Product-related Initiatives for the Environment

Tokyo Electron is working hard to reduce the impact of its products on the environment by making them more energy efficient and curbing the use of hazardous substances. In addition, the company is also striving to reduce the environmental impact of logistics by promoting a modal shift and creating innovative packaging methods.

Reducing Environmental Impact during the Use of Products

Tokyo Electron organizations for reducing environmental impact

Tokyo Electron has two organizations working for the reduction of environmental impacts of products: the Product Environment Compliance Meeting and Products Environment Value Meeting. The Product Environment Compliance Meeting ensures that our equipment and their parts and components fully comply with environmental regulations and our voluntary programs.

The Products Environment Value Meeting has developed and started to implement roadmaps to reduce the environmental impact of each of our products. Specifically, while ensuring the effectiveness of each roadmap, the council is working to reduce the energy consumption of equipment, address chemical substance-related matters, enhance efficiency in the use of processing gases and liquid chemicals, and improve the environmental performance of existing equipment. The progress of these initiatives is monitored as part of the Group-wide medium- to long-term plan.

Technology Symposium

The Tokyo Electron Group held its 14th Technology Symposium in January 2012 at which a variety of environmental technologies were presented. In a poster session, Tokyo Electron divisions and departments engaged in a lively exchange of ideas and information in order to share innovative technologies.

Technology Symposium

Energy-saving Measures for Products

We are promoting the reduction of product energy consumption by focusing on four approaches: reducing the energy used by the product itself; reducing the energy used by peripheral devices; ensuring systematic and efficient operation of products; and ensuring energy-saving operation of customers' factories. The energy-saving features of each piece of equipment are summarized below.

Plasma Etch System

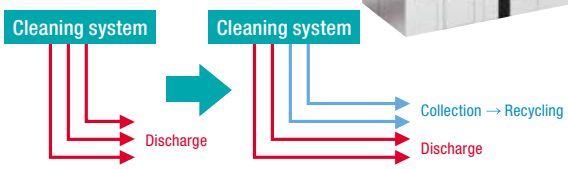
Reduced energy consumption of peripheral devices

A chiller that cools the inside of a plasma etch system and a pump needed to maintain a vacuum within the chamber have been designed to operate intermittently according to the status of the system, leading to a 25% reduction in energy consumption (including a reduction in the volume of coolant and N_2 used).

Single Wafer Cleaning System

Recycling of pure water

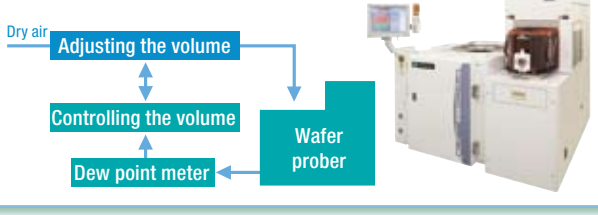
Waste fluid flow paths are divided into those for recycling and those for discharge to enable collection and recycling of pure water.



Wafer Prober

Reduced volume of dry air

The volume of dry air produced has been cut by up to 60% compared with traditional products by installing a dew point meter to monitor and adjust the volume of dry air used.



Customer's Factory

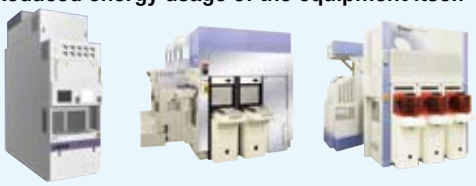
Energy-saving operation of the factory
(planned operation and proper management)

System

Efficient management

Equipment

Reduced energy usage of the equipment itself



Reduced energy usage of peripheral devices

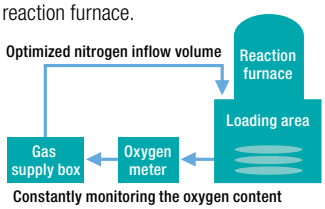
Pump | Cooling Chiller | Scrubber

Peripheral Devices

Thermal Processing System

Reduced volume of nitrogen used

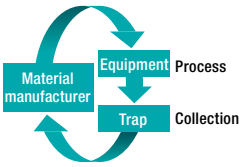
The volume of nitrogen used has been reduced by 60% compared with traditional products by monitoring and controlling the oxygen content in the loading area, where wafers are loaded for input into the reaction furnace.



Single Wafer CVD System

Recycling of ruthenium (Ru)

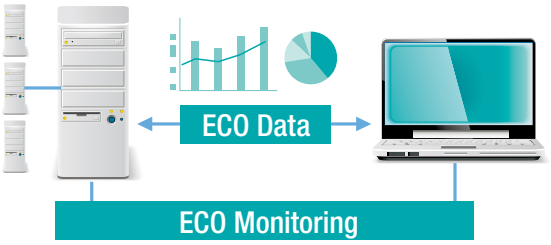
Ruthenium used during semiconductor fabrication is collected, re-refined and reused without being returned to a metallic state, making it possible for us to reduce CO_2 emissions by approximately 30% compared with the traditional process, where only newly refined ruthenium is used.



Eco Monitor

Visualization of energy usage (currently under development)

Various types of energy used by the different types of equipment are monitored according to the SEMI S23* guidelines, and the energy use is compared and analyzed to support energy conservation.

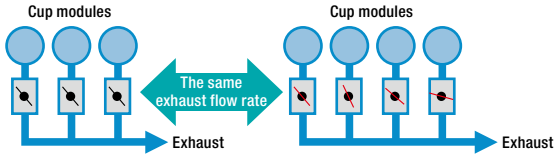


* SEMI S23: Guidelines for energy conservation for semiconductor production equipment issued by Semiconductor Equipment and Materials International (SEMI), an international industry organization for semiconductor/FPD production equipment and material manufacturers

Coater/Developer

Adjusting the exhaust volume to optimal levels

The volume of exhaust from each rotary cup module in the equipment is controlled according to the operational condition.



Silicon carbide (SiC) Epitaxial CVD System

Photovoltaic Panel Production Equipment

Technology for Eco Life

Measures against Regulated Chemical Substances

The Tokyo Electron Group's policy regarding regulated chemical substances:

❶ We will quickly supply products that are in compliance with the laws and regulations of countries in which our customers operate.

❷ We will set our own standards and continue to make efforts to reduce the use of regulated chemical substances in our equipment.

Voluntary measures taken to reduce the use of regulated chemical substances in equipment

Although the Tokyo Electron Group's products are not subject to the EU's RoHS[*1] Directive, a widely known set of standards regulating the use of hazardous chemicals, the Group is committed to voluntarily reducing the use of the six substances specified by the directive: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenals (PBBs) and polybrominated diphenylethers (PBDEs).

In addition, we work with our suppliers to promote the use of alternative products that meet the requirements of the directive, while we also use a dedicated database to manage the chemical substances contained in the components and parts used in our products.

From the second half of fiscal 2009, we began shipping equipment containing 98.5% or more parts that meet the directive. The share of these pieces of equipment with fewer regulated chemical substances as a proportion of our major pieces of equipment exceeded 50% as of the end of March 2012. They include the following:

- CLEAN TRACK™ LITHIUS Pro™
- CELLESTA™+
- TELINDY PLUS™
- Tactras™ RLSA™ Etch

We will continue to strive to further increase the proportion.

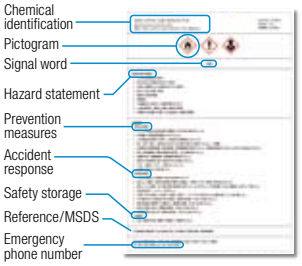
*1 RoHS: Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment

Complying with the laws and regulations in countries and regions where our customers operate

❶ We provide equipment in full compliance with China's version of RoHS, enacted in March 2007, to which Tokyo Electron Group's products are subject. China's RoHS, like the EU directive, regulates the use of lead, mercury, cadmium, hexavalent chromium, PBBs and PBDEs and requires that necessary information be provided to customers.

❷ Countries around the world have begun to introduce regulations based on the Globally Harmonized System of Classification and Labelling of Chemicals (GHS)[*2] formulated by the United Nations. The Tokyo Electron Group makes available safety information on chemical substances specified by the GHS through (material) safety data sheets, or (M)SDS, as well as labels affixed to containers carrying chemical substances. Shown below is an example of a label in compliance with Japan's GHS standards.

*2 Globally Harmonized System of Classification and Labelling of Chemicals (GHS): A system agreed upon by the United Nations that is intended to provide unified standards across various countries for the classification of hazard level, labeling and the content of (M)SDS.



Example of a label that complies with Japan's GHS standards

❸ Europe has instituted the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH) regulation[*3], a standard that requires that safety information related to exposure be provided for a product containing more than 0.1% in weight of any substance of very high concern (SVHC), as well as the Regulation on Classification, Labelling and Packaging Substances and Mixtures ("CLP Regulation")[*4], which has a broader scope than the GHS. In compliance with these standards, we consistently undertake investigations to identify the presence of any SVHC in our equipment and provide necessary safety information when a SVHC amounting to more than 0.1% is present in any of our products.

❹ With regard to the battery regulations[*5] enacted by the EU and Taiwan, we check whether applicable batteries are used inside our products and take necessary measures to maintain compliance with the requirements. We have also begun building a framework that will enable us to fully comply with these regulations from the very bottom of the supply chain.

*3 Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH): A regulation pertaining to the registration, evaluation, authorization and restriction of chemicals. For products containing SVHC in particular, manufacturers are required to provide information on the SVHC content of their products as well as information to ensure the safe use of the products.

*4 Regulation on Classification, Labelling and Packaging Substances and Mixtures ("CLP Regulation") (EC No. 1972/2008): An EU regulation concerning the classification, labeling, and packaging of chemicals and mixtures

*5 Battery regulations: Regulations enforced in each country to facilitate the collection and recycling of batteries, including the mandatory indication of the recycling symbol on batteries

Future plans

❶ We will further increase the shipment ratio of equipment containing reduced amounts of regulated chemical substances.

❷ We will effectively utilize the Joint Article Management Promotion-consortium (JAMP) and other frameworks as well as broaden our collaboration with customers and suppliers to promote more rational and accurate measures for the management of regulated chemical substances. We will also continuously improve our chemical substance management system to further strengthen our control over chemical substances.

❸ We will further tighten the management of regulated chemical substances on a global level to achieve an even higher level of environmental compliance of products.

Approaches to Reducing the Environmental Impact of Logistics

Tokyo Electron's stance on the environmental impact of logistics

Regulations concerning logistics have been tightened with a view to helping curb global warming. At the same time, companies are facing growing demands for measures to reduce the environmental impact of their logistics. For its part, the Tokyo Electron Group will continue striving to reduce the environmental impact caused by the transport of its products through such means as promoting a modal shift*1 for domestic and overseas transport and adopting packaging methods with a smaller environmental footprint.

Shift to modes of transportation with less environmental impact

*1 Modal shift: A shift in the mode of transportation. Specifically, switching from conventional freight transportation by truck or aircraft to means such as marine and rail, which have a lower impact on the environment.

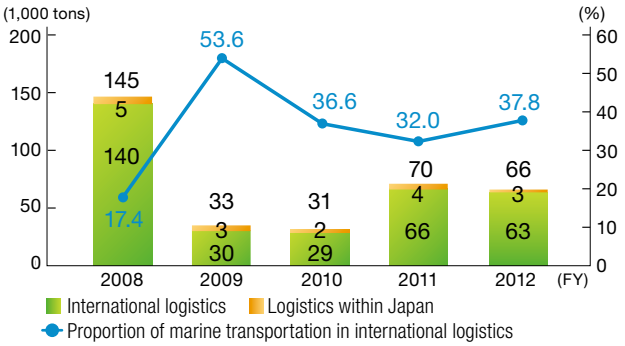
Reducing the environmental impact of logistics

We calculate and monitor CO_2 emissions generated from sources regulated by the Act Concerning the Rational Use of Energy for logistics purposes within Japan, as well as CO_2 emissions of international logistics between Group companies and to overseas customers. Our goal, set in 2008, has been to cut CO_2 emissions per ton-kilometer of international transportation to half of fiscal 2008 levels by fiscal 2015. As a result of our efforts toward meeting this goal, in fiscal 2012 we achieved a 54% reduction in the total volume of CO_2 emissions, and a 22% reduction on a per-ton-kilometer basis. The share of marine transportation used for exports also increased by more than 20 points over the baseline year to 37.8%.

With respect to logistics within Japan, it is estimated that our modal shift efforts in fiscal 2012 led to a reduction in CO_2 emissions of approximately 92 tons.

A modal shift in exports has also been promoted, and we are now using seaborne shipping for all FPD production equipment as well as for semiconductor production equipment delivered to our customers in Korea and parts of Europe and North America. In order to make the change from airborne to seaborne shipping easier, we are working to reduce production lead time to ensure there is no impact to on-time delivery.

CO_2 emissions from logistics and the proportion of marine transportation



Green packaging

We use wooden frames and corrugated cardboard as packaging materials when shipping products. To reduce the amount of resources used for packaging, we also use reusable corrugated cardboard boxes for some shipments inside Japan. Furthermore, casters and special tools used for moving products on-site at the customers' premises are collected and brought back to Group plants for reuse as part of our efforts to save resources.

The Ministry of the Environment's support project for consignors working on the reduction of CO_2 emissions from logistics

In fiscal 2012, we took part in the Ministry of the Environment's trial project to support consignors seeking effective measures to reduce logistics-related CO_2 emissions. The objective of this project is to calculate the actual volume of greenhouse gas emissions generated from the supply chains of consignors so as to help consignors plan countermeasures and identify problems in the implementation of those countermeasures. By participating in this project, the Tokyo Electron Group could verify the calculation methods for determining the volume of CO_2 emissions and the effects of the modal shift for international logistics and joint delivery implemented within the Group. We will reflect the findings arising from this project in our future activities.

TOPICS

Reducing environmental impact by promoting the use of rail transportation to carry goods from suppliers

Tokyo Electron Kyushu is actively promoting the use of rail transportation when procuring from suppliers to reduce environmental impact. In fiscal 2012, the company switched the mode of transportation from road to rail for freight from Osaka. To maintain high transportation quality, the company introduced various measures, including the employment of special pallets that attenuate train vibrations. In February 2012, when the rail transportation started, it is estimated that CO_2 emissions were reduced by 82% or approximately 2.3 tons compared with the traditional freight transportation by trucks. From fiscal 2013, the company is also planning to eliminate the use of courier services and direct delivery by suppliers so as to reduce the environmental impact of procurement logistics. These efforts are expected to lead to not only the reduction of CO_2 emissions but also shortened transportation time, lower logistics costs, and decreased workloads.

Modal shift to rail transportation