

Measures to Combat Climate Change

(Disclosure in Line with the TCFD Recommendations and Carbon Neutrality Initiatives)

Basic Stance and Policies

Although it uses fossil raw materials and fuels in its product manufacturing processes and emits a considerable amount of greenhouse gases, the Showa Denko Group has many products that contribute to energy conservation and to the carbon cycle. We regard measures to combat climate change as a management priority in terms of both risks and opportunities. In May 2019, we announced our endorsement of the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD). In accordance with these recommendations, we are promoting sound dialogue with our stakeholders while evaluating risks and opportunities related to climate change and conducting scenario analysis to inform initiatives that enhance our resilience.

Governance and Risk Management

Climate change and other sustainability initiatives are overseen by the Group CEO and promoted by the Group CSO. Meanwhile, strategies to mitigate climate change risks and contribute to the greater society are discussed regularly by the Sustainability Promotion Council, which includes the CEO and other chief officers, after discussion by a Groupwide carbon neutrality project team. Opportunities are emphasized alongside risks in these discussions. Information on climate change and other risks with the potential to significantly impact the management of the Company is registered in an integrated manner in our risk management system via Companywide risk assessment activities. Top risks, those risks deemed to have a particularly high frequency or potential degree of impact, are evaluated through discussion by the dedicated Risk Management Committee. Important matters examined by the Sustainability Promotion Council and the Risk Management Committee are submitted to the Management Committee for deliberation and decision before being reported to the Board of Directors.

Strategy and Scenario Analysis

Our assessments of the potential impact of climate change on our businesses were conducted with a focus on data centers. Under the scenarios projecting average global warming of 2°C and 4°C above pre-industrial levels, demand for semiconductors and hard disks (HDs) is expected to grow in conjunction with the data center market, as the digitalization of

society advances. However, these scenarios do not present hope for a large increase in the electricity supply as society transitions to low-carbon energy sources, meaning that governments will likely be providing active support to energy-saving undertakings, and customers' desire for energy conservation options can thus be expected to grow.

Accordingly, there will be a need to reduce the energy consumption of equipment, such as central processing units (CPUs), graphics processing units, memory, HDs, and power supplies at data centers. As semiconductors become more intricate, their energy-saving benefits increase rapidly. Showa Denko is therefore poised to contribute to energy savings by enhancing the precision of its CMP slurries and high-purity etching gases.

However, there is a limit to the degree to which the intricacy of CPUs can be increased. This is one of the reasons we launched the JOINT2 consortium, which is tasked with accelerating development of semiconductor material technologies that contribute to energy savings through higher package density and smaller distance between circuits in back-end semiconductor production processes.

Looking ahead, we anticipate an increased range of opportunities for use of our materials. For example, we have embarked on collaborative initiatives with an affiliate in the optoelectronics field, which is expected to produce next-generation energy-saving technologies. Other opportunities can be seen in the rising capacity of HD media and the move toward SiC devices for power supplies in response to the popularization of electrified vehicles.

Climate Change-Related Risks and Opportunities and Major Response Measures

Recent scenario analyses led us to update the identified risk and opportunities in the semiconductor and electronic materials domain. In this domain, additional decarbonization initiatives will be needed, but there are also significant opportunities on which to capitalize, as this area represents one of our Core Growth businesses.

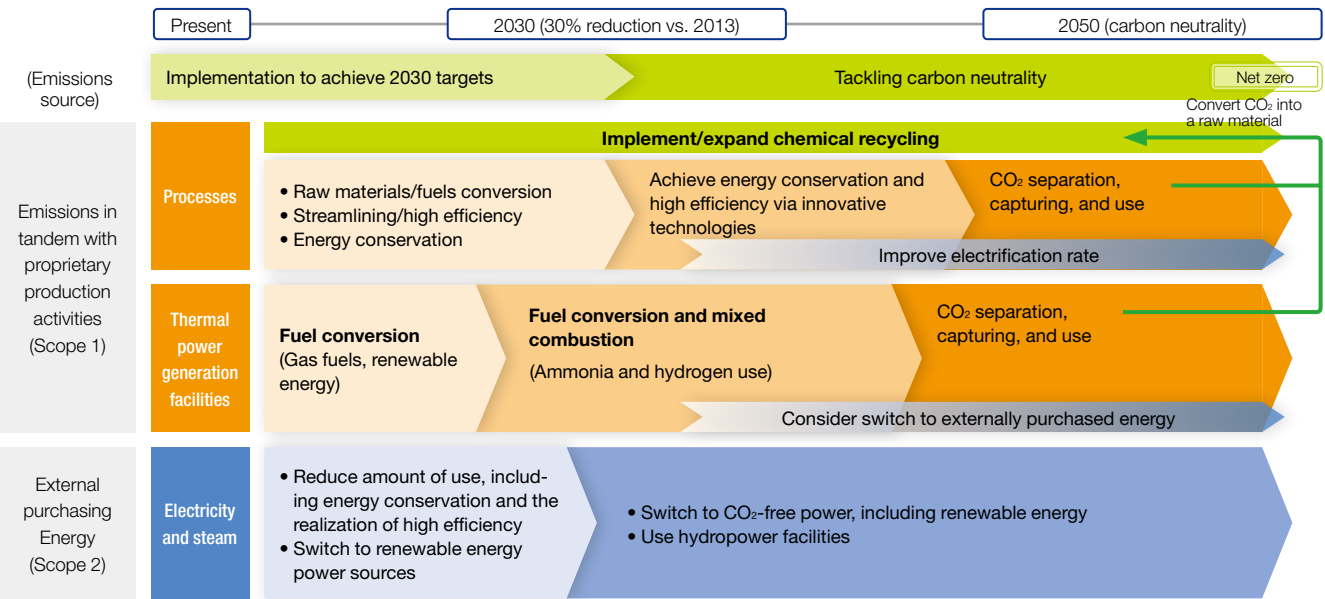
Climate Change-Related Risks and Opportunities and Major Response Measures (The following is a selected extract—please see our website for full details) WEB

	Impact of climate change	Domain	Risk	Opportunity	Response
Transition risks and opportunities (1.5°C and 2°C scenarios)	Increase in tax (cost) due to the introduction of carbon pricing	All business domains	○		• Revision of GHG emissions reduction targets for 2030 and establishment of the roadmap (P.63) • Carbon neutrality initiatives pertaining to chemicals and petrochemicals (P.63) • Participation in the GX (Green Transformation) League
	Increases/decreases in sales due to changes in consumer behavior and awareness		○	○	• Promotion of products, development of new products, and improvement of competitiveness in response to the needs of a decarbonized society • Advancement of R&D based on long-term themes at the Stage for Co-creation (new research facility) (P.57)
	Greater request for initiatives and disclosure related to decarbonization from customers		○		• Establishment of life cycle assessment and carbon footprint calculation frameworks (P.64), tracking of CO ₂ emissions, and formulation of reduction plans
	Government policies supporting decarbonization initiatives of companies	Semiconductor and electronic materials	○	○	• Development of eight-inch SiC wafers for next-generation green power semiconductors (adopted as part of the NEDO Green Innovation Fund project) (P.44) • Development of a low-concentration CO ₂ separation system employing an innovative separation agent (adopted as part of the NEDO Green Innovation Fund project) (P.52) • Reinforcement of the global semiconductor material supply chain (adopted under the Ministry of Economy, Trade and Industry subsidiary program for overseas market survey projects for building resilient supply chains in the Indo-Pacific area)
	Response to technological innovation and reductions to the electricity consumption of semiconductor devices		○	○	• Establishment of the JOINT2 consortium to develop next-generation semiconductor package technologies (adopted as part of the advanced semiconductor manufacturing technology development project under the NEDO post-5G telecommunications system platform reinforcement R&D program) (P.45) • Assessment of environmental standard conformity of product designs, and development of low-carbon products
Physical risks and opportunities (4°C scenario)	Growing demand for energy-saving, next-generation power semiconductors in conjunction with an increase in data processing volumes brought about by digitalization	All business domains	○	○	• HD media R&D to reduce electricity consumption of data centers • Response to increased demand for SiC power semiconductors
	Suspended operation of manufacturing sites due to flooding, and decrease in profit caused by an increase in the equipment repair cost		○		• Analysis of flood risks at manufacturing sites • Regular risk identification and reduction activities, and enhancement of business continuity planning

Indicators and Targets

In preparation for the upcoming integration, we reviewed our greenhouse gas emission reduction targets for 2030 in 2021 and set the target of a 30% reduction relative to the 2013 level. We will review the medium- to long-term plans made for each of our sites, aiming at the creation of a low-carbon economy, and set the medium-term targets for our overseas Group companies. To achieve our greenhouse gas emission reduction targets for 2030, we will further reduce our greenhouse gas emissions and promote energy conservation. Carbon neutrality will also be pursued leading up to 2050, to accomplish the goal of becoming a company that contributes to a sustainable global society as put forth by our long-term vision.

Roadmap to Carbon Neutrality in 2050



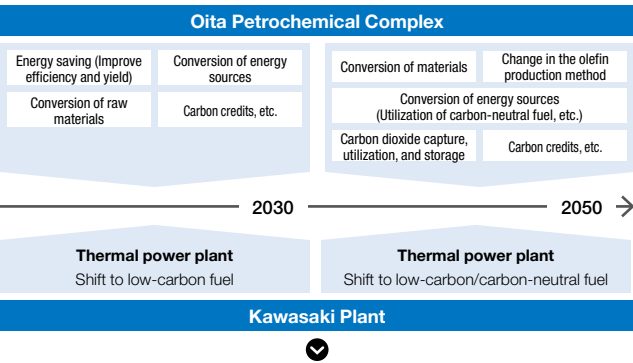
- Up to 2030, promote initiatives for rigorous streamlining, increased efficiency, energy conservation, and conversion to gas fuels (high-efficiency co-generation system)
- Promote technology development for new GHG capture and utilization processes and sustainable plastic chemical recycling
- From 2030 to 2050, promote in earnest initiatives for fuel conversion/mixed-combustion using ammonia and hydrogen, and electrification of production processes
- Promote utilization of private hydroelectric power and shift to renewable energy power for use in production
- Aiming to achieve carbon neutrality, promote the development of innovative GHG capture/utilization technologies, utilization of recycled GHG as chemical materials, and implementation of sustainable plastic chemical recycling technologies

Path to Carbon Neutrality Centered on Petrochemicals and Other Chemicals

The Chemicals segment provides products that are indispensable to society. At the same time, however, it emits more greenhouse gases during its production processes than other segments. For this reason, petrochemical and other chemical operations will be a central focus of our efforts to achieve carbon neutrality. Up until 2030, our pursuit of carbon neutrality will involve building upon existing technologies centered on those for conserving energy and switching to new energy sources. R&D efforts looking toward 2050, meanwhile, will include the low-concentration CO₂ separation system employing an innovative separation agent that was adopted by NEDO under its Green Innovation Fund. WEB

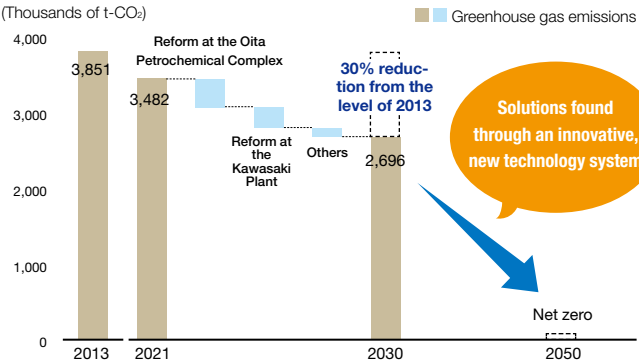
Roadmap for Petrochemicals and Chemicals Businesses

Formulation of reduction measures for the Oita Petrochemical Complex and Kawasaki Plant, contributors of a large portion of Companywide emissions



Promote independent measures while searching for solutions through co-creation with stakeholders

Road to Carbon Neutrality



Note: Figures represent the total of Scope 1 and Scope 2 emissions for Showa Denko (consolidated in Japan) and Showa Denko Materials (non-consolidated).

Topics

Graphite Electrode Production through Renewable Energy Use

Our Omachi Plant, which produces graphite electrodes, has three hydroelectric power generation facilities (Aoki, Tokiwa, and Hirotsu) that utilize the region's shared water resources. Hydroelectric power generation is a reliable, low-carbon source of electricity. In April 2022, this plant also shifted to power sources, certified as not being generated using fossil fuel for electricity purchased, to supplement that procured through hydroelectric power generation. Following the example of the Omachi Plant, our mother factory, we are promoting similar renewable energy initiatives in Europe.

The Omachi Plant is located in Omachi City, Nagano Prefecture, which became the first municipality to be recognized by the Japanese government as evolving into a futuristic city based on the principles of the SDGs in July 2020. Accordingly, this city has unveiled a plan of becoming a sustainable city with plentiful water nurturing co-creative partnerships inspired by the SDGs. Showa Denko is supporting this plan by providing all of the water from the 36 km of waterways it manages for hydroelectric power generation purposes for use in agriculture or daily use by community members. In addition, we are using big data to examine ways to maximize the output of our hydroelectric power generation systems, as part of our efforts to promote the effective use of water together with the community.

Further efforts to reduce greenhouse gas emissions will be taken in the years ahead. These efforts will not be limited to the use of renewable energy and may involve conversion to more eco-friendly fuel sources. Through these initiatives, we will supply graphite electrodes produced using an eco-friendly process.



Hydroelectric power station of the Omachi Plant (Hirotsu)

Greenhouse Gas Abatement Systems

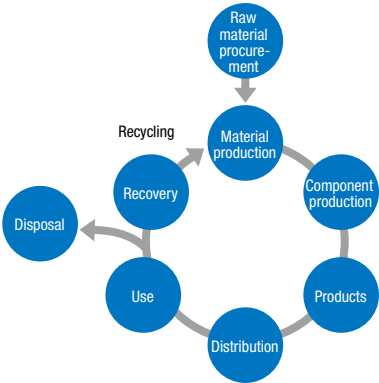
We are developing exhaust gas abatement systems that treat perfluorochemical (PFC) gases, which have a particularly high greenhouse effect coefficient, to contribute to reductions in emissions of greenhouse gases. To date, more than 1,200 of our systems have been delivered around the world. PFC gases are used in processes such as semiconductor etching, and the Company produces and sells high-purity PFC gases as a product. Semiconductors are crucial components found in various products used throughout society. As a chemical manufacturer, we seek to minimize the negative impacts of manufacturing processes on the global climate. We are therefore ramping up foundational development activities for catalysts and chemicals that are more effective at preventing emissions of harmful gases. On this front, we have concluded a joint development agreement with a South Korean abatement system manufacturer, to help us redevelop our product lineup in accordance with requirements of countries around the world. This company has succeeded in commercializing combustion-type and plasma-type abatement systems and boasts superior mechatronics and engineering capabilities. These strengths are anticipated to lead to technical synergies with Showa Denko, which itself has strengths in the field of chemicals, and thereby help us to combat global warming through improvements to existing equipment, cost reductions, and enhancements to systems for local production and consumption.



Life Cycle Assessment and Carbon Footprint Initiatives

Life cycle assessments are a means of quantitative evaluation of the environmental impacts of products and services throughout their entire life cycle, or within a specified portion of this life cycle. At Showa Denko, we base life cycle assessments on our accumulated experience and insight to use assessments as one facet of our establishment and construction of systems, in preparation for the upcoming integration. Specifically, we are developing frameworks to apply life cycle assessment methodologies to measure the total amounts of greenhouse gas emissions (carbon footprint) associated with individual products. For example, life cycle assessments have been commenced to quantify the greenhouse gas emission reduction benefits of the recycling technologies that utilize waste plastic at the Kawasaki Plant. We have also been expanding the scope of these assessments beyond products to apply these methodologies from the R&D phase, and plans have been formulated to begin performing life cycle assessments of R&D activities in 2023. Contracts have been concluded with external life cycle assessment experts to provide guidance to support our implementation of these activities, allowing us to receive advice on our assessment methodologies. Moreover, we participate in the life cycle assessment research groups of external organizations, to coordinate with external experts and other companies through research on concrete case studies.

Product Life Cycle



Environment

Policies and Management

Showa Denko has defined the basic policy for its responsible care activities (🔗 P.66) as being considerate of health, safety, and the environment throughout all stages of product life cycles, and we are working to reduce environmental impacts across product life cycles in accordance with this policy. As a chemical company, we of course seek to minimize the missions of hazardous substances, waste, and pollutants and to fulfill our responsibility as an emitter of such substances. We are also going a step further to appropriately assess the impact of our business on the environment and to implement measures for preserving the environment based on the findings of such assessments, while contributing to the pursuit of carbon neutrality and to the resolution of social issues.

The CEO is the highest authority for environmental preservation

activities, and it is the CEO who leads us in shaping the responsible care policies that form the basis of our environmental preservation activities and in communicating these policies inside and outside the Group. Business divisions and sites are responsible for advancing environmental preservation activities based on these policies, while our headquarters offers support for these activities. Moreover, information on the status of environmental management is shared at regular meetings of the Responsible Care Promotion Council and the Management Committee. These meetings are also used as an opportunity to set Groupwide environmental preservation activity targets, which are then deployed to business sites. Business sites advance environmental preservation and management activities based on the details of responsible care plans formulated by the site manager.

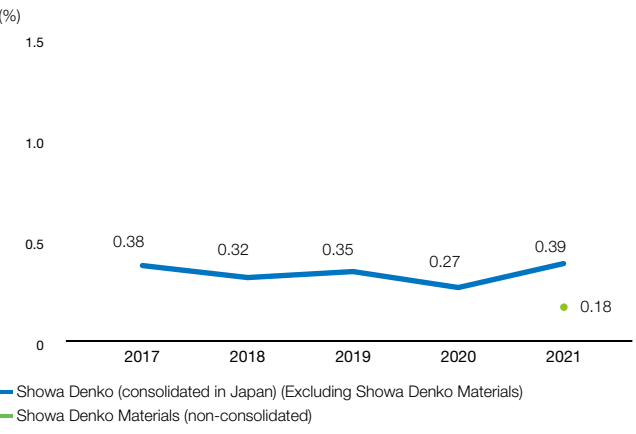
Strategies

One of the material sustainability issues defined in the Company's long-term vision is "gain social credibility through responsible business management." Our efforts to address this issue include a range of environmental initiatives. Environmental management pertaining to environmental risks—such as global warming, waste, and water, air, soil, noise, and vibration pollution—is being improved based on our responsible care policies and through initiatives to develop supply chain-spanning monitoring systems and effective environmental risk management systems. With especially strong environmental management systems overseas, the newly integrated company is promoting environmental preservation on a global scale.

The following KPIs have been defined in relation to material sustainability issues along with targets for 2025, which we are steadily working toward.

Greenhouse gas emissions (Scope 1 + Scope 2) (🔗 P.25)

Ratio of Industrial Waste Sent to Landfills



Priority measures	Targets for 2025	Results in 2021
1) Greenhouse gas emissions (carbon neutrality declaration) 2) Industrial waste sent to landfills 3) Environmental accidents	1) 30% reduction in greenhouse gas emissions (Scope 1 + Scope 2) from fiscal 2013 (consolidated) * Target for 2030 2) 0.5% or less in Japan, 5.0% or less outside Japan 3) Zero environmental accidents (consolidated)	1) 10% reduction for Showa Denko and 0.5% reduction for Showa Denko Materials from fiscal 2013 2) 472 tons out of 135,000 tons of industrial waste sent to landfills, for a ratio of 0.35% (Showa Denko [consolidated in Japan] + Showa Denko Materials [non-consolidated]) 3) Zero accidents (Showa Denko [consolidated in Japan] + Showa Denko Materials [non-consolidated]) (Global information collection frameworks to be developed)

Environmental Measures in Kitakata City

Surveys of soil and underground water at our production base in Kitakata City, Fukushima Prefecture, revealed that the content of fluorine and other substances in soil and underground water exceeded the regulatory standards on the premises as a result of past operations. This fact was reported to the Fukushima Prefectural Government in December 2020, resulting in the site being designated an area which requires action in accordance with the Soil Contamination Countermeasures Act. Environmental response measures based on this act have been implemented since 2021.

Minamata Disease in Niigata Prefecture

With regard to Niigata Minamata disease, which was officially recognized in 1965, we maintain an awareness of the significant scale at which substances emitted by Showa Denko have caused damage to the victims and residents of neighboring areas through contamination of the Agano River, and we are committed to collaborating with the Japanese government as well as local governments in order to cope with this issue with sincerity, and to provide solutions in accordance with the Pollution-related Health Damage Compensation Law and other relevant laws and regulations.