Our Response to the TCFD Recommendations

Becoming a TCFD Signatory by Declaring Our Support for Its Guidelines

On February 14, 2020, we declared support for recommendations issued by the Task Force on Climate-related Financial Disclosures (TCFD) and became a TCFD signatory.

Idemitsu's Approach to the Disclosure of Climate Change-Related Information

We disclose information in accordance with TCFD recommendations. Using our robust information disclosure framework, we will proactively disclose information to stakeholders, accurately identifying risks and opportunities arising from climate change in connection with our business.

Area	TCFD recommendations	Idemitsu's disclosure	Page for disclosure
Governance	1. Describe the Board's oversight of climate-related risks and opportunities	• Governance system for climate change	▶P.12, 16,64
	2. Describe management's role in assessing and managing climate-related risks and opportunities	• Governance system for climate change	▶P.16
Strategy	1. Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term	• Identification of risks and opportunities • Responding to risks and opportunities	▶P.19
	2. Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning	• Identification of risks and opportunities • Responding to risks and opportunities	▶P.19
	3. Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario	• Scenario Analysis • Business portfolio reform	▶P.9,19
Risk management	1. Describe the organization's processes for identifying and assessing climate-related risks	• Climate change risk assessment process (Evaluation by each business site and the Safety & Environmental Protection Headquarters)	▶P.16, 17,19
	2. Describe the organization's processes for managing climate-related risks	• Climate change risk assessment process (Report to the Management Committee and evaluation)	▶P.16, 17,19
	3. Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management	• Climate change risk assessment process	▶P.16, 17,19
Metrics and Targets	1. Disclose the metrics used by the organization to assess climate-related risks and opportunities in line with its strategy and risk management process	• GHG emission reduction target, absolute amount and per unit of production	▶P.21
	2. Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 GHG (greenhouse gas) emissions and the related risks	• GHG emission reduction target, absolute amount and per unit of production • Identification of risks and opportunities	▶P.19,21
	3. Describe the targets used by the organization to manage climate-related risks and opportunities, as well as disclose performance against targets	• GHG emission reduction target, absolute amount and per unit of production • GHG emission reduction results	▶P.21

Response to Circular Economy

The Circular Economy Concept

Idemitsu Group recognizes that the goal of realizing a circular economy is to transform the conventional mass production, mass consumption and mass disposal society into a society that minimizes the consumption of natural resources and reduces the burden on the environment as much as possible. In recognition of this, the Idemitsu Group is promoting a variety of initiatives to ensure that renewable resources are consumed at a sustainable rate, which does not overtax their rate of renewal, and that nonrenewable resources are consumed in the most effective manner. Simultaneously, we are working to reduce consumption of non-renewable resources over time by shifting to renewable alternatives.

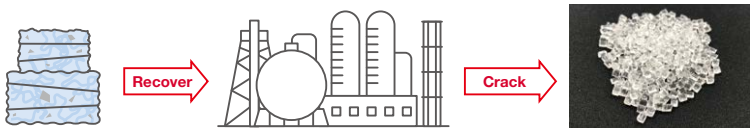
Examples of Initiatives

We are actively engaged in activities on how to realize a sustainable circular business while ensuring the sustained and efficient use of renewable resources and their incorporation into our business supply chain. To this end, we are taking an across-the-board approach to fully utilize the diverse technologies possessed by each department and meet this challenge.

Specifically, we are engaged in plastic recycling, solar panel recycling, and, from a long-term perspective, carbon recycling, which treats CO_2 as a resource.

Plastic Recycling

We are working on the practical application of chemical recycling, in which collected plastics are decomposed and returned to chemical raw materials by using the cracking units for petroleum refining.



Plastic waste | Refinery cracking equipment | Plastic resin

We are also aware of the need to tackle the problem of marine plastic waste by rallying every company in the supply chain. We have joined two industry associations and started sharing and exploring information. We are also working to raise awareness of the problem of marine plastics within the Company.

- Japan Initiative for Marine Environment (JaIME)
  Established by five Japanese chemical-related associations (Japan Chemical Industry Association, The Japan Plastics Industry Federation, Plastic Waste Management Institute, Japan Petrochemical Industry Association, and Vinyl Environmental Council).
- Clean Ocean Material Alliance (CLOMA)
  Consisting of 361 business corporations and organizations from plastic supply chains (as of August 27, 2020)

Response to Circular Economy

Solar Panel Recycling

In August 2020, a project proposed by Solar Frontier K.K., was adopted by the New Energy and Industrial Technology Development Organization (NEDO) as a joint-research project to be supported by the programs "Technological Development for Promoting Solar Power Generation and Making It a Major Power Source" and "Technological Development for Achieving Long-Term Stable Energy Source based on Solar Power Generation." The aim of this project is to demonstrate a technology for the material recycling of waste crystalline silicon and CIS solar cell modules in a way that generates lower environmental burden.

The volume of solar cell modules that must be disposed of is expected to grow radically from the 2030s onward. According to NEDO, the estimated annual volume of disposed modules will peak at some point in the 2035–2037 period, reaching somewhere between 170,000 and 280,000 tons. Anticipating these circumstances, Solar Frontier has recognized the importance of establishing a technology that enables a low-cost and eco-friendly process for recycling solar cells as part of efforts to popularize solar power generation without increasing environmental impact. Therefore, since 2010 the company has been engaged in the ongoing development of technology for recycling CIS thin-film solar cells.

In FY2019, Solar Frontier took on the development of element technology supporting the material recycling of laminated glass-type solar cells through a joint-research project with NEDO. Building on low-cost decomposition technology established by prior R&D and technological demonstration activities, the project confirmed the ratio of material recycling can potentially be increased to approximately 90%.

Through engagement in the latest joint-research project, we aim to further advance this technology with the aim of reducing recycling costs and enhancing the eco-friendliness of the process involved.

Specifically, over the four years from FY2020 to FY2023, we will take on the development of a recycling technology for crystalline silicon-based solar cells in addition to the development of similar technology for CIS thin-film solar cells. In the course of this endeavor, we will also aim to contain the cost of separation processing at 3 yen/W or lower for both types of cells. Moreover, we will develop applications for separated materials in line with our target of achieving a material recycling ratio of 90% or more. To this end, we intend to build a continuously operating demonstration plant for processing commercial-size solar cell modules at the Kunitomi Plant (Kunitomi-cho, Miyazaki Prefecture), a production base run by Solar Frontier. We will thereby strive to demonstrate the targeted recycling technology by the end of the project period.

■ CIS thin-film solar cell modules processed by a panel separator

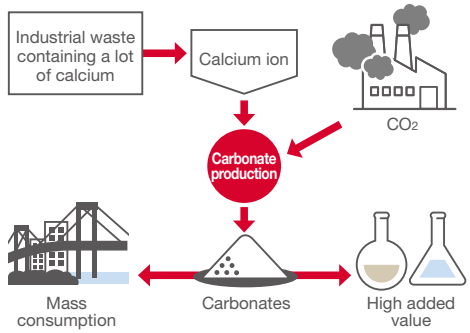
■ Comparison of cover glass processed by a panel separator and the cover glass of a new solar panel (Transparency of processed cover glass is comparable to that of new cover glass)

Carbon Recycling

Treating CO_2 as a resource, we promote carbon recycling by producing various carbon compounds from CO_2 and reusing them for such applications as producing chemicals, fuel, and minerals. We are a member of the Working Group on the Roadmap for Carbon Recycling Technologies organized by the Japanese government, and is engaged in R&D on carbonate production and other technologies aimed at enabling the reuse of CO_2 as a resource.

● Carbonate Production

In tandem with Ube Industries, Ltd., JGC Corporation, JGC Japan Corporation and several universities, our company co-founded "CCSU (Carbon dioxide Capture and Storage with Utilization) Study Group" in 2019. This study group aims to promote an industry-academia collaboration to develop new technologies that convert CO_2 emitted from thermal power plants and factories into resources by utilizing industrial waste with high calcium content. With the Japanese government promoting the development of technologies for CO_2 recovery and other measures to combat global warming, we are working on technological development aimed at establishing methods for utilizing industrial waste containing high levels of calcium and other substances that react with CO_2 to produce carbonates. By doing so, we strive to make CO_2 a value-added material.



In July 2020, a project deriving from the study group was adopted by NEDO as a commissioned R&D project spanning five years from FY2020 through FY2024. Focused on the R&D of an accelerated carbonate production process employing calcium contained in industrial waste, including waste concrete, this project will take on the development of technologies for extracting raw material calcium from such waste and reacting it with CO_2 contained in exhaust gas from industrial facilities in order to fix the carbon with the aim of commercializing and popularizing this process. Moreover, looking to assess the CO_2 reduction effect of the accelerated carbonate production technology, we will test and evaluate it with the aim of improving the efficiency of calcium extraction and carbonate production as we strive to optimize the entire process and establish the technology.

Through our involvement in this commissioned project, we will play our part in industry-academia-government collaboration to develop new carbon fixation technologies that utilize CO_2 emitted from power generation and manufacturing facilities. We will also step up our initiatives in fields ranging from raw material procurement to application development to achieve the social implementation of these technologies.

● Our Unique Technologies for Reusing CO_2 as Resources

We have succeeded in the direct synthesis of methane and other hydrocarbons from water and CO_2 using a gas diffusion electrode loaded with our original catalysts. Most competing processes for synthesis begin by dissolving CO_2 in water to generate a reaction. Our unique process avoids this step by employing a gas diffusion electrode to stimulate a direct reaction with CO_2 gas. We are currently striving to improve the properties of our electrode catalysts, such as their reaction performance, cost-effectiveness, and durability, as we work to develop a process capable of treating greater volumes of CO_2.

Looking ahead, we will promote research into this technology with the goal of establishing a highly efficient process that is powered by renewable energy and produces hydrocarbons, alcohol, and other useful substances from CO_2 by 2030. In these ways, we will promote the reuse of CO_2 and contribute to a sustainable society.