

The 5th International Conference on Carbon Recycling Summary Document

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New Energy and Industrial Technology Development

Background of the conference

On 27 September 2023, the 5th International Conference on Carbon Recycling was held in Hiroshima, Japan, with various participants from the industry, academia and government. The conference aims to reaffirm each country's commitment to developing and demonstrating technologies for the public implementation of carbon recycling, which is a key technology for achieving carbon neutrality, and to strengthen cooperation among countries.

Carbon recycling can contribute to achieving a carbon-neutral society in 2050, as it can reduce CO₂ emissions from conventional supply chains by utilizing CO₂ as feedstock to produce new and different valuable materials. In addition, for hard-to-abate sectors such as the materials and petroleum refining industry, due to the difficulty in decarbonization through electrification and/or hydrogenation, carbon management, via maximizing the use of carbon recycling and CCS, is necessary to achieve carbon neutrality in 2050.

Main message of the conference

The following are the points we have verified through this conference.

1. This panel recognized the potential of Recycled Carbon Fuels (RCFs), such as e-fuels and e-methane, in reducing CO₂ emissions in transport and various sectors. Due to the high energy intensity required in the production process, these fuels are most competitive when produced in areas rich in renewable energy, and its ease in storage and transport renders RCFs an attractive option for transferring renewable energy from regions with abundant renewable energy to regions with scarcity. In addition, as renewables-rich areas optimal for RCFs production are widespread across the world, RCFs provide an option to enhance energy security through diversification of supply chains.

RCFs also possess identical properties to conventional oil/gas products and can utilize existing or partially modified infrastructure, thereby having the potential to reduce emissions in gas networks, maritime, aviation and vehicle stock. Specifically, liquid e-fuels' drop-in ability in terms of mixing e-fuels with conventional fossil fuels can steadily reduce CO₂ emissions while limiting the impact on market prices. Also, e-methane, which can use existing gas networks was pointed out as a method of transitioning from natural gas use and can be used in various applications.

However, several issues when accelerating deployment of RCFs were raised, including raising awareness of RCFs, reducing costs through R&D, promoting demonstrations, creating demand, and establishing international frameworks for robust CO₂ accounting and certification of RCFs. In light of these issues, in order to accelerate the commercialization of RCFs, it was agreed to explore their potential across industries, evaluate technological

advances, and strengthen international cooperation among governments, industry and academia, including with countries possessing significant renewable energy potential.

2. Carbon recycling is already being implemented in society as a means of achieving carbon neutrality in an increasing number of project cases, and collaboration among different industries is creating new business opportunities. On the other hand, it has been pointed out that in order to further accelerate the industrialization of carbon recycling internationally, there are various issues to be addressed, such as cost reduction of hydrogen and capturing technologies including DAC, and the establishment of environmental values of carbon recycling products. It is necessary to create measures that can provide input energy at low-cost and high efficiency, such as hydrogen and CO₂ and to create a carbon recycling market in which many players can participate and create competition. To this end, it is important to create a system that enables businesses and R&D institutions to appropriately measure and evaluate the environmental value of carbon recycling through LCA methods. In addition, it is necessary to have a mechanism for explaining and promoting the environmental value to stakeholders, and it is necessary for not only governments but also all people in the world to join efforts.
3. Although the environment for commercialization of carbon recycling technologies differs from country to country, startups and other organizations are working to commercialize new technologies in many countries. In order to commercialize a new technology, it is necessary to conduct steady tests at each stage of research and demonstration, such as understanding the operating conditions and methods of scaling. In this context, the role of R&D demonstration sites in various countries, including the “R&D and Demonstration Base for Carbon Recycling at Osaki-Kamijima” island, Hiroshima Prefecture, and the “National Carbon Capture Center” in Alabama, US, not only function as sites for conducting research and demonstrations, but also serve as places where experts provide advice and exchange a variety of information, and play an important role in promoting technology development and reducing costs. It is expected that more companies and research institutions will collaborate with this demonstration base and that stronger cooperation among such companies will further improve the function and operation of this demonstration base and contribute to the commercialization of innovative carbon recycling technologies.
4. To promote public implementation of carbon recycling, it is important to innovate through joint business formation through inter-company and inter-regional cooperation that links CO₂ emitters and users. Collaboration methods vary among companies depending on conditions such as region and industrial location, etc. Collaboration through joint business formation may lead to maximization of CO₂ reduction effects and regional revitalization by fostering new industries. Hiroshima Prefecture, for example, is working to build a region-wide collaboration program among companies in carbon recycling by providing matching support through the “Council of Hiroshima for a carbon Circular Economy (CHANCE)”, an industry-academia-government collaboration program, and support for addressing specific regional issues.

Considering the business environment of the target region and its characteristics, etc., a step-by-step approach to inter-company and inter-regional collaboration could lead to regional revitalization and job creation. In addition, the industrialization of carbon recycling requires flexible thinking and rapid technological development. Startups play a very important role in this process, and integrated support for startups is required from industry, academia, and government.