

Message from the Director in Charge of the Environment

TOK uses its world-leading high purification technology and diverse human resources in the pursuit of environmental value and occupational safety.



Nobuo Tokutake *Director, Officer, Department Manager, Manufacturing Dept.*

Megatrends

■ Globalization of Supply Chains and the Deepening Problem of Climate Change

As a fine chemicals manufacturer, TOK supplies high value-added products through the structure of close relationships with customers through its six plants in Japan and five plants overseas. TOK has identified the following megatrends in the external environment in both its upstream and downstream value chains.

First of all, upstream domains have seen greater risks that should be managed more closely amid the megatrend where supply chains are increasingly globalized. Overseas suppliers now account for a larger part of solvent and polymer suppliers, the main materials in photoresists, and these suppliers have a relatively higher risk of accidents than Japanese suppliers. Measures must be taken to address this risk, and also respond to environmental regulations in each country. In downstream domains, environmental and safety-related laws and regulations, as well as regulations concerning the management of chemical substances, have become tougher every year in the U.S., China, South Korea, and Taiwan, where the Company has its production sites, amid the megatrend of increasingly severe problems caused by climate change. The TOK Group will continue to rapidly address changes in the external environment and megatrends like this. At the same time, we are ready to advance measures under our Environmental Policy and Occupational Health and Safety Policy with an eye on changes in social issues and the further globalization of business activities.

Risks and Opportunities

■ Unique Environmental Risks in Fine Chemicals

In capital markets, shareholders, investors, and ESG research institutions tend to view and analyze TOK shoulder to shoulder with other major chemical manufacturers in the chemicals sector. However, TOK specializes in fine chemical products, so its product portfolio and the size of its plants are quite different from those of major chemicals companies that produce bulk chemicals. Approximately 90% of the ingredients in photoresists, our leading product, are safer solvents* and the remaining 10% are polymers and photosensitizing agents, which are detoxicated in closed loop systems at semiconductor manufacturers. Accordingly, the environmental risk associated with the fine chemicals produced by TOK are relatively lower than bulk chemicals that are mainly made from naphtha and the like. As environment-related laws and regulations are tightened

Tighter environmental and safety-related laws and regulations around the world

- Japan: Revisions to the Act on the Evaluation of Chemical Substances and Regulation of Their Manufacture, etc. (Chemical Substances Control Law) (June 2017)
- The U.S.: Revision to the Toxic Substances Control Act (TSCA) (June 2016)
- South Korea: Revisions to the Chemicals Control Act (proposed revisions published in January 2019)/Revisions to the Occupational Safety and Health Act (January 2019)
- Taiwan: Revisions to the New and Existing Chemical Substances Registration Act (March 2019)/Revisions to the Toxic Chemical Substances Control Act (January 2019)

Environmental Policy

Contributing to society in our aim to become a corporate group that is trusted around the world, is one of the most important themes in our management plans. Accordingly, we will track our impact on the environment in all phases, from product development to procurement, production, sale, and disposal. Reducing environmental impact from our corporate activities by complying with laws and regulations, as well as our internal regulations and social norms, and balancing production with environmental conservation while preventing of pollution. We will take steps to accelerate the development of businesses in the environment and energy fields in order to contribute to the creation of energy on a global scale.

1. Enhance handling and management with consideration for chemical safety and the environment.
2. Promote efficient use, reuse, and recycling of resources.
3. Promote activities to conserve energy and mitigate global warming.
4. Prevention of pollution.



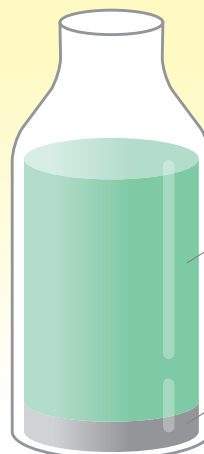
Occupational Health and Safety Policy

In consideration for the safety of the chemical agents to use as chemicals manufacturing industry, we carry out the reduction of the risk and exclusion and security work thoroughly and act for security of the security of an employee and the interested party and the prevention of the illness.

- ▶ Prevention of the work-related accident
- ▶ Continuous improvement of the system



Depiction of raw materials in TOK's photoresists



Approx. 90%
Safer solvent*

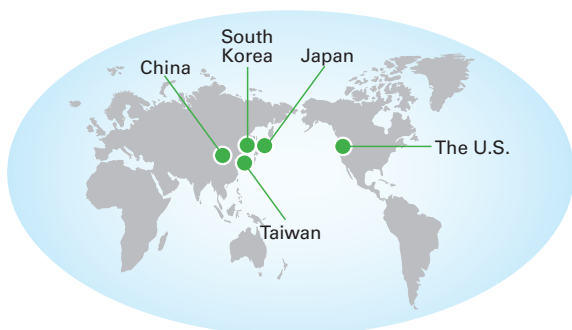
Approx. 10%
Polymers,
photosensitizing agents, etc.

* Safer solvent: Solvent that decomposes in vivo and is gentler on the human body, living organisms and the environment

around the world, however, TOK will continue to focus on creating and operating a robust chemical substance management system with the ultimate aim of creating shared value and sustaining improvement in its corporate value.

■ Environmental and Other Risks Dispersed with Five-region Production System

In line with its strategy since 2014 of building close relationships with customers, TOK has expanded production capacity in the U.S., China, South Korea, and Taiwan, putting into place a system able to disperse risks globally while enabling the rapid supply of cutting-edge products. Recently, TOK has been making capital investments to further expand production capacity at overseas sites. This measure also plays a role of fulfilling the TOK Group’s responsibilities as a supplier by reducing environmental risks, as well as the risk of natural disasters and accidents.



■ World-leading High Purification Technology is an Opportunity to Create Environmental Value

Our world-leading high purification technology is one of our core competencies that has been honed since the Company’s founding. This high purification technology contributes to the creation of environmental value, in addition to making semiconductors and electronic devices perform better, conserve electricity, and become smaller. For example, if materials delivered by a supplier unexpectedly contain prohibited substances or controlled/regulated substances, the Company’s high purification technology can remove these impurities, thereby providing the best value to its customers while reducing environmental risks.

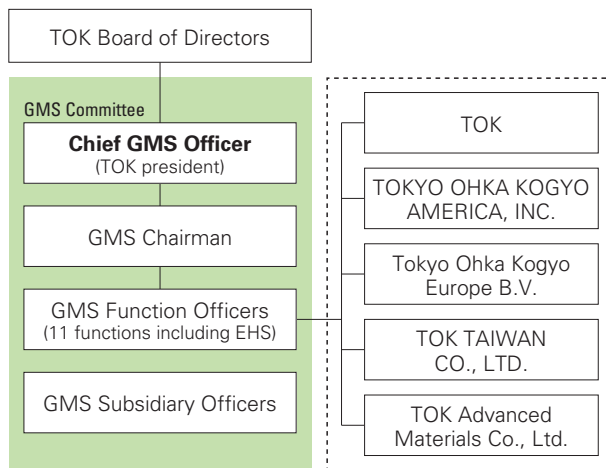
Key Measures in the TOK Medium-Term Plan 2021

■ Strengthening Environmental Risk Management Systems at Overseas Sites

Some of TOK’s most important management issues are taking an integrated approach to managing chemical substances, reducing environmental impact, and ensuring the health and safety of employees. The Company engages in Responsible Care activities* and operates the Group Management System (GMS) to minimize the impact of potential risks inside and outside Japan and prevent them from materializing. In 2017, the Company created an EHS (environmental, health and safety) management policy with the aim of further enhancing the effectiveness of these systems. TOK has bolstered group-wide initiatives for the environment and safety through an integrated management structure based on GMS and the EHS Div. As a result, the reinforcement of structures at domestic sites has wound down, and under the “TOK Medium-Term Plan 2021,” the Company aims to instill solid risk management at all sites, including overseas subsidiaries, from 2019, while improving chemical substance and environmental risk management at overseas sites through the strengthening of human resources and organizations.

* Activities in which companies handle chemical substances voluntarily take environmental, safety and health measures in every process from chemical substance development through manufacturing, logistics, use and final consumption to disposal and recycling, and announce the results of these activities while engaging in dialogue and communication with the public. (Defined by Japan Chemical Industry Association)

TOK Group’s Responsible Care activity framework



Strengthening chemical substance and environmental risk management at overseas sites in 2019

Taking EHS (environmental, health and safety) into Account When Developing Materials for Cutting-edge Semiconductors



New chemical substances are often used when developing new materials for cutting-edge semiconductors. For this reason, the Company is enhancing collaboration between the EHS Div. and the Research and Development Dept. as a key measure in the first fiscal year of the “TOK Medium-Term Plan 2021.” TOK is working to improve data coordination between the EHS Div. and the Research and Development Dept. with a better chemical substance database in order to have systems in place for properly managing chemical substances and rapidly providing products to customers. For chemical substance registration applications in foreign countries, we are creating a framework for timely registrations by having local subsidiaries coordinate with the EHS Div. to monitor progress.

Kimitoshi Kato General Manager, EHS Div.

Promoting EHS Activities with Capabilities of Diverse Human Resources

■ Rapid Response by Non-Japanese Employees

The EHS Div.'s human resources make it one of the most diverse organizations within the Group, and non-Japanese employees and senior employees in particular are a driving force behind advances in environmental and occupational health and safety activities. As the pace of revisions to local laws and regulations gains momentum overseas, especially in Asian countries, our Chinese and South Korean employees have been instrumental in keeping abreast with local laws and regulations, accelerating the process of registering and receiving approval for chemical substances from foreign government institutions.

■ Abundant "Know-Why" Among Senior Employees

Because cumulative past experience has proven to be very effective in environmental and occupational health and safety activities, roughly half of the employees in the EHS Div. are over the age of 50. Our senior human resources have insight into the advantages and disadvantages of newer and older production facilities, and are experts in environmental management and occupational safety thanks to their decades of experience working on the front lines of production at TOK. These senior employees have not only "know-how," but also "know-why" (knowledge that allows them to immediately know why something may have happened), a precious management resource that backs the Company's ability to sustain value creation.

Enhancing Engagement with Suppliers

■ "Creating Together" as TOK's Lifeline

Instead of working solely on its own, TOK's lifeline is "creating together," through working closely together with its suppliers from the raw material composition stage and sharing targeted quality standards, to further reduce the environmental impact of its products such as photoresists, while increasing added value. The Company periodically exchanges opinions with and performs audits at its main suppliers around the world, and shares throughout its supply chain the standards required by TOK and its customers. In this way, we provide authentic environmental value to our customers and society.

■ Creating Cutting-edge Environmental Value with Suppliers

Collaborating with our suppliers is a key factor in making further advances in the high purification technology that creates environmental value, as well as developing materials for next-generation power semiconductors. Not only TOK, but also its suppliers, must make investments and take risks in their pursuit of the highest levels of purity in the world and the development of cutting-edge materials. Key personnel from TOK and its suppliers are devoted to ensuring successful outcomes to their projects, and regularly convene Technical Review Meetings (TRM), Management Review Meetings (MRM), and Executive Review Meetings (ERM).

Pursuit of Best Practices through Participation in "Communities"

■ Activities in Responsible Care Committee at Japan Chemical Industry Association

TOK actively participates in "communities" of stakeholders within the industry that aim to minimize risks associated with hazardous chemical substances, air pollution, and workplace accidents. We aim to deepen knowledge about the latest innovations and best practices in environmental conservation and occupational health and safety. The Japan Chemical Industry Association, a group of companies in the chemicals sector, periodically hold meetings of the Responsible Care Committee, which provides opportunities to hear about the latest developments at the plants of each company, in the context of chemical substance management, environmental conservation, security and disaster prevention, and dialogue with local communities. These meetings also inform the Company's activities in environmental conservation and occupational health and safety.

■ Participation in chemSHERPA

In July 2017, TOK adopted the chemSHERPA information transfer schemes for chemical substances contained in products. Initially proposed by the Ministry of Economy, Trade and Industry, chemSHERPA was established with agreements of some electronics-related companies. The scheme aims to create a common format for accurately and efficiently conveying information about chemical substances contained in products from upstream to downstream operations. As the organization that manages chemSHERPA, JAMP*¹ counts 443 companies*² (including TOK) as members. Through this organization, TOK obtains the latest information about chemical substances and broader trends, which is used to further improve its management of chemical substances.

*1 Joint Article Management Promotion-consortium

*2 As of June 27, 2019

Formulating the Next Long-term Environmental Targets

■ To Advance the Creation of Environmental Value from a Long-term Standpoint

TOK has set various environmental targets for 2020 to guide the creation of environmental value from a long-term perspective, and these targets are fast approaching their final fiscal year. With the intention of advancing the TOK Group's environmental initiatives and creation of environmental value from a long-term standpoint, the Company's new investment plans incorporate environmental considerations and energy conservation as a part of its basic assumptions. The Company is preparing to incorporate the details of TCFD* and other guidelines into the formulation of its new long-term environmental targets for 2020 and beyond. TOK intends to heavily incorporate these guidelines while testing various arrangements and KPI settings that make the most sense for its operations, which entail the continued development of fine chemical products in high value-added fields that experience rapid technological change. We hope that our stakeholders are excited to see how the TOK Group will continue to create environmental value.

* Task Force on Climate-related Financial Disclosures

Creating New Environment Value through Business Activities

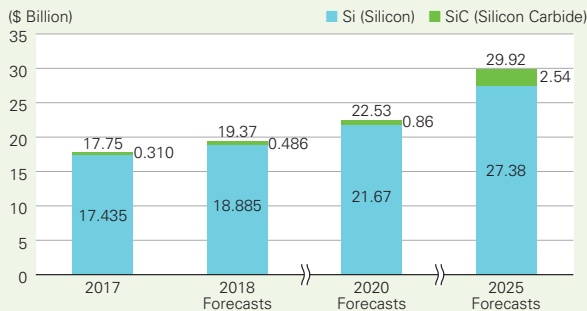
As introduced in the Special Feature (pages 30–31), TOK continues to contribute to solutions for the worsening problem of climate change through the stable supply of g-Line and i-Line photoresists for power semiconductors, for which it has the world's top share*¹. Recently, the Company has focused on the following R&D projects to provide new environmental value in the future.

*¹ Share of sales volume for 2017 (Source: Fuji Keizai's "Whole View of Photo-functional Material and Product Market 2018")

Development of High-heat-resistant Photoresists for Next-generation Power Semiconductors

The power semiconductor market is projected*² to grow at an average annual rate of 6.7% through 2025 and reach \$29.9 billion by 2025, a figure that is roughly 1.7 times higher than 2017. SiC (silicon carbide) power semiconductors, regarded as a leading next-generation power semiconductor, greatly improve the electric power efficiency of electric vehicles, solar power generation and power sources of industrial machinery, and are expected*² to see a compound annual growth rate of 30% and reach \$2.5 billion by 2025, or about 8.2 times larger than in 2017. SiC power semiconductors are currently produced using conventional i-Line photoresists with lithography, etching, and high-temperature treatment processes. In this field, TOK is developing high-heat-resistant photoresists that will reduce the number of production processes and increase pattern precision. By combining high-heat-resistant resins with conventional i-Line photoresist technologies, this product features both high heat resistance and high resolutions. With this product, TOK will be able to contribute more to solutions for climate change through next-generation power semiconductors.

*² Source: Yano Research Institute "Survey on Global Power Semiconductor Market (2018)," published on January 15, 2019



Note 1. Manufacturer shipment value basis
Note 2. Estimates shown for 2018, 2020 and 2025

Next-generation power semiconductors (SiC semiconductors) market:
CAGR 30% (2017 to 2025)
 TOK is developing high-heat-resistant photoresists.

Conventional power semiconductors (Si semiconductors) market:
CAGR 5.8% (2017 to 2025)
 TOK stably supplies g-Line and i-Line photoresists. (The world's top share*¹)

Developing a Gas Separation Membrane for Separating and Capturing Rare Gases and CO₂

As a new business, TOK is developing a gas separation membrane for efficiently separating and recovering rare gases and CO₂ with low energy requirements based on the "nano membrane" developed in 2016 with help from NanoMembrane Technologies, Inc. (Headquarters: Higashi-ku, Fukuoka City/Representative: Toyoki Kunitake), which has been designated as a RIKEN Venture*³ by RIKEN. This gas separation membrane, which has a thickness roughly one-thousandth the thickness of a human hair, can potentially be used in applications for re-using helium, a rare gas needed in the semiconductor production process, as well as the environmental field, renewable energy devices, storage batteries and fuel cells. The Company is promoting open innovation with universities, companies, and research institutions to further advance its development.

*³ A company started up with core technologies from research projects at RIKEN, and was designated through satisfying certain conditions.

Thickness: less than 1/1,000th that of a strand of hair

