



## Response to Climate Change

### Basic Stance

Recognizing that responding to climate change is one of the most important issues that must be addressed on a global scale, Idemitsu Group works to solve this issue through both "mitigation" and "adaptation" by making maximum use of our resources.

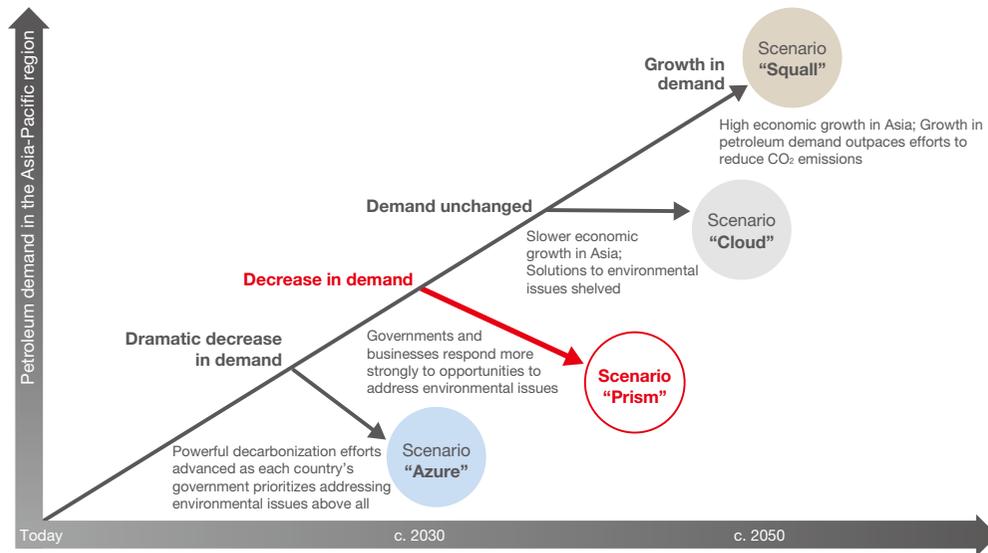
Assuming multiple scenarios of future possible business environments through scenario analysis, we identify risks and opportunities and reflect the results in its strategies and initiatives.

### Scenario Analysis

With regard to risks and opportunities associated with climate change, we used scenario analysis to explore possible energy transition pathways, resulting from decarbonization, development of environmental technologies, and social change, and to examine their impacts on our company.

Scenario analysis identifies energy demand and the effects of climate change in the Asia-Pacific region and the management environment in 2050 is assumed. Four scenarios were prepared, including a scenario in which the increase in energy demand exceeds the trend toward low-carbon emissions due to the high growth of the Asian economy, and a scenario in which the targets of the Paris Agreement are achieved. (Figure below) We are examining specific priority topics with a strong awareness of the "Prism" scenario, in which the company is expected to take stronger environmental measures.

#### ■ Long-term Scenarios for Conditions of the Energy Business in the Run-up to 2050



### Risks and Opportunities

On the basis of scenario analysis, we examined the risks and opportunities we face. As for risks, we recognize a decline in demand for petroleum products due to the spread of electric vehicles (EVs) as well as changes in consumer awareness, and a decline in the reputation of the fossil fuel business. On the other hand, with an increasing demand for renewable energy and environmentally friendly products, we are aware of opportunities to contribute to the realization of a low-carbon society and to expand our businesses.

We aim to reform its business portfolio in order for the Group to become a group of resilient companies by responding to these risks and strengthening its business initiatives to capture opportunities. (Quantitative targets for business portfolio transform on Page 9)

Classification	Matters to be evaluated	Response and initiatives
Transition risk	Decline in demand for petroleum products due to the spread of EVs and changes in consumer awareness	<ul style="list-style-type: none"> <li>Market monitoring and the establishment of optimal production, supply and sales systems</li> <li>Departure from the business portfolio depending on fossil fuel</li> </ul>
	Decline in energy prices due to technological advances	<ul style="list-style-type: none"> <li>Strengthening of the competitiveness of the entire supply chain</li> </ul>
	Possibility of divestment of the coal mining	<ul style="list-style-type: none"> <li>Development of mixed burning technology with black pellets and biomass</li> </ul>
Physical risk	Decline in the reputation of the oil and coal business	<ul style="list-style-type: none"> <li>Strengthening of external engagement</li> </ul>
	Suspension of equipment operation and damage to bases due to abnormal rainfall and others	<ul style="list-style-type: none"> <li>Reinforcement of equipment maintenance and strengthening of the supply chain</li> </ul>
	Impact of sea-level rise on manufacturing and distribution bases	<ul style="list-style-type: none"> <li>Measures such as reinforced seawall and relocation of control rooms</li> </ul>
Opportunity	Expanding demand for renewable energy	<ul style="list-style-type: none"> <li>Development of renewable energy sources in Japan and overseas</li> </ul>
	Strengthening of IMO (International Maritime Organization) regulations	<ul style="list-style-type: none"> <li>Efficiency improvement and reinforcement of refinery facilities</li> </ul>
	Increasing demand for environmentally friendly products with low environmental impact	<ul style="list-style-type: none"> <li>R&amp;D and overseas expansion of lubricants for electric vehicle units, advanced greases, and biological pesticides</li> </ul>
	Increasing demand for energy-saving materials	<ul style="list-style-type: none"> <li>Development of applications for next-generation materials and commercialization of all solid state lithium-ion battery materials</li> </ul>
	Development of distributed energy resource systems	<ul style="list-style-type: none"> <li>Development of and entry into VPP (virtual power plant) control services</li> </ul>
	Development of the circular economy	<ul style="list-style-type: none"> <li>Development of recycling technologies for waste plastics, solar panels, carbon, etc.</li> </ul>
Opportunity	Advent of the MaaS (Mobility as a Service) society	<ul style="list-style-type: none"> <li>Development leveraging the existing SS (service station) network and entry into ultra-compact EVs</li> </ul>
	Development of natural gas resources	<ul style="list-style-type: none"> <li>Shifting focus from oil to gas</li> </ul>

### Risk Management

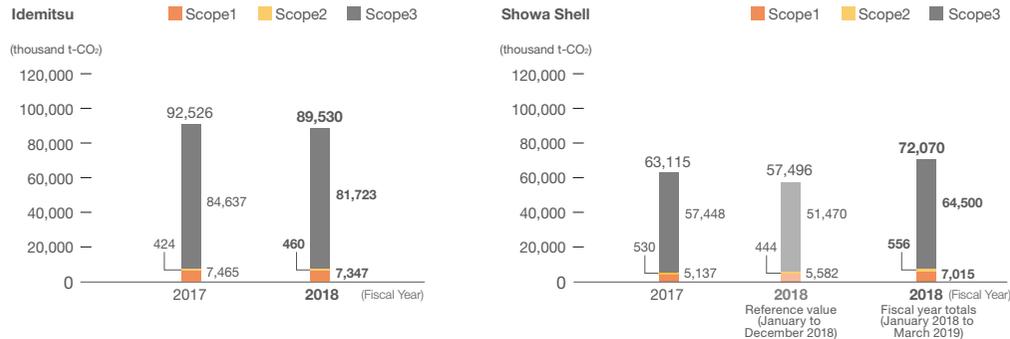
Climate-related risks are also identified and assessed by the Safety & Environmental Protection Headquarters. In addition, receiving advice from outside experts, the Safety & Security Advisory Committee conducts risk management from objective viewpoints. We are also developing a comprehensive risk management system that incorporates ESG elements into our internal control system.

## Response to Climate Change

### Concept of Climate Change Mitigation

We believe it is important to reduce GHG (greenhouse gas) emissions not only our Scope 1 and 2 emissions, but also throughout the value chain including Scope 3, because emissions from the consumption of our products (Scope3) are overwhelmingly larger than those from direct emissions (Scope 1) of refineries, plants, and factories or emissions from electricity use (Scope 2). (Refer to the figure below). In particular, we place top priority on reducing CO<sub>2</sub>, which accounts for more than 90% of Japan's GHG emissions.

#### Our group's CO<sub>2</sub> Emissions by Scope

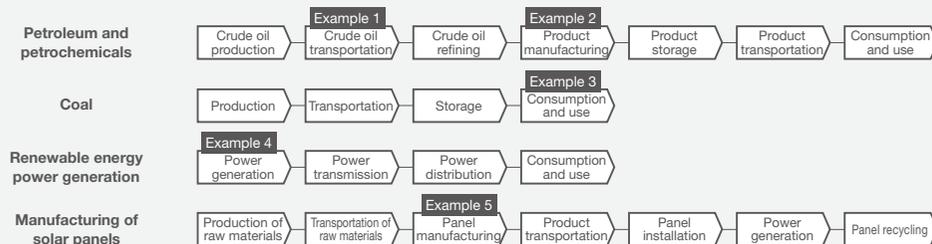


\* Idemitsu's results for FY2017 do not include S3-6 (Business Travel) and S3-7 (Employee commuting).

\* Figures of Showa Shell for 12 months (January – December 2018) listed for reference purpose are not covered by the independent practitioner's assurance.

There are many areas in diversified value chains related to the Idemitsu Group businesses that could contribute to reducing CO<sub>2</sub> emissions. Therefore, we will contribute to reducing CO<sub>2</sub> emissions by strengthening activities in these areas.

#### Value chains in various businesses and examples of contribution to reducing CO<sub>2</sub> emissions



#### Examples of contribution to the reduction of CO<sub>2</sub> emissions in the value chains

- Example 1** Reduction of fuel consumption by improving the operating efficiency of crude oil carriers
- Example 2** Reduction of fuel consumption by promoting energy-saving at refineries
- Example 3** Reduction of coal consumption by introducing a high-efficiency combustion system for coal-fired boilers
- Example 4** Limitation of fossil fuel power generation by expanding renewable energy power generation
- Example 5** Expansion of renewable energy power generation by manufacturing and supplying solar panels

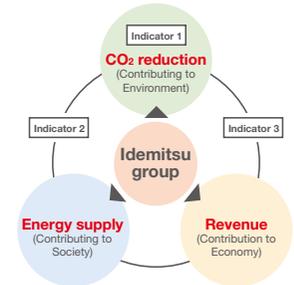
### CO<sub>2</sub> Reduction Targets and Monitoring Indicators

We recognize that environmental contribution by reducing own CO<sub>2</sub> emissions is not enough in the light of corporate sustainability. At the same time, we believe it is important to contribute to society by providing low-carbon energy with a view to the transition to a low-carbon society in the future, and to contribute to the economy by continuing to generate profits while transforming our business portfolio.

In addition to its fossil fuel business, we conduct business related to the development of renewable energy and environmentally friendly products, as well as research aimed at solving social issues. These activities contribute to the reduction of CO<sub>2</sub> emissions on a global scale throughout our value chain. We recognize that this concept will become even more important in the future along with the reduction of CO<sub>2</sub> emissions by the Group.

Based on this recognition, our group will accelerate its efforts to reduce CO<sub>2</sub> emissions by establishing 3 indices.

The CO<sub>2</sub> reduction targets in Indicator 1 are set in Japan's 2030 Nationally Determined Contribution of GHG reduction targets in a way that greatly surpasses the targets of industry associations to which we belong. Indicator 2 is based on the assumption that energy demands of customers are stably supplied. At present, indicator level is set in a manner that is consistent with the levels required by society as outlined in our company's scenario "Prism." However, we will revise the indicator level as needed while monitoring trends in low carbon energy demand by society.



#### Target value

##### Indicator 1 Scope 1 + 2 Reduction of Our group

(An indicator of the extent to which "Scope 1 + 2 emissions" has been reduced through promotion of energy conservation activities at refineries, plants, and factories, etc.)

##### 2030 Target (compared to 2017 levels): 2 million ton-CO<sub>2</sub> (▲15%)

(Calculation formula) = CO<sub>2</sub> emissions in target year (Scope 1 + 2) - CO<sub>2</sub> emissions in base year (Scope 1 + 2)

#### Monitoring indicator

##### Indicator 2 Low carbon level of supplied energy

(Indicator of the extent to which an energy company can reduce the "CO<sub>2</sub> emissions per unit of energy" supplied to society)

##### 2050 Indicator Level (compared to 2017 level): ▲30%

(Calculation formula) =  $\frac{\text{CO}_2 \text{ emissions (Scope 1 + 2 + 3) - CO}_2 \text{ avoided emissions}^*}{\text{Amount of energy supplied to society}}$

##### Indicator 3 Degree of carbon exit from corporate earnings

(Indicator of how the "Revenue level per unit of CO<sub>2</sub>" emitted by the company as a whole is being raised)

(Calculation formula) =  $\frac{\text{Revenue}}{\text{CO}_2 \text{ emissions (Scope 1 + 2 + 3) - CO}_2 \text{ avoided emissions}^*}$

\* CO<sub>2</sub> reduction contribution through the entire value chain

## Response to Climate Change

### Contribution to the Reduction of CO<sub>2</sub> Emissions Through the Entire Value Chains

We are committed to reducing CO<sub>2</sub> emissions on a global scale throughout the entire value chains. We will promote contribution to the reduction of CO<sub>2</sub> emissions through our business activities in the following five areas.

- Promotion of energy conservation and zero emission of power consumption
- Provision of environmentally friendly products and services
- Expansion of renewable energy power generation
- Expanding supply of biomass fuels
- Development and social implementation of innovative technologies

#### Promotion of Energy Conservation and Zero Emission of Power Consumption

We will work to reduce direct and indirect CO<sub>2</sub> emissions from refineries, complexes and plants. We hold monthly meetings at major manufacturing sites to monitor the progress of energy-saving activities and to share best practices.

- Construction of high-efficiency naphtha cracking furnace (Tokuyama Complex)



Reducing energy consumption through new capital investment

- Illustration of renewable energy supply to an offshore oil field



Participation in a joint project with Equinor and other partners

#### Provision of Environmentally Friendly Products and Services

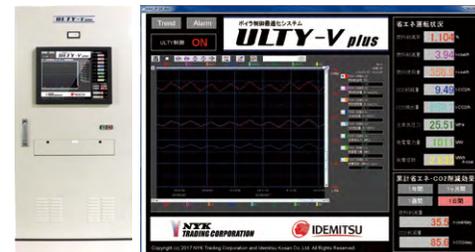
We will contribute to the reduction of CO<sub>2</sub> emissions not only for the Idemitsu Group but also for other companies by providing products and services that help reduce CO<sub>2</sub> emissions.

- Production of domestic solar panels (Kunitomi Plant, Solar Frontier K.K.)



One of the largest production capacities in Japan

- Sale of control optimization system for coal-fired boilers (ULTY-V plus™)



Reduction of coal consumption through optimal operation control

We promote the development of environmentally friendly products in growth business fields as follows:

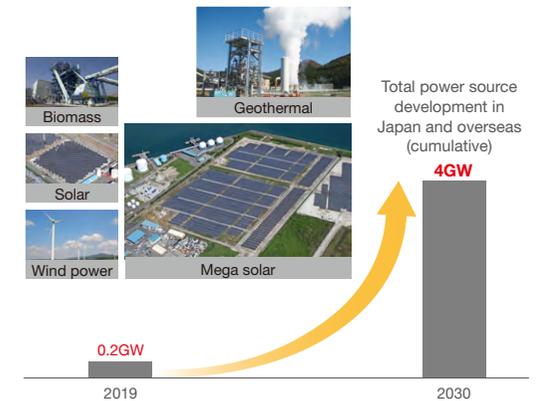
- Products compatible with EVs (high-performance lubricants and grease)
- Development of all-solid lithium-ion rechargeable battery materials
- Next-next-generation high-performance (e.g., ultra-high-efficiency) solar panels
- High-performance grease (utilization of cellulose nanofiber, a biodegradable and safe material derived from wood pulp for food machinery)

#### Expansion of Renewable Energy Power Generation

As of November 30, 2019, we are operating renewable energy power plants generated by solar, geothermal, biomass, and wind power in Vietnam as well as in Niigata, Oita, Kanagawa, and Aomori. We will significantly expand the use of renewable energy sources in Japan and overseas toward 2030 by leveraging our accumulated operational know-how.

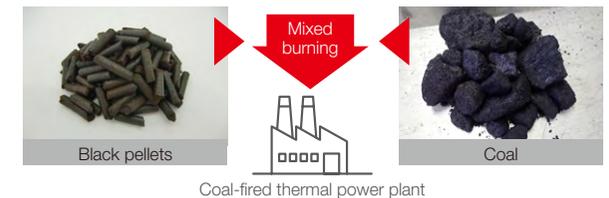
##### Specific Initiatives in FY2019

- Construction of 49.5MW mega solar plant completed in Vietnam
- Decision made to commercialize biomass power generation at the Tokuyama Complex
- Start of 100MW photovoltaic power generation project in Colorado, USA
- Start of 50.5MW photovoltaic power generation project in California, USA



#### Expanding Supply of Biomass Fuels

We are working on the development of black pellets, a biomass fuel that can reduce CO<sub>2</sub> emissions by co-firing with coal at coal-fired power stations. Black pellets are made by pulverizing, drying, roasting, and semi-carbonizing wood. They are superior to conventional white pellets in terms of water resistance and pulverization, and can be handled in the same way as coal. As a result, it is possible to reduce coal consumption and increase the use of renewable energy (black pellet) without modifying existing facilities. We are preparing to expand our business in Southeast Asia, with a demonstration plant in Thailand at the center.





## Response to Climate Change

### Development and Social Implementation of Innovative Technologies

For transition toward a low-carbon society, we will continue to actively promote the practical application of CCS (Carbon dioxide capture and storage), CCU (Carbon dioxide capture and utilization), and CO<sub>2</sub>-free hydrogen, for which technological innovation will be significantly expected in the future, through demonstration tests and other means.

#### ■ Cooperation in the CCS Demonstration Test Project

We have been cooperating in a carbon capture and storage (CCS) demonstration project that the Japan CCS Co., Ltd. has been operating in Tomakomai, Hokkaido Prefecture, on commission from the Ministry of Economy, Trade and Industry (METI) and New Energy and Industrial Technology Development Organization (NEDO). The project is utilizing CCS technology that absorbs CO<sub>2</sub> from gaseous power plant emissions before it can be released into the atmosphere, pumping it deep underground to sequester it. Since April 2016, our role in the project has been to supply the gas containing CO<sub>2</sub> from the Hokkaido Refinery for use in the demonstration project.

#### ■ Participation in the Working Group on the Roadmap for Carbon Recycling Technologies

We participated in the Working Group on the Roadmap for Carbon Recycling Technologies established by the METI. The Working Group was established to promote an effective and rapid development of carbon recycling technologies. The roadmap was compiled in June 2019.

#### ■ Cooperation in the Hydrogen Supply Chain Demonstration Project

We are cooperating in the world's first international hydrogen supply chain demonstration project promoted by the Advanced Hydrogen Energy Chain Association for Technology Development (AHEAD) supported by NEDO. This project will contribute to the utilization of hydrogen, which does not emit CO<sub>2</sub> during combustion, in large-scale power generation. In this project, hydrogen will be separated from liquid (methylcyclohexane), which will be transported from Brunei Darussalam, by a demonstration plant newly constructed by AHEAD on the premises of Keihin Refinery of TOA Oil Co., Ltd., the company of our Group. The plant is scheduled to be operated at the Keihin Refinery from 2020.

#### ■ Conceptual drawing of the dehydrogenation plant

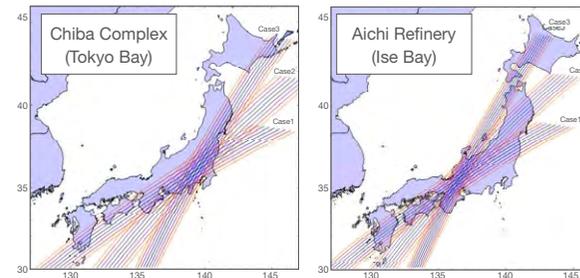


### Concept of Climate Change Adaptation

Climate change is said to be one of the causes of intensification of natural disasters. In the event of a natural disaster, it is extremely important to clarify damage estimates, identify risks, minimize damage to refineries and complexes, and restore operations as soon as possible. In order to enable Idemitsu to fulfill its mission of energy supply, we work on investing in facilities and equipment as a mean of safety assurance management, as well as enhancing emergency responses from the perspective of disaster mitigation in the event of unexpectedly large-scale disasters. We also work on strengthening our ability to respond to disasters by conducting training in collaboration with local governments and industry associations to prepare for operations in the event of a disaster.

Recently, an increasing number of typhoons crossed the country while maintaining their strength. High tides caused by typhoons will increase the risk of flooding at refineries and complexes located in coastal areas. The Idemitsu Group therefore simulates the route along which the largest-scale typhoon expected in the future directly hits refineries and complexes, and analyzes the impact of inundation caused by high tides. Based on this analysis, we are considering investment (installation of flood-prevention walls for seawater pump rooms, reinforcement of tetra-pods for seawalls, etc.) and emergency responses.

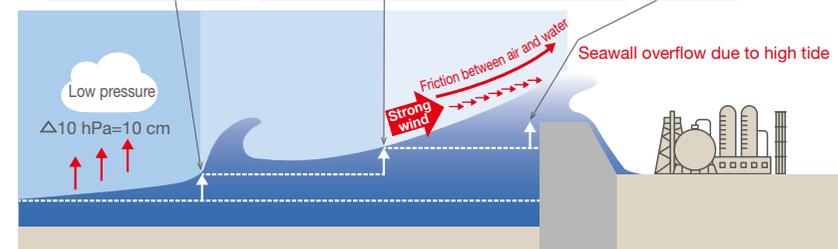
#### ■ Assumption of typhoon tracking maps to be used as a basis for studying high tide damage to refineries and complexes



#### ■ Assumed image of high tide damage

Rise in sea level due to weather conditions

$$= \text{inverse barometer effect} + \text{rise in average sea level due to breaking waves} + \text{wind surge}$$





## Column Idemitsu Group's Technologies Underpinning Innovation

### R&D Structure

Technological innovation is essential to achieving the objectives of the Paris Agreement, an international framework to address climate change issues, where corporate R&D activities will play an important role. Idemitsu Group will continue to create innovations that can contribute to solving various social problems, including climate change, through the development of state-of-the-art technologies in various fields, which it has cultivated over the years through the development of petroleum products.

Our R&D system is comprised of "Advanced Technology Research Laboratories", which supervises corporate R&D, and research laboratories in each department. Each of them carries out specialized development. In addition, we established "Research and Development Committee" as the company-wide organization to not only examine the direction of company-wide research and development, strategies, and issues, but also to deepen cooperation among laboratories and to strengthen technological capabilities.

Segment and name of laboratory		Outline of Initiatives	
Corporate R&D	Advanced Technology Research Laboratories (ATRL)	Environment & Energy Research Laboratory	<ul style="list-style-type: none"> <li>Research on climate change measures (Biofuels and Biochemicals), development of biological materials and high performance materials</li> </ul>
		Frontier Materials Development Laboratory	<ul style="list-style-type: none"> <li>Development of advanced functional materials</li> </ul>
		Advanced Battery Materials Research Laboratory	<ul style="list-style-type: none"> <li>Development of advanced battery materials related with all-solid-state lithium ion battery and lithium recovery technology</li> </ul>
		Atsugi Research Center	<ul style="list-style-type: none"> <li>Research on climate change measures (Artificial photosynthesis and biomass conversion technology)</li> <li>Development of high-performance inorganic thin film semiconductors and devices</li> </ul>
		Analytical Technology Center	<ul style="list-style-type: none"> <li>Providing advanced analysis and solutions to a wide range of fields throughout the group</li> </ul>
Petroleum segment	Technology & Engineering Center	<ul style="list-style-type: none"> <li>Technology development in the area of engineering design, construction, operation, quality control &amp; assurance, and asset integrity &amp; reliability</li> <li>Technology-driven contribution to existing and new businesses</li> </ul>	
Functional materials segment	Lubricants	Lubricants Research Laboratory	<ul style="list-style-type: none"> <li>Research and development of lubricants and tribology (lubrication technology)</li> </ul>
		Idemitsu Lubricants America Corporation R&D Center Idemitsu Lube (China) Co., Ltd. Research & Development Center Idemitsu Lube Asia Pacific Pte. Ltd. R&D Center	<ul style="list-style-type: none"> <li>Local-based research and development of lubricants</li> <li>Global development of lubricants products and technologies with the Lubricants Research Laboratory (Japan) as the mother research center</li> <li>Rapid product development and provision of technical services to meet local needs in overseas</li> </ul>
		Nippon Grease Co., Ltd. Technical Research Laboratory	<ul style="list-style-type: none"> <li>Research and development of grease, rust prevention oil, cutting oil, etc.</li> </ul>
	Advanced materials & Performance chemicals	Performance Materials Laboratories	<ul style="list-style-type: none"> <li>Development of advanced materials through high-value-added petrochemical raw materials</li> </ul>
		Idemitsu Unitech Co., Ltd. R&D Center for Plastic Products	<ul style="list-style-type: none"> <li>Research and development for resin processing product</li> </ul>
		Lion Idemitsu Composites Co., Ltd. Composite Materials Research Laboratory	<ul style="list-style-type: none"> <li>Design, development and analysis of customer grades of composite materials that meet customer needs</li> </ul>
	Electronic materials	Electronic Materials Development Center	<ul style="list-style-type: none"> <li>Research and development of OLED materials</li> </ul>
		Idemitsu OLED Materials Europe AG	
		Advanced Electronic Materials Development Group	<ul style="list-style-type: none"> <li>Research and development of special polycarbonate resins and functional coating agents</li> </ul>
		Inorganic Materials Development Group	<ul style="list-style-type: none"> <li>Research and development of oxide semiconductor materials</li> </ul>
	Asphalt	Bitumen R&D Section	<ul style="list-style-type: none"> <li>Basic research on asphalt and its applications</li> <li>Development of high performance asphalt</li> </ul>
	Agri-Bio	Agri-Bio Technology Section	<ul style="list-style-type: none"> <li>Development of active ingredients for pesticides and feed additives derived from microorganisms and natural products</li> </ul>
		SDS Biotech K.K. Tsukuba Research & Technology Center	<ul style="list-style-type: none"> <li>Development of safe and useful products for the protection of livestock and plants and prevention of diseases</li> </ul>
Lithium-ion battery material	Battery Material Development Center	<ul style="list-style-type: none"> <li>Development of sulfide-based solid electrolytes for practical application of all-solid-state lithium ion batteries</li> </ul>	
Power and renewable energy segment	Photovoltaic power generation	Office of Next Generation Product Development	
		Solar Frontier K.K. Atsugi Research Center	<ul style="list-style-type: none"> <li>Research and development of CIS solar cells</li> </ul>
Resources segment	Coal	Coal & Environment Research Laboratory	<ul style="list-style-type: none"> <li>Only private research institute specializing in coal</li> <li>Provision of technology services that anticipate needs and development of clean coal technologies to meet the needs of a low-carbon society</li> </ul>

### External Evaluation of Idemitsu Group's Technologies

Our technologies are highly appreciated by the international community. As an example, Idemitsu and Showa Shell have been ranked 1st and 3rd respectively in the world among the industry subgroups\* for three consecutive years since 2017 in the "Opportunities in Clean Tech," which is one of the items evaluated by MSCI, an ESG evaluation organization. (Table below)

We will continue to make the most of its advanced R&D capabilities to contribute to the solution of global issues through collaboration with others.

\* Within GICS (Global Industry Classification Standard), Idemitsu Group belongs to the Oil & Gas Refining and Marketing industry subgroup.

#### Ranking of companies in the sector of MSCI's "Opportunities in Clean Tech"

Ranking	2019	2018	2017
1	Idemitsu	Idemitsu	Idemitsu
2	Company A	Company A	Company A
3	Showa Shell	Showa Shell	Showa Shell
4	Company B	Company B	Company D
5	Company C	Company C	Company B

### Examples of Specific Initiatives

#### Development of CIS solar cell technology

At the Atsugi Research Center of Solar Frontier K.K., we are engaged in leading-edge research and development related to CIS solar cells, aiming to improve energy conversion efficiency at both the research and commercial production levels, as well as developing new applications and developing advanced next-generation products with market development potential.

In January 2019, a joint research project with the NEDO (New Energy and Industrial Technology Development Organization) led to the achievement of a world record energy conversion efficiency of 23.35% for the cadmium-free CIS solar cell (Cd-Free CIS solar cell)'s cell (about 1 cm<sup>2</sup>). This record is approximately 0.4 percentage points higher than the highest conversion efficiency of 22.9% (Achieved by our company in November 2017) for cadmium-containing CIS solar cells, and represents the highest conversion efficiency in the world for all CIS solar cells. By applying basic technologies, we are working to lower costs by increasing the output of panels and to deliver environmentally friendly and economical products to customers.

#### Utilization of Collagen and Mucin Derived from Jellyfish

These days, jellyfish are popular in aquariums because of their beautiful appearance. However, jellyfish may have a negative impact on fisheries and businesses of companies along the coast. The use of jellyfish as a resource is desired worldwide.

Jellyfish Research Laboratories, Inc. (Kanagawa Prefecture), the company of our Group, has invented a technology to utilize useful ingredients made from jellyfish. Collagen derived from jellyfish has been confirmed to be effective in promoting the regeneration of epidermis which is considered to be difficult to regenerate, and is expected to be used in the fields of regenerative medicine and beauty treatment. Mucin derived from jellyfish is also expected to have potential as a treatment for knee osteoarthritis.

By taking advantage of the characteristics of jellyfish, we will create the future of life science and contribute to the quality of life of people around the world.



## Response to Climate Change

### Idemitsu Group's Information Disclosure on Climate Change

We disclose information in accordance with TCFD\* recommendations. We will proactively disclose information to stakeholders by accurately identifying risks and opportunities of climate change in our business through our information disclosure framework.

Area	TCFD recommendations	Idemitsu's disclosure	Page for disclosure
Governance	1. Describe the board's oversight of climate-related risks and opportunities	<ul style="list-style-type: none"> <li>Governance system for climate change</li> </ul>	▶ P.15
	2. Describe management's role in assessing and managing climate-related risks and opportunities	<ul style="list-style-type: none"> <li>Governance system for climate change</li> </ul>	▶ P.15
Strategy	1. Describe the climate-related risks and opportunities the organization has identified over the short, medium, and long term	<ul style="list-style-type: none"> <li>Identification of risks and opportunities</li> <li>Responding to risks and opportunities</li> </ul>	▶ P.18
	2. Describe the impact of climate-related risks and opportunities on the organization's businesses, strategy, and financial planning	<ul style="list-style-type: none"> <li>Identification of risks and opportunities</li> <li>Responding to risks and opportunities</li> </ul>	▶ P.18
	3. Describe the resilience of the organization's strategy, taking into consideration different climate-related scenarios, including a 2°C or lower scenario	<ul style="list-style-type: none"> <li>Scenario Analysis</li> <li>Business portfolio reform</li> </ul>	▶ P.7, 9, 18
Risk management	1. Describe the organization's processes for identifying and assessing climate-related risks	<ul style="list-style-type: none"> <li>Climate change risk assessment process (Evaluation by each business site and the Safety &amp; Environmental Protection Headquarters)</li> </ul>	▶ P.15, 16, 18
	2. Describe the organization's processes for managing climate-related risks	<ul style="list-style-type: none"> <li>Climate change risk assessment process (Report to the Management Committee and evaluation)</li> </ul>	▶ P.15, 16, 18
	3. Describe how processes for identifying, assessing, and managing climate-related risks are integrated into the organization's overall risk management	<ul style="list-style-type: none"> <li>Climate change risk assessment process</li> </ul>	▶ P.15, 16, 18
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	<ul style="list-style-type: none"> <li>GHG emissions absolute amount and per unit of production</li> </ul>	▶ P.19
	2. Disclose Scope 1, Scope 2, and, if appropriate, Scope 3 GHG (greenhouse gas) emissions, and the related risks	<ul style="list-style-type: none"> <li>GHG emissions reduction targets</li> </ul>	▶ P.19
	3. Describe the targets used by the organization to manage climate-related risks and opportunities and performance against targets	<ul style="list-style-type: none"> <li>GHG emissions reduction targets</li> </ul>	▶ P.19

\* TCFD: The Task Force on Climate-Related Financial Disclosures established by the Financial Stability Board in 2015

## Response to Circular Economy

### Concept of Circular Economy

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. We are promoting a variety of initiatives to ensure that renewable resources are consumed within their renewable capabilities, that resources without renewable capabilities are consumed in the most effective manner, or can be shifted to other renewable resources while reducing their use over a long period of time.

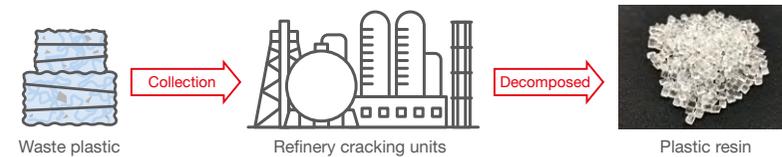
### Examples of Specific Initiatives

We aim to realize sustainable circular business by reusing renewable resources as much as possible and incorporating them into its business supply chain.

Specifically, we are engaged in plastic recycling, solar panel recycling, and, from a long-term perspective, carbon recycling, which treats CO<sub>2</sub> 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.



The problem of marine plastic waste involves the related all companies in the supply chain. Idemitsu has joined two industry associations and started sharing and exploring information. We are also working to raise awareness of the problem of marine plastics waste within the Company.

#### ■ Japan Initiative for Marine Environment (JaIME)

JaIME was 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)

CLOMA is affiliated by 250 companies in the plastic supply chain.

### Recycling of Solar Panels

In collaboration with NEDO, Solar Frontier K.K. of our Group is working on the development of CIS solar cell recycling technology. This recycling technology is characterized by the separation and collection of each material. It has been confirmed that more than 90% of rare metals such as indium and selenium contained in the battery can be collected. We will apply this treatment technology to the recycling of crystalline silicon solar panels. In the future, we plan to construct a pilot line at the Kunitomi Plant, where we will study the feasibility of solar panel recycling technology.