Product-Related Initiatives for the Environment

The Tokyo Electron Group works hard to reduce the impact of its products on the environment through various improvement measures, such as reducing energy requirements of our semiconductor and FPD production equipment and minimizing the use of regulated chemical substances.

Designing Products that have Less Environmental Impact in Use

Our Approach to Reducing the Environmental Impact of Our Products

We believe it is important to promote environmentally conscious designs, as we have clearly stated in the Tokyo Electron Group Credo and Principles on Environmental Preservation. We give top priority to the provision of energy-saving equipment and to reducing or finding alternatives for the regulated chemical substances contained in our products.

Organizations for Reducing Environmental Impact

Two working groups are in place to promote our efforts to reduce the environmental impact of our products: the Chemical Substances Steering Team and the Product Working Team. The former works to reduce or substitute the use of chemical substances subject to applicable regulations in our equipment parts and components. The latter was established under the Environmental Steering Committee in fiscal year 2008. Under the leadership of the Product Working Team, each business unit has developed a roadmap to reduce their environmental impact. In preparing the roadmap, business units were required to cover the following mandatory items: reducing energy requirements in our products, addressing chemical substance-related matters, reducing the number of parts and processes required, reducing the use of processing gases and liquid chemicals, and improving the environmental performance of existing equipment. In addition, they were encouraged to cover voluntary items such as reducing the number of processes required for equipment installation. In the design and development process, we also consider and implement, where possible, the reduction of required materials and the number of processes involved. Progress of the defined goals will be reviewed in the Group's mid- and long-term plan.

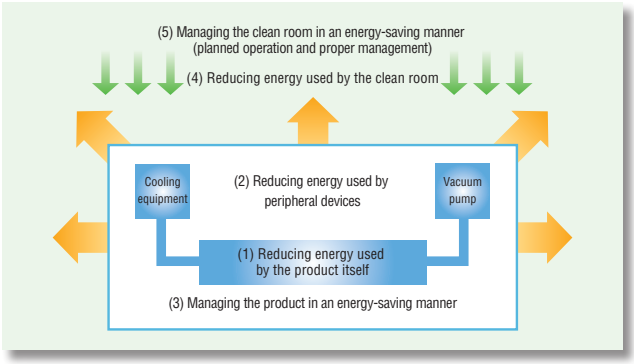
Items in the Environmental Road Map by Each Division

(1) Reducing the energy requirements in our products
(2) Addressing chemical substance-related matters
(3) Reducing the number of parts and processes required
(4) Reducing the use of processing gases and liquid chemicals
(5) Improving the environmental performance of existing equipment

Energy-Saving Measures for Products

We are examining measures to reduce the energy that our products consume when they are used and have set the following five targets: (1) reducing energy used by the product itself; (2) reducing energy used by peripheral devices; (3) managing the product in an energy-saving manner; (4) reducing energy used by the clean room; and

Approach to Energy Saving of the Products

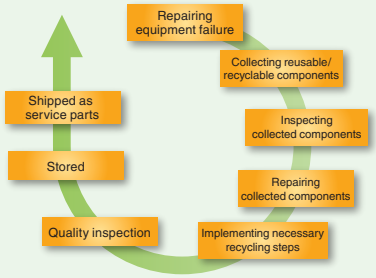


TOPICS

Recycling of Replaced Components

In the past, we disposed of faulty equipment components we produced. We opted not to recycle faulty components due to their peculiarities and quality concerns. In order to use resources more effectively and reduce disposed waste, we have explored ways we could change this practice. Now, old components replaced during the equipment warrantee period are collected and inspected by our Group. If components are found to be reusable or recyclable, they are refurbished and reused. In shifting to this new policy, we established a quality standard for inspections that requires the same level of inspection for used components as for new components, and the detection of any noticeable degradation or abrasion, among others. In addition to resource saving and waste reduction, the revised practice brings another benefit: the results of any repairs undertaken can provide insight into creating longer-lasting products and to reduce stock levels and maintenance costs. This collection and recycling program is currently only available in Japan but will be extended to overseas markets in the future to achieve further reduction of waste and improved resource consumption.

Flow of Replaced Recycling Process



(5) managing the clean room in an energy-saving manner (planned operation and proper management). For energy-saving management of the clean room, we are required to cooperate with customers and facility manufacturers. Such close cooperation will allow us to make further efforts to reduce the energy consumed by our products while they are in use. In addition, we will identify how much energy our products and their supplementary devices (e.g. vacuum pumps and cooling equipment) consume in reference to the SEMI S23 standard, and monitor the consumption of electricity as well as the consumption of water, dry air, cooling water and exhaust heat, and take appropriate measures.

We strive to contribute to both the workplace and the global environment by developing equipment of even higher quality.

Masami Akimoto

Senior Vice President, Deputy General Manager,
Development & Manufacturing Division
Tokyo Electron Limited

When developing equipment and products, satisfying our customers' requests for excellent product performance and reducing the environmental impact of our products are inseparable objectives.

I have been engaged in development of the Group's products since I joined the company in 1984. While "environmental consciousness" and "global warming prevention" are frequently used phases these days, concern for the environment has long been a basic element of our product development. Meeting customer needs by producing equipment with shorter wait times, low energy consumption, higher utilization and higher yield is indeed synonymous with reducing the environmental impact of our products.

For example, reducing the use of liquid chemicals in manufacturing semiconductors/FPDs is not only about the environment but also about cost performance and process efficiency. This recognition drove us to make a variety of improvements such as changing our coating methods to reduce the use of liquid chemicals and recycling used liquid chemicals with a high collection rate. Such improvements over the years have resulted in higher production efficiency, requiring less energy and resource consumption.

We aim to reduce the environmental impact of both new and existing products.

We are developing next-generation models of our products in collaboration with customers to meet extremely high requests for equipment that has less of an impact on the environment. At the same time, we are implementing environmental improvements to existing products installed at customer sites. Once shipped from our factory, our semiconductor production equipment will be in use for a long time, generally speaking, for 15 to 20 years. Tens of thousands of units of our equipment are in operation worldwide. We must retrofit them to reduce their environmental impact and extend their product life. We have started to provide this modification service in earnest with the launch of a Post-Sales Division this year.

Collaboration among engineers as well as good physical and mental well-being is needed to take our development capabilities to the next level.

In pursuit of the development of equipment that is even more environmentally-friendly, we need a forum to build a network of engineers, share experience and expertise, and discuss basic technologies and research methodologies, in addition to individual R&D efforts at each business unit. From an initiative launched last year, we now hold a quarterly gathering of engineers, enabling us to hold in-depth peer-based discussions and utilize the technological expertise of other departments. In an increasing number of new product development projects, cross-departmental project members are solicited and selected.

In tandem with enhancing our R&D capabilities, we are promoting a better work-life balance for our employees. Good physical and mental health is a powerful enabler of outstanding performance. We are particularly working to slash overtime work hours, so far generating good results. For instance, one department's monthly average overtime work hours has declined by about 60%.

Excellent performance of the equipment we develop leads to better performance for its users and providers and their respective organizations, and in turn greater profits for the companies. Reliable, stable equipment can be a helpful partner in customer production activities. Furthermore, it will substantially ease the burden on our Group's field engineers.

We will continue striving to develop high-quality equipment both in terms of functionality and environmental performance.

Product-Related Initiatives for the Environment

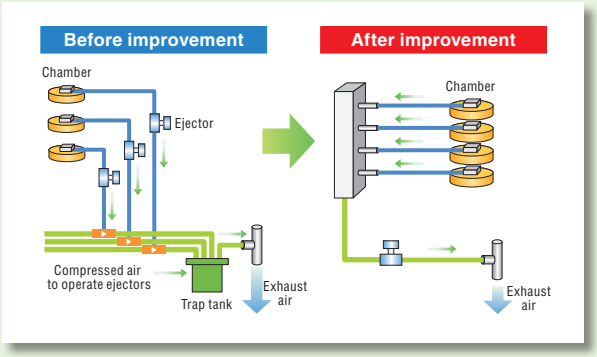
Preventing Global Warming

Initiative for Coater/Developer CLEAN TRACK™ LITHIUS Pro™

A coater/developer is used to coat photoresist and develop the exposed pattern simultaneously in the lithography process (where the same photo development technology is applied) in manufacturing semiconductors. When we developed the CLEAN TRACK LITHIUS Pro coater/developer by redesigning our 300 mm wafer CLEAN TRACK™ LITHIUS™, we concurrently worked to reduce the environmental impact of the overall LITHIUS series. Specifically, we adopted a new exhaust system for hot plate chambers which directly uses exhaust air from the factory. We previously exhausted air by using compressed-air powered ejectors. This shift enabled us to reduce the use of compressed air by 35% or more compared to the previous system. We also worked to achieve a proper volume of nitrogen gas purge in this coater/developer, resulting in at least a 70% reduction in the use of nitrogen gas. Through these improvements, the revised models' energy requirement per unit area of wafer was reduced by approximately 20%. When developing the new LITHIUS Pro, we incorporated energy-saving features, such as introducing an inverter-equipped automatic control system for the humidifying heater and the freezer within the temperature and humidity controller, and reducing the number of pumps used. As a result, LITHIUS Pro requires 32% less electricity than the initial LITHIUS model. Its energy use per unit area of wafer was also slashed by 35% from the existing LITHIUS model. We will continue to incorporate a greater number of energy efficient designs in all new products and adopt such "green" features for existing models.

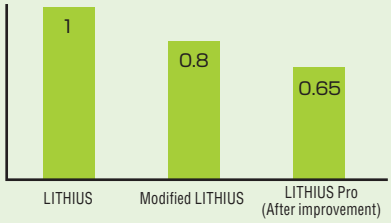
CLEAN TRACK™ LITHIUS™ → CLEAN TRACK™ LITHIUS Pro™

Improvement of Exhaust System of Hot Plate Chambers



The shift of chamber exhaust system from an ejector-based method to a direct exhaust method eliminated the use of ejectors and compressed air for ejectors.

Energy Consumption per Unit Area of Wafer
(Consumption by the initial model = 1.0)



●Comment from an Employee●

Meeting Expectations to Improve Energy Efficiency from the Development Stage

Keiichi Yahata
Safety Technology Section, CT System Design Dept.
Tokyo Electron Kyushu Limited

In recent years, our customers have requested equipment with ever-greater energy efficiency. As semiconductor production equipment is high-precision machinery, modifying its design after completion or at a later stage involves significant risk and requires tremendous effort in terms of risk assessment. This means it is important to consider energy efficiency in the product development stage.

Initiative for FPD Coater/Developer

A FPD coater/developer is used to apply photoresist on FPD substrates and develop the exposed pattern. This equipment—which contains coating, developing, and drying units—becomes increasingly larger as the substrates it processes expands. Our Exceliner™ is an example of this type of large model and we aim to reduce its environmental footprint through a variety of improvements, even during the product concept development phase. For instance, the scrubber unit for washing substrates reuses a maximum of 3,000 cubic meters of pure water used for rinsing in the pre-washing process. In addition, more than 90% of its used developing agent is recycled and the coating method for photoresist has been changed from spin-coating to slit-coating. In this way, this equipment now requires more than 90% less photoresist.

Modification of Thermal Processing Systems to Reduce Energy Consumption

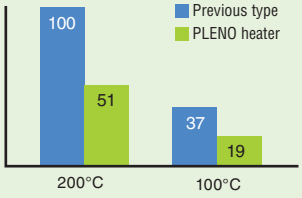
Some of our thermal processing systems use exhaust pipe heaters to prevent byproducts and other substances from adhering to the inside surface of the chamber. The electricity consumed by the pipe heaters has been reduced by 40 to 50% by installing PLENO heaters which have a higher-insulation performance than previously used silicon rubber pipe heaters. The PLENO heaters are made from porous PTFE,* which means this unit is cleaner, suffers little degradation and thus has a probable longer product life.

*PTFE: polytetrafluoroethylene (PTFE) is a fluorocarbon resin consisting of fluorine and carbon.

PLENO heater

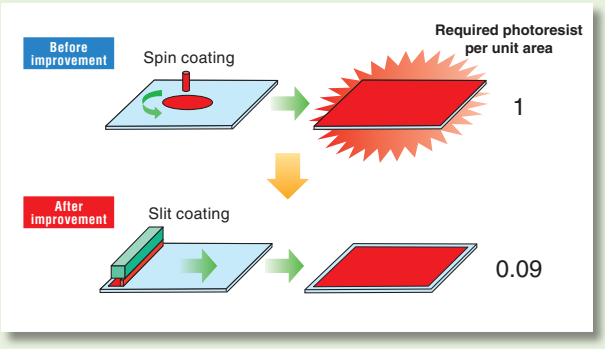
ALPHA (α)-303i to be modified

Electricity Use at Different Temperatures



Note: Power use of the previous type at 200°C = 100

Shift from Spin Coating to Slit Coating

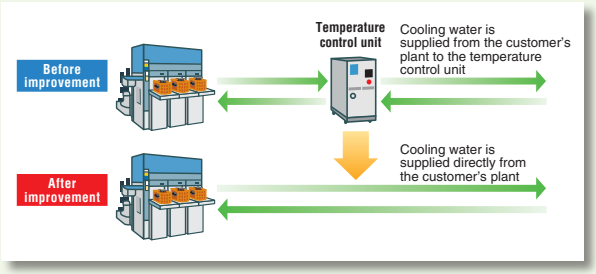


Initiative for Single Wafer Deposition System Trias™

A single wafer deposition system is used to form metal and barrier films by using thermal and plasma energy. This system adopts a chemical vapor deposition (CVD) process, whereby a gaseous mixture of reactive chemicals is supplied in the chamber and then heated. As a result of this chemical reaction, thin layers are formed and deposited.

Previously, cooling water was supplied to the system from a dedicated temperature control unit installed outside the system. However, we noted that this external device accounted for a large portion of the overall environmental impact of the system and consulted with our customers to find a solution to reduce its energy requirements. We learned that the cooling water systems of customers' factories can be directly supplied to a single wafer deposition system in a consistent manner. We therefore decided to modify the system to be suitable for the new cooling water supply method which does not need a separate temperature control unit. This shift led to a reduction in energy use and installation space. As proof of the success of this measure, we received an award from a customer in recognition of our environmental initiative.

Discontinue Use of a Dedicated Chiller



●Comment from an Employee●

Creating Environmentally Friendly Products through Extensive Discussions with Customers

Mitsumasa Kubota
Second Group, SD Design Engineering Dept.
Tokyo Electron AT Limited

The elimination of the temperature control unit is the result of extensive discussions with customers and many attempts to improve the equipment. We will continue striving to develop environmentally friendly products and new green technologies.

Product-Related Initiatives for the Environment

Management of Chemical Substances

Our Activities toward Reducing the Use of Regulated Chemical Substances in Products

Against the backdrop of growing concerns over the impact that harmful substances contained in parts and materials have on the environment and eco system, many countries have worked to regulate the use of such substances in automobiles and electrical products. The Tokyo Electron Group is making appropriate responses to these movements. For example, with regard to the RoHS Directive[1] that took effect in July 2006, we issued a written statement demonstrating that the semiconductor and FPD production equipment manufactured by our Group falls outside the scope of the Directive because they are large-scale stationary industrial tools, to which the Directive does not apply. This statement also specifies the rationales of our judgment.

We have already met all requirements of China's RoHS[2], which became effective in March 2007. In order to meet the regulatory requirements of relevant countries in a prompt manner, we established a Chemical Substances Steering Team, which comprises representatives from TEL's headquarters and its manufacturing subsidiaries. The team collects and shares information and investigates the use of regulated chemical substances in our products and advises us, in cooperation with our suppliers, when to replace products containing these substances with alternatives. Despite the fact that our semiconductor/FPD production equipment is not regulated by the EU's RoHS, we voluntarily developed a timetable in fiscal year 2007 to phase out the use of the six regulated substances used in our products (excluding certain products). We are scheduled to start shipping products that meet EU RoHS standards in stages from the second half of fiscal year 2009.

1 **RoHS:** Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment

2 **China's RoHS:** Officially called "Management Methods for the Prevention and Control of Pollution from Electronics Information Products"

Chemical Substances to be Reduced

First Priority

Cadmium	Pigments, stabilizers, and resins
Hexavalent chromium	Chrome plating
Lead	Solders, paints, electrical wire coating, and free-cutting metal
Mercury	Batteries and fluorescent lamps
PBBs	Resin parts
PBDEs	Resin parts

Second Priority

Substances designated as Level A substances in JIG*
(We have already implemented measures for many of these substances.)

* **The Joint Industry Guide for Material Composition Declaration for Electronic Products (JIG)** was prepared by Japanese, American and European private trade associations. The Guide lists the chemical substances for which conservation measures should be implemented. It classifies the substances into Level A and Level B: 16 substances are listed as Level A substances, including cadmium, hexavalent chromium, lead, mercury, PBBs, and PBDEs. More than 400 substances are listed as Level B substances.

Response to China's RoHS

China's RoHS, which became effective on February 28, 2007, is intended to regulate the use of chemical substances in electronic information products sold on the Chinese market. The Tokyo Electron Group has already taken the necessary actions in response to this regulation, which requires compliance with the following two rules.

1. Product Labeling

Products containing chemical substances regulated under China's RoHS must carry a label showing the period during which the product can be used in an environmentally safe manner. The Tokyo Electron Group generally sets this period at 25 years.

2. Disclosure of Information on the Use of Chemical Substances

Information on the use of products containing regulated chemical substances should be disclosed in the product's instruction manual and similar documents in the Chinese language. The Tokyo Electron Group strictly complies with this rule.

System to Reduce the Use of Regulated Chemical Substances

The Tokyo Electron Group operates a chemical substances management system based on the principle of not using, purchasing or selling parts containing regulated chemical substances at more than regulatory specified levels. This system is used to register and refer to information on the use of chemical substances in various parts. This system allows us to check with ease whether parts to be used in our products contain regulated chemical substances or not and controls the manufacture or shipment of products containing these substances.

Future Regulations on Chemical Substances

In Europe, under regulations such as REACH[1] (which mandates safety evaluations of almost all chemical substances sold on the market and registration of the relevant information), the new Batteries Directives[2] and the PFOS[3] Directives, companies will be increasingly required to fulfill their responsibilities as a manufacturer and follow the precautionary principle. All Tokyo Electron Group departments, from those engaged in product development and design, manufacturing, materials procurement, quality assurance, and environment and safety are making concerted efforts to comply with these regulations. We will also explore optimal management of chemical substances by joining the activities of JAMP[4] and other forums.

1 **REACH:** Registration, Evaluation, Authorization and Restriction of Chemicals

2 **The EU's new Batteries Directive** regulates the disposal of batteries which are collected from used electronic and electric devices in compliance with WEEE. It also requires labeling with a designated recycling mark to facilitate collection and recycling.

3 **Perfluorooctanesulfonic acid (PFOS)** is used as a water repellent and waterproof coating and in producing flame-resistant greases and oils. The EU's directive, effective June 27, 2008, prohibits the use of PFOS in quantities larger than those designated, with some exceptions.

4 **JAMP:** Joint Article Management Promotion-consortium