivalent to carbon recycled products used in Japan).

■ Roles of the Carbon Recycling Fund Institute (CRF) and its progress to date

* Roles of the Carbon Recycling Fund Institute (CRF):

The CRF is a platform for coordination between stakeholders who are working to create a sustainable carbon system and provides a place for information sharing. We consolidate members' opinions to overcome obstacles CRF members face in taking initiative for the development and social implementation of carbon recycling technologies, and support creation and social implementation of innovations that contribute to carbon recycling as a facilitator to promote measures through dialogues with stakeholders.

* Progress of activities from 2022 to July 2023:

- The CRF has begun group activities for realizing a sustainable carbon recycling system. In FY2022, the CRF studied possibilities in Takehara and other cities in Hiroshima Prefecture, with members and participating companies exploring items that would lead to collaboration.
- Regarding research grants, the CRF selected 16 projects, including three conducted by start-ups in FY2023, and 16 projects including three conducted by start-ups in FY2022. Of 40 projects selected from FY2020 to FY2022, progress has been made in 11 of them. Specifically, one project is in the process of verification testing, seven have been selected as national projects, and three are being jointly researched in the private sector.
- The CRF has promoted information sharing among members and other stakeholders by, for example, enhancing our website and organizing the online carbon recycling salon. More than ten introductions have led to dialogues between individual companies.
- To establish an environment where the private sector works on carbon recycling related to CO₂ sinks as a business activity, the CRF established a forestation fund as the third fund in April 2023 and started afforestation with fast-growing trees. We also created the CO₂ Sinks Study Group as a place for discussion about the future development of green and blue carbon.
- The CRF organized the second term of a program called "Carbon Recycling University" to develop carbon recycling coordinators. We also jointly organized a "local Carbon Recycling University" with Hiroshima University in February 2022, where local young people and young employees from member companies think about the future of the community through carbon recycling.
- The then-Chairperson of the CRF, Mr. Nobuo Fukuda, gave a video speech as a high-level government respondent at the 8th UN STI Forum. The moderator commented that carbon recycling is an extremely important technology for mitigating climate change in his speech in response to the significance of building a sustainable carbon system that leverages the Earth's inherent functions.

■ Revisions to three core recommendations to promote the achievement of a carbon recycling society (Revisions are underlined.):

The CRF made the following recommendations based on discussions among members about what society should become and processes to realize it, as members take the initiative in working on the development

and social implementation of carbon recycling technologies. The CRF is taking the lead with its members in implementing the recommendations to achieve carbon neutrality, mainly through carbon recycling and realize a carbon recycling society, according to the roles described in Chapter 2.

Develop and promote innovation, develop human resources

- The CRF and its members should formulate and implement growth strategies to achieve carbon neutrality by 2050. They should also develop carbon recycling technologies and products, verify these technologies and products, deploy them in the real world at a faster pace, and expand investment in them. To help achieve these goals, we should engage in cross-industry coordination, including coordination with start-up companies, and take full advantage of open innovation. We should also leverage government-led support to implement measures such as a “Basic GX Policy.”
- To support the activities of these industries, the national government should enhance its measures, such as by providing greater support to accelerate green transformation. Solid and continuous support should be provided for highly motivated companies that take the initiative.
- Between 2030 and 2050, personnel who can implement carbon-neutrality measures and carbon recycling should be developed.
- A deeper understanding of carbon neutrality and carbon recycling should be fostered among the general public in order to promote greater adoption by society.

Create CO₂ value chains

- Carbon recycling technologies and products establish their importance and roles in society through their deployment and application, so CRF members should promote the creation of CO₂ value chains that contribute to the valuation of CO₂ by promoting the understanding and usage of carbon recycling technologies and products.
- CO₂ separation and recovery is the key technology in the value chain. The CRF will enhance the efforts that will work with it and help CO₂ suppliers and users work together to develop a strategy for the dissemination of CO₂-derived products.
- To maintain and enhance Japan’s international competitiveness, the national government should promote measures across the ministries that provide incentives, such as offering premiums for products and services that use CO₂ value chains.
- Quantitative evaluation of obtained and accumulated data regarding CO₂ separation, capture, and usage should be promoted, as should the visualization of CO₂ flow based on LCA. Furthermore, efforts should be made to further the overall optimization of the effects and impact of introducing carbon recycling.
- Discussion on matters that would have major impacts on and consequently transform the social structure, such as emission trading, carbon taxes, and carbon pricing, should be promoted. Unified systems that ensure fairness between industries should be prepared and implemented without delay.
- CO₂ sinks such as oceans and vegetation should be evaluated, and international rules should be actively deployed. Support should be provided for small-scale voluntary credit frameworks that serve as their base.

Integration with regional revitalization and expansion to the global market

- CRF members should create examples that leverage the strengths and features of communities by collaborating with local governments. In particular, the agriculture, forestry, and fishing industries should be revitalized as they contribute to CO₂ sinks. Examples include planting fast-growing trees and building fish reefs made of CO₂ concrete.
- The national government should strengthen support for creating examples of CO₂ value chains through collaboration between the private sector and local communities.
- Efforts should be expanded to the global market, including the licensing business. Particularly for Asian countries, carbon-neutrality technologies should be introduced to nurture carbon recycling into one of Japan's growth industries, contributing to carbon neutrality throughout Asia.

■ **Summary**

The importance of carbon recycling to capture and fix CO₂, and use CO₂ and carbon compounds as resources, is rising at an unprecedented speed in order to achieve carbon neutrality based on a balanced combination of environment and economy. As such, the Carbon Recycling Fund Institute serves as a platform for cross-industrial and industry-academic-government coordination, implementing these recommendations and other activities. The Institute will promote the creation of a framework for global carbon recycling, namely a "Sustainable Carbon System," in various fields including resources, energy, and food through industry-academic-government coordination and cooperation with overseas parties as well as cross-industrial collaboration in the private sector to help achieve carbon neutrality not only in Japan but also across the globe.

■ **Attachment 1. Progress made through actions by members of the CRF working towards the realization of a carbon recycling society**

CRF members have made progress in verification as well as research and development on CO₂ separation and capture, fuel conversion, mineralization, conversion to chemicals for the social implementation of carbon recycling technologies, as well as CO₂ capture and fixing. These are the next to enter practical use coordination with the agriculture, forestry, and fishing industries. Attachment 1 introduces examples of these developments.

■ **Attachment 2. Questionnaire targeting CRF members**

■ **Attachment 3. Overview of the CRF**