



**CARBON  
RECYCLING  
FUND INSTITUTE**

**Paving the way for the Sustainable Carbon System**



# Carbon Recycling Fund Institute

Contribute to the creation of innovation by using CO<sub>2</sub> as a resource

## Background and Objectives for Establishment

The global warming issue differs from regional environmental problems, such as NO<sub>x</sub> and SO<sub>x</sub>, in that it will be crucial to reduce CO<sub>2</sub> emissions throughout the world, meaning the issue cannot be resolved solely on the basis of those regulatory measures already in place.

How to improve the energy access, meanwhile, poses another major challenge, with approximately one billion people around the world still unable to achieve the benefits of electricity.

Given this situation, carbon recycling policies that see CO<sub>2</sub> as a resource to be used and promote innovation in this field are coming to play an important role in Japan's energy policies. Rather than seeing CO<sub>2</sub> in a negative light as has been the case in recent years, it is also recognized that, in order to achieve the goal of carbon neutrality by 2050, further efforts will be needed that make active use of CO<sub>2</sub> as a source of carbon.

Accordingly, the Carbon Recycling Fund Institute was established on August 30, 2019 under a private sector initiative with the aim of both addressing the global warming issue and improving the energy access throughout the world. The new institute will foster innovation in carbon recycling by public relations and sponsoring the research and development in the field.

## Overview

**Name:** Carbon Recycling Fund Institute

**Established:** August 30, 2019

**Address:** 3F Daiichi Misu Building, 2-34-7, Nishi-Shimbashi, Minato-ku, Tokyo 105-0003

**Membership categories (annual membership fee):**

Corporate members: 200,000 yen/

Individual members: 10,000 yen/

Local government members (-)/ Academic members (-)

**Membership list**

Please refer to the attachment or our website for the latest list.

**Chairperson:** Tsugio MITSUOKA (Representative Director and Chairman of the Board, IHI Corporation)

**Vice Chairperson:** Masayoshi KITAMURA (Special Counselor, Electric Power Development Co., Ltd.)

**Vice Chairperson:** Kouji EGUCHI (Representative Corporate Executive Officer, Senior Vice President, Chief Supply Chain Officer, Mitsubishi Chemical Group Corporation)

**Senior Executive Director:** Masamichi HASHIGUCHI

**Director:** Susumu NIBUYA (Representative Director, Idemitsu Kosan Co., Ltd.)

**Director:** Chiaki SUYAMA

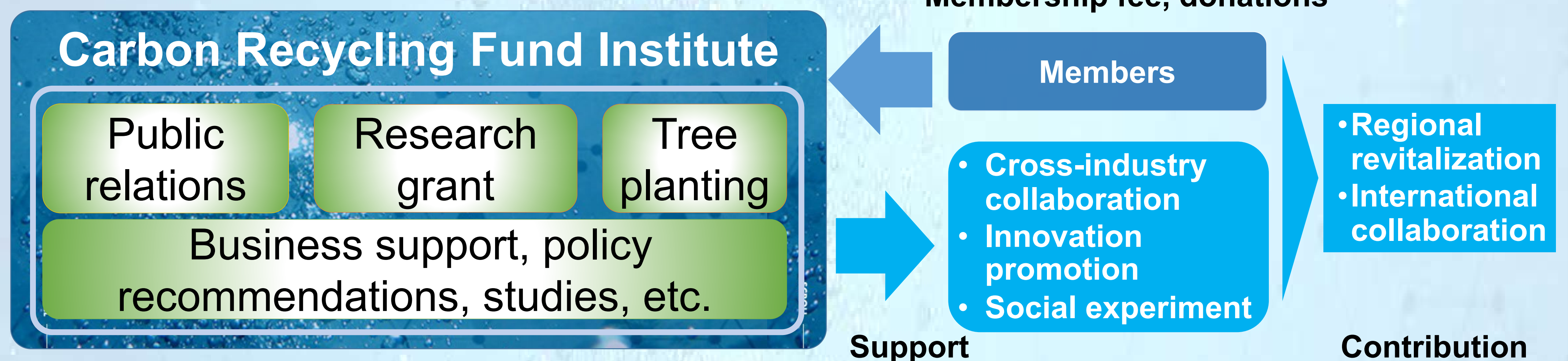
**Auditor:** Kouji TAKEDA (Managing Executive Officer, President of Resources,

Energy & Environment Business Area, IHI Corporation)

**Executive Adviser:** Yoshimitsu KOBAYASHI (Chairman of the Board, Tokyo Electric Power Company Holdings, Incorporated)

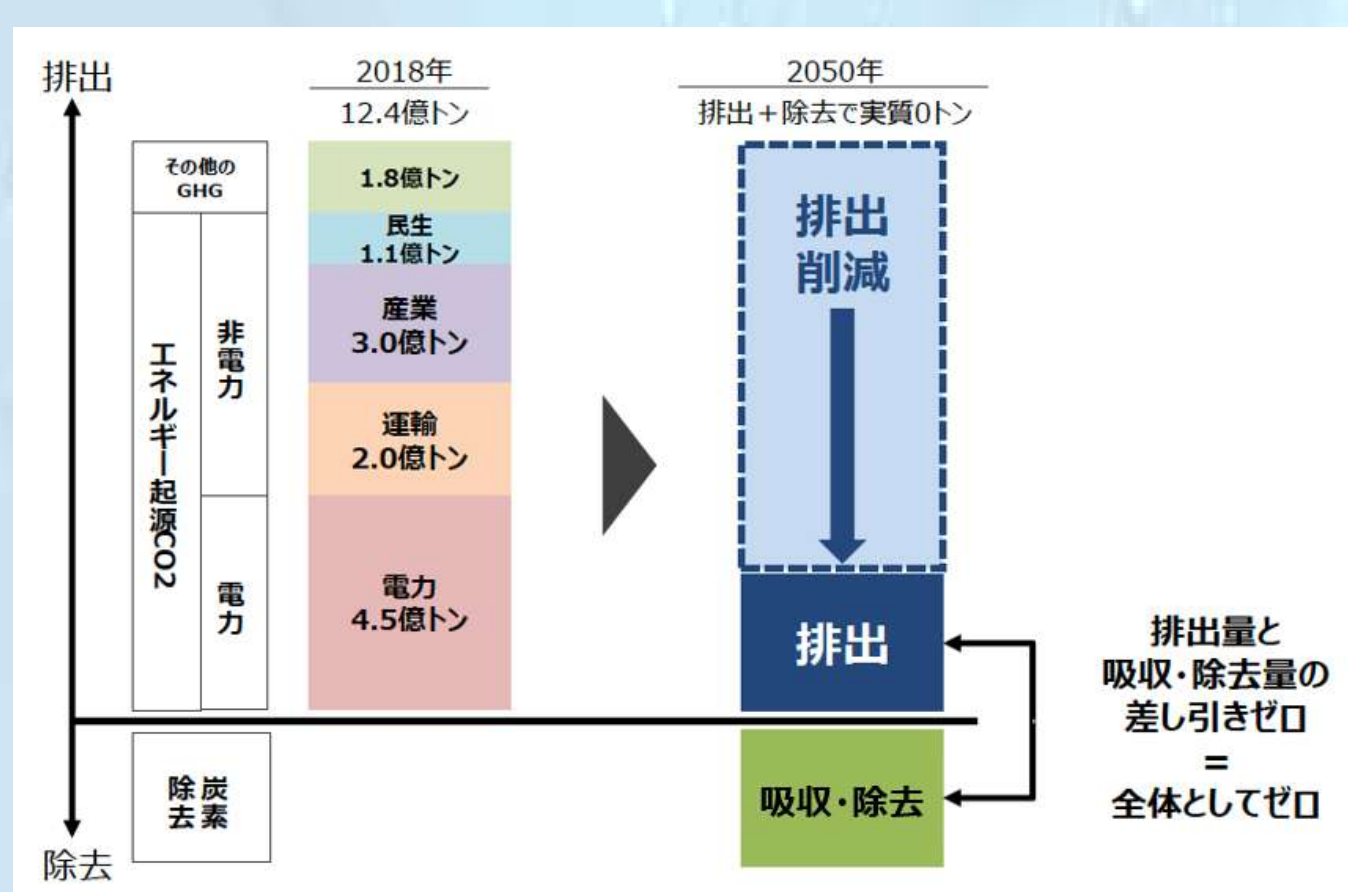
**Adviser:** Takeo KIKKAWA (Vice President, International University of Japan (IUJ))

## Activities



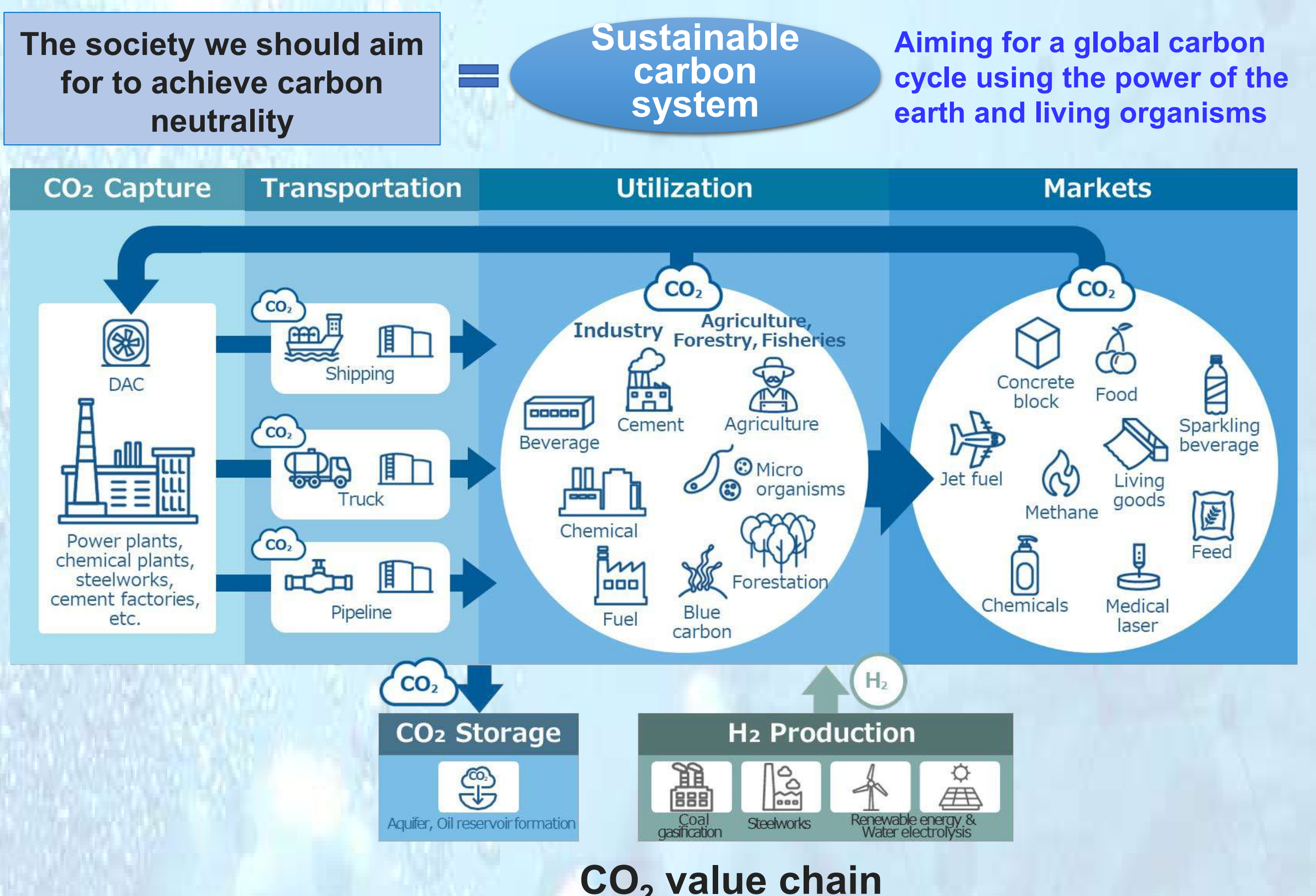
## Towards achieving a sustainable carbon system

- It is important to **balance the amount of CO<sub>2</sub> emission with the amount of absorption and removal (usage and fixation).**
- Not only emission reduction, but **CCUS/ carbon recycling and absorption into forests, oceans, and soils** are key.
- It is important to **build a value chain for CO<sub>2</sub>**, from the sources to the collection, transport, use and storage of CO<sub>2</sub>.



Carbon neutral image

(Reference: Ministry of Economy, Trade and Industry)



CO<sub>2</sub> value chain

# Activities

## I. Public relations

The institute provides the latest information on carbon recycling in Japan and elsewhere through a variety of media including our website, participates in international exhibitions, holds events, symposiums, and training sessions in collaboration with various media, and conducts other public relations activities, such as awareness-raising activities related to carbon recycling.

### Carbon recycling closed online community



The institute holds online lectures on timely topics to share information and discuss carbon recycling/carbon neutrality among its members.

This program is for CRF members only.

### Participation to exhibitions, symposiums etc.

The top management of the institute disseminates the significance of sustainable carbon to the world and participates in exhibitions to promote CR activities.

### University of Carbon Recycling



Carbon Recycling University is an education program which fosters problem-solving thinkers.

- Each year, twenty employees from member companies participate in the program.
- Collaboration with startup companies
- Presentation of discussion results and cross-industrial exchanges

### Sharing information on websites etc.



### The tale of Carbo and Risa

The tale of Carbo and Risa is an original digital content of the institute which conveys the significance and initiatives on carbon recycling to the next generation in a fun way.



Chairperson Nobuo FUKUDA during a speech at the UN STI Forum



Vice Chairperson Masayoshi KITAMURA during a speech at the Smart Energy Week 2022

## II. Research grants

A number of obstacles are blocking the practical viability of carbon recycling, including issues of cost, international competition, funding for fundamental research and others. The institute offers grants and member matchings to researchers and startups who are taking on these challenges to create innovation. We also promote working group activities for the purpose of social experimentation of various initiatives.

	Outline
Grant recipients	Grants are given to a researcher or a team of researchers belonging to a company, university, or corporation. A new startup support quota was established in FY2022.
Assessment points	Originality, innovation, superiority over conventional technologies, how to define issues, social feasibility such as collaboration with companies, etc.
Grant amount	Ten million yen/ case (average grant amount: approx. 7 million yen/ case)
Application/ approved cases	FY2020: 35 applications-> 12 approved; FY2021: 46 applications -> 12 approved; FY2022: General - 55 applications ->14 approved; startups - 29 applications -> 2 approved



Presentation on the research grant activities (as membership benefit)

## III. Tree Planting

We have engaged in considering the development of rules for CO<sub>2</sub> sinks and activities to spread understanding of CO<sub>2</sub> sinks by planting fast-growing trees with local communities and members.

### CO<sub>2</sub> sink study group

### Activities to spread understanding of CO<sub>2</sub> sink



Tree Planting with our members and local companies

## IV. Business support, policy recommendations, information analysis, etc.

The institute provides business support and offers recommendations on national policies on energy, environment and technology development policies for the social implementation and commercialization of carbon recycling. We also collect the latest news from around the world about carbon recycling and CCUS and distribute dozens of articles each week to our members.

- Embodiment of social implementation of carbon recycling (social implementation working group)
  - ✓ Implement activities to link the carbon recycling value chain through social implementation working group.
  - ✓ Explore how carbon recycling can contribute to the revitalization of local industries by leveraging regional strengths.



## Carbon recycling closed online community

- The Institute is continuing to grow into a group that collaborates with various industries through our activities.
- Over 100 people participate and interact each time.



RIEOM Research Institute for Environmental Economics and Management  
WASEDA University

**カーボンプライシングの動向とこれからの展望**

2022年4月20日(水)  
@カーボンリサイクルファンド講演会

有村俊秀  
早稲田大学・政治経済学術院 教授  
同・環境経済経営研究所・所長  
経済産業研究所ファカルティフェロー

オンライン テーマ: R&D

・9月22日(木) 14:00~15:30 (Web-Ex)

環境系スタートアップ企業の  
起業家と話をしましょう!

【内容(案)】  
2022年度研究助成採択テーマ スタートアップ企業からの講演

- (1) 合成バイオ技術を活用した化学品生産の取り組み  
清水 雅士 様 (マイクロバイオファクトリー株式会社 代表取締役)
- (2) 気体から素材・エネルギー創出へ  
浅利 大介 様 (株式会社Atomis 代表取締役CEO)
- (3) 未利用バイオマス残渣を活用したカーボンニュートラル技術および炭素価値の創出に関する開発  
川谷 光隆 様 (Innovare株式会社 代表取締役)

オンライン テーマ: 政策/仕組み

・10月25日(火) 15:30~17:00 (Web-Ex)

**イノベーション・新事業創出のヒントを得ましょう**

講演タイトル: 「境界連結」~Boundary Spanning & Innovation~  
講演者: 伊能 美和子 (いよく みわこ) 様 (株式会社Yokogushist 代表取締役)  
ご略歴: NTTグループで様々な事業/サービスを次々と立ち上げた女性イントラプレナー(社内起業家)の草分け的存在。現在は複数の上場企業の社外取締役や、大学客員教授などを務めながら、自らが提唱する「ヨコグシスト」として活躍

概要: 部門・組織、会社の壁を越えて課題を共有したり、ヒト・モノ・カネを結びつけてイノベーション創出のハブになる人=「ヨコグシスト」を提唱。本公演では、イノベーション・新規事業創出のカギとなる「バウンダリースパナー(境界連結者)」等について解説を頂く。



### Speakers in Carbon Recycling Salon

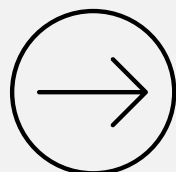
(Speaker: Leading experts in a particular field, Researcher, Start-up Company, Our members)

## The tales of Carbo and Risa

High schoolers from the future, Carbo and Risa, time travel back to the 2020s to learn about carbon recycling.

With an eye on future generations, you can enjoy learning with this content the importance of carbon recycling and initiatives for it. It's fun to learn about and easy to understand.

Scan here



カボ・リサ物語

08 第8話 CRF広報活動編 未来を築く共感の輪  
カーボンリサイクルについて、CRFの広報活動の取組みを調査します。

07 第7話 KDDIグループ編 つなぐチカラで海を見える化!  
カーボンリサイクルについて、KDDIグループのブルーカーボンの取組みを調査します。

06 第6話 CRF研究助成活動編 研究助成で社会にイノベーションを!  
どのようにイノベーション創出支援してる?カーボンリサイクルファンド(CRF)の研究助成活動の取組みについて調査します。

05 第5話 IHI編 潜入!未来のスマートコミュニティ  
カーボンリサイクルについて、株式会社IHIの相馬市で行っているスマートコミュニティの取組を調査します。

04 第4話 出光産産編 バイオマス燃料で目指せ、循環型社会  
カーボンリサイクルについて、出光興産株式会社のバイオマス燃料の取組を調査します。

03 第3話 J-POWER編 瀬戸内海の小島でカーボンリサイクル  
カーボンリサイクルについて、電源開発株式会社のガス化技術の水素の取組を調査します。

## Message from leaders

CRF leaders introduce endeavors of the Institute and its members at international conferences, exhibitions, etc.



Chairperson Nobuo Fukuda during a speech at the UN STI Forum



Vice Chairperson Masayoshi Kitamura during a speech at the Smart Energy Week 2022

	Features
Eligibility	Researchers or teams affiliated with companies, universities, etc. A startup support framework newly established in FY2022
Research targets	<p>Research on carbon recycling that uses CO<sub>2</sub> (or carbon atoms) as a resource, related technologies, and social science to solve social issues</p> <p>&lt;Expected Fields&gt;</p> <ol style="list-style-type: none"> <li>1. CO<sub>2</sub> fixation by mineralization (materials such as concrete)</li> <li>2. Conversion to fuels</li> <li>3. Conversion to chemicals</li> <li>4. Separation and recovery (including direct-air capture)</li> <li>5. Social science</li> <li>6. Utilization of CO<sub>2</sub> sinks (soil, forests, blue carbon, biologics, agriculture, forestry and fisheries)</li> <li>7. Other (H<sub>2</sub> production, geo-engineering, functional materials, medical fields, etc.)</li> </ol>
Evaluation points	Creativity, innovativeness, superiority over conventional technologies, method to determine issues, and social realization potential through collaboration with companies
Grant scale	Approx. 10 million yen per case (average: approx. 7 million yen per case)
Number of applications and accepted cases	<p>FY2020: 39 applications → 12 accepted, FY2021: 46 applications → 12 accepted</p> <p>FY2022: 55 applications → 14 accepted and 29 applications for startup support → 2 accepted</p> <p><b>FY2023: 56 applications → 14 accepted and 31 applications for startup support → 2 accepted</b></p>
Attribution of research results	Research results basically belong to researchers



## Projects selected as government-funded projects or joint research with companies

Research field	Grantee	Research project name (grant fiscal year)	Principal investigator name (affiliated institution)
Technologies for CO <sub>2</sub> fixation	Joint research with companies (verification testing)	Development of a novel CO <sub>2</sub> immobilization technology using microbial fuel cells (FY 2022)	Daisuke SANO (Tohoku University)
	NEDO and MOE	Development of a novelnew CO <sub>2</sub> mineralization method usingfor waste seawater using biogenic amines (FY 2021)	Ko YASUMOTO (Kitasato University, Kitasato Institute)
Technologies for conversion to fuels	JST/OPERA	Breeding to eliminate bottlenecks against practical application of microseaweed-derived biofuel (FY 2021)	Shigeaki HARAYAMA (Chuo University)
Technologies for conversion to chemicals	Green Innovation Fund	Development of super-efficient polyurethane material production method using CO <sub>2</sub> (FY 2021)	Katsuhiko TAKEUCHI (National Institute of Advanced Industrial Science and Technology)
	Joint research with companies, etc.	Development of technology for synthesizing lactic acid and polylactic acid from carbon dioxide (FY 2021)	Hajime KAWANAMI (National Institute of Advanced Industrial Science and Technology)
	Joint research with companies	Adaptive research on new low-temperature methanol synthesis catalyst to IGCC+CCS (FY 2020)	Noritatsu TSUBAKI (University of Toyama)
Technologies related to CO <sub>2</sub> separation and capture	JST/JST-Mirai	Development of CO <sub>2</sub> absorber for low-cost CO <sub>2</sub> -free hydrogen production (FY 2021)	Kei INUMARU (Hiroshima University)
	Joint research with companies, etc.	Development of highly efficient DAC technology using CO <sub>2</sub> absorbing and releasing agents that separate even water (FY 2021)	Fuyuhiko INAGAKI (Kobe Gakuin University)
Social sciences	MOE	Research on the Realization of Setouchi Carbon Recycling Complex (FY 2020)	Takayuki ICHIKAWA (Hiroshima University)
Utilization of CO <sub>2</sub> sinks	JST/A-STEP (tryout)	Development of a compact horticultural system with atmospheric CO <sub>2</sub> enrichment by membrane separation (FY 2021)	Shigenori FUJIKAWA (Kyushu University)
	JSPS (grants-in-aid for scientific research)	Enhancement of plant CO <sub>2</sub> uptake using a chemical compound (FY 2022)	Yohei TAKAHASHI (Nagoya University)



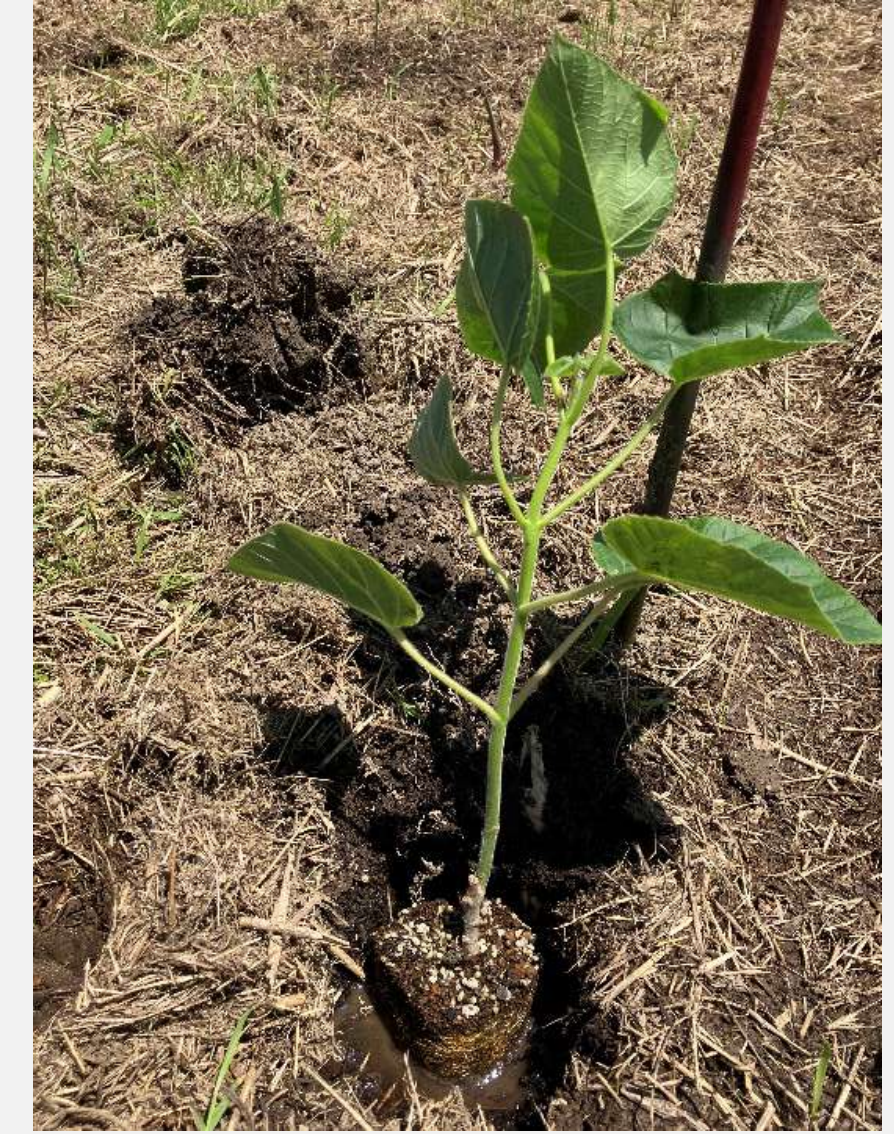
Field	Study title	Name of Research Representative (Organization)
CO2 separation and capture	Development of Defect-Free MOF Ultrathin Membranes for CO2 Capture	Shunsuke TANAKA (Kansai University)
	Room temperature and atmospheric pressure CR technology using innovative separation adsorbent and photocatalyst	Hideki TANAKA (Shinshu University)
CO2 separation and capture (Direct Air Capture)	Highly efficient atmospheric CO2 capture featuring with a new CO2 emission system	Fuyuhiko INAGAKI (Kobe Gakuin University)
	DAC System with Innovative Separation Membrane and Photoresponsive Absorbent	Tatsushi IMAHORI (Tokyo University of Science)
	[Startup support framework] Development of Direct Air Capture (DAC) system using zeolites	Kei IKEGAMI (Planet Savers Inc.)
Conversion to fuels	Development of novel on-demand laser driven chemical process	Akira KUWAHARA (Nagoya University)
Conversion to chemicals	Development of highly effective cathode catalysts for electrochemical CO2 reduction	Yoshikazu ITO (University of Tsukuba)
	Development of Fluidized Bed Plasma Reactor for Innovative Direct Methanol Production from CO2	Nobusuke KOBAYASHI (Gifu University)
	Development of Reaction System for Selective Conversion of CO2 to Chemicals with Waste Silicon as a Reducing Agent	Ken MOTOKURA (Yokohama National University)
	Development of technology to convert CO2 into useful chemicals using electrochemical dehydration reactions	Katsuhiko TAKEUCHI (National Institute of Advanced Industrial Science and Technology)
Conversion to chemicals (Using organisms)	Development of fatty alcohol production from CO2 using microorganisms	Kosuke NISHIO (Utilization of Carbon Dioxide Institute Co., Ltd.)
Social sciences	Regime Change for Carbon-Neutral Agriculture, Forestry, and Fisheries	Ayu WASHIZU (Waseda University)
Conversion to high value-added materials	Development of Direct Coating Process of Carbon Nanotube Films from Carbon Dioxide	Yuta SUZUKI (Doshisha University)
Technologies related to the use of bio-energy	Development of a novel electrochemical device for effective utilization of unused carbon resources	Akifumi IDO (Central Research Institute of Electric Power Industry)
	[Startup support framework] A New Bio-Energy with Carbon Capture & Storage	Atsushi Alex MAZAWA (Kyoto University Innovation Capital)
Direct use of CO2	CO2 hydrate storage and discharge system	Shin'ya OBARA (Kitami Institute of Technology)



# Tree Planting

Supporting Efforts to Expand CO2 Sinks

- CO2 sink study group  
considering the development of rules for CO2 sinks
- Activities to spread understanding of CO2 sinks  
planting fast-growing trees with local communities and members



- ✓ The need for green and blue carbon to achieve carbon neutrality
- ✓ Buildings that make maximum use of wood
- ✓ Domestic production of biomass resources
- ✓ Understanding of CO2 sink expansion and regional revitalization through citizen participation

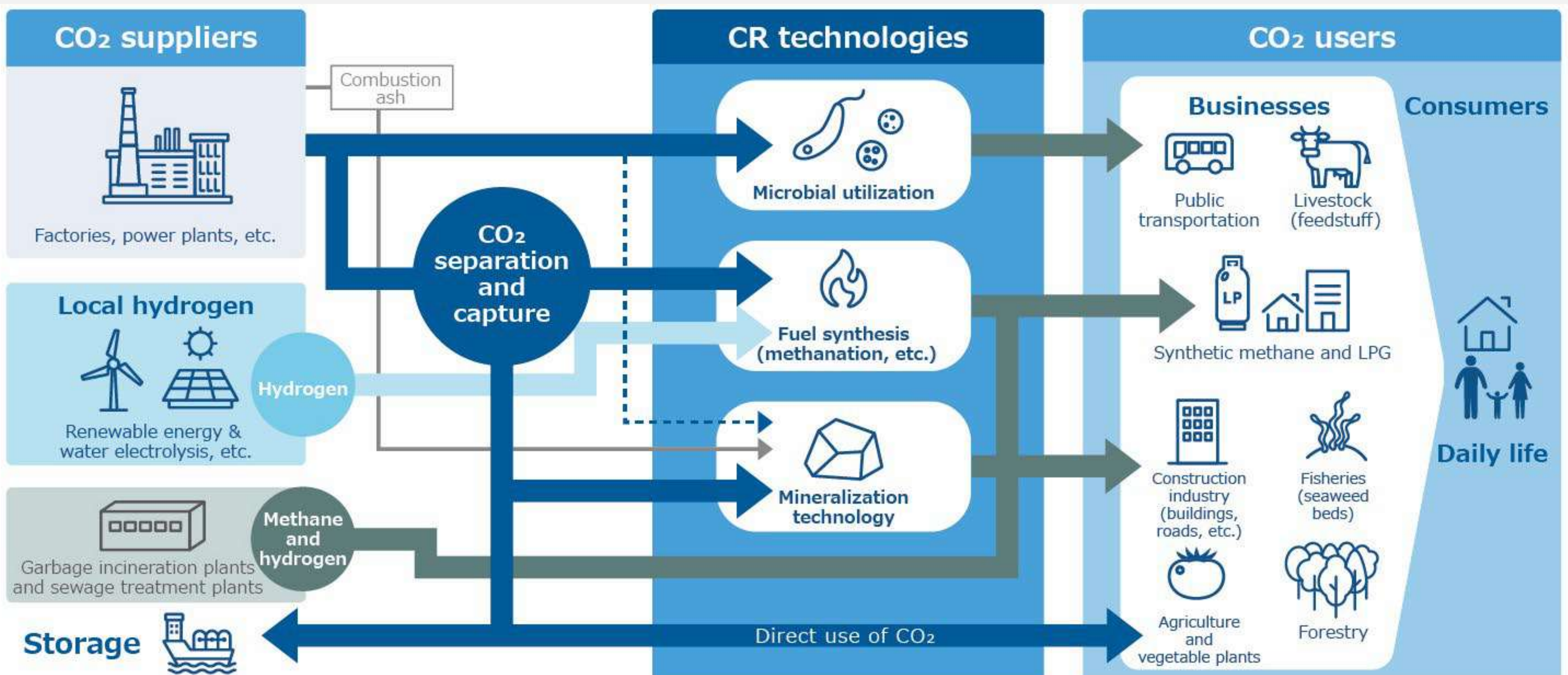


# Business Support

establishment of CO2 value chain

## Working Group for Social Implementation

- We studied how to connect CO2 value chains in a locality for the first time in Takehara (Hiroshima)
- Participants including CRF members, local government, and research institutes examined how carbon recycling can contribute to local rejuvenation together with local companies





# CARBON RECYCLING FUND INSTITUTE

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Mail



X(Twitter)