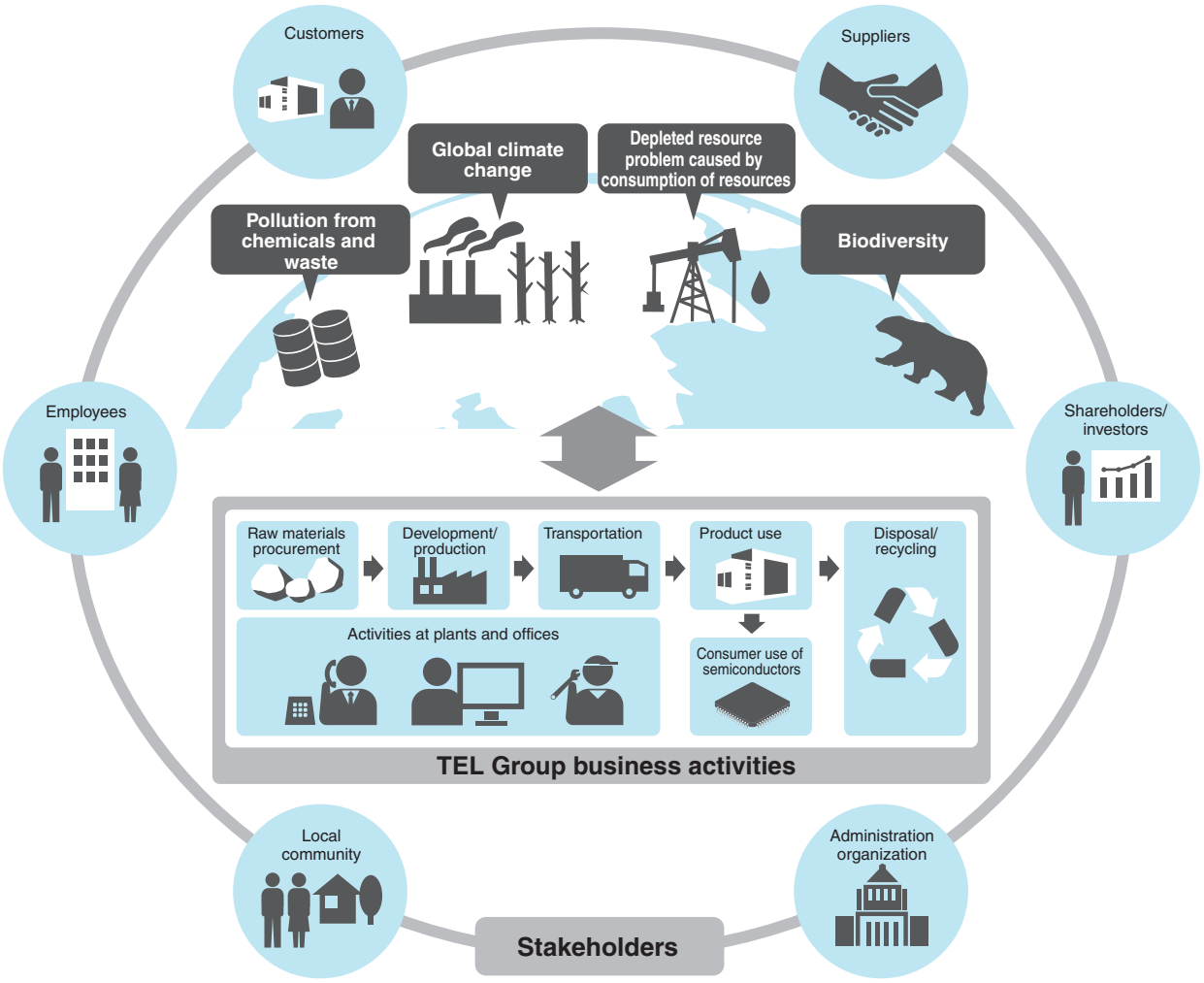
Environment

The earth has various environmental issues, such as global climate change, depletion of resources, and pollution from waste, as well as the reduction in biodiversity as a result of these changes. The TEL Group aims to solve environmental issues through our leading-edge technology and services under the slogan of "Technology for Eco Life," and contribute to the protection and conservation of the environment.

TEL Group business activities and environmental issues



The TEL Group's products go through many stages in their life cycles, from product development and production, activities at plants and offices, procurement of parts, product logistics, and finally use by the customer. The result of these processes, such as greenhouse gases, discharged water and waste, and consumption of resources like water and petroleum, all have an impact on the earth's environment that is closely linked to biodiversity. Of these, the TEL Group considers the main environmental issues to be preventing global climate change, conserving resources, eliminating waste, and biodiversity, and has set goals with a multifaceted approach to our commitment to stakeholders, risk management and enhancing corporate value. Based on these goals, the TEL Group will continue efforts to promote the development of a sustainable society.

* See CSR Goals on pages 28 and 29 of this report for details about goals.

Start of environmental activities

1994

The TEL Group established a special division for environmental activities in 1994, and began environmental activities for the overall Group. ISO 14001 compliance began in 1997. The Environment Policy was established in 1998 and based on this policy we are promoting the reduction of environmental impact.

Environmental activity promotion framework

Global Environment Meeting

- **Product Environment Value Meeting**
  Energy-saving/resource-saving products, etc.
- **Product Environment Compliance Meeting**
  Compliance with, and response to, laws and regulations on environmental standards for products in each country
- **Operation Environment Value Meeting**
  Reducing environmental impact of business activities; ensuring compliance

Environmental management

Environmental activity promotion framework

In order for the Group to collectively solve environmental issues the TEL Group has established the Global Environment Meeting, held twice a year to monitor the progress of our environmental goals and ensure that we are continuously improving. We also have individual meetings such as the Product Environment Value Meeting, the Product Environment Compliance Meeting and the Operation Environment Value Meeting to facilitate information sharing among concerned parties to achieve our environmental goals.

Also, the TEL Group is working to obtain an ISO 14001 certification, an environmental management standard, primarily at manufacturing subsidiaries since 1997. Currently, 10 of our locations are certified, and we will continue maintenance and certification acquisition in the future.

We ensure compliance with environmental laws, emission standards, and other voluntary standards using the frameworks we have put into place. In fiscal 2014, the Group was not involved in any environmental incidents or accidents, found in violation of environmental law, or subject to any related legal proceedings.

Environmental education

The TEL Group provides Group employees with environmental education and training to improve environmental awareness at all job levels. In fiscal 2014, we educated employees in the U.S., Europe, Korea, China, and Taiwan about the environment with an e-learning system on the Web, and we will continue to educate our employees about the environment in the future.

Web-based environmental education

Biodiversity

Global climate change problems, depleted resource problems, and waste problems can cause abnormalities in the ecosystem, and have a significant impact on biodiversity. The TEL Group is working to preserve biodiversity for a sustainable society through efforts to create green space at each plant in Japan and overseas.

In fiscal 2014, ecosystem tours were held multiple times at each plant and office in Japan. Bird walks were organized around the Fuchu Office along the Tama River with sightings of rare birds such as house swifts and shrikes. Additionally, in a lecture about biomimicry we learned that the features and workings of the familiar ecosystems could serve as hints to develop new technologies, and we recreated the appearance of leaves housed inside winter buds using origami. This is called the “Miura fold” and is used for maps and cans to fold large items in a way so that they can later be opened effortlessly.

Becoming familiar with and getting to know nature is a way for us to become aware of new information and challenges, and we will continue biodiversity conservation and activities in the future.

Ecosysytem tour

Initiatives to Prevent Global Climate Change

Product initiatives

The TEL Group believes that promoting environmentally friendly product design is a crucial part of its corporate activity and we are working on reducing the energy consumption of our products as a top priority challenge. As a result, we achieved our target of reducing energy consumption by 50% (per wafer; compared to fiscal 2008) in major models of each business unit by fiscal 2015 ahead of time in fiscal 2014. In the future, we will continue to promote manufacturing that has high energy efficiency and a low environmental impact.

Main activities for fiscal 2014

● Thermal processing system TELINDY™ PE

In our thermal processing system, multiple wafers go through batch thermal processing with a heater. Using existing equipment, it was already possible to batch process 100 to 125[*1] wafers, but by developing and using long type heaters that have lower power consumption, we are now able to process 150 wafers in each batch. As a result, in addition to improving productivity, we reduced energy consumption by 66%[*2] per wafer.

*1: The number of wafers that can be batch processed will differ according to the process.
*2: Compared to the Poly-Si process on existing equipment as of 2007.

● Plasma etch system Tactras™ Vigus™

By significantly improving efficiency of internal high-frequency conversion circuits for high-frequency power of plasma production with a high level of power consumption, we reduced energy consumption by approximately 40%. In addition, an additional 30% reduction was achieved by moving a constant temperature circulator (chiller) for electrode temperature control with a similar high level of power consumption from the auxiliary equipment area closer to the equipment itself and reducing the load on internal components. Also, features such as chiller flow reduction, high-frequency power-off, and vacuum transfer pump-off, etc. were developed, and we aggressively adopted usage of an automatic sleep mode that switches to an energy saving state while idling.

● Single wafer cleaning system CELLESTA™-i

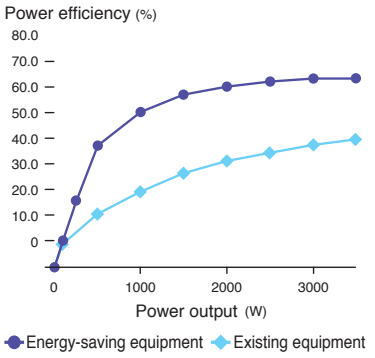
We adopt a system that is able to recycle liquid chemicals for cleaning wafers in the supply tank without disposing them in our selected models. The chamber cup of this equipment has a liquid waste separation structure, and by separating and collecting liquid waste by liquid chemical type, it is possible to recycle liquid waste. With this system, the amount of liquid waste consumed is reduced, and it contributes to reducing the customer's waste treatment costs in addition to reducing the power consumption of the heater.

Equipment category	Model	Reduction rate (%)
Plasma etch system	Tactras™ Vigus™	50
Thermal processing system	TELINDY™ PE	66
Single wafer CVD system	Trias*e*+™ EX-II™ TiN	50
Single wafer plasma treatment system	Trias*e*+™ SPA *i*	56
Coater/developers	CLEAN TRACK™ LITHIUS Pro™ Z	52
Single wafer cleaning system	CELLESTA™-i	69
Scrubber system	NS300+	69
Gas chemical etch system	Certas WING™	56
Wafer prober	Precio nano™	69

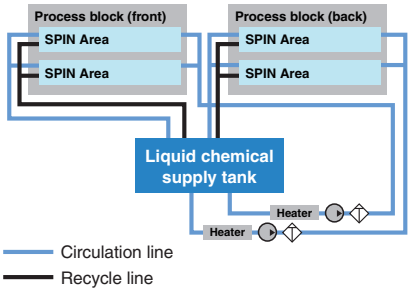
Power consumption of major models of each business unit

50% reduction

High-frequency power efficiency improvement



Liquid chemical circulation collection



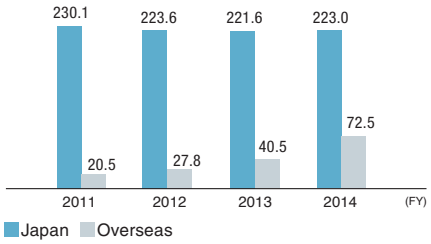
Liquid waste from the spin area is returned to the liquid chemical supply tank and reused

TEL Group plant and office electricity generated with PV power

22% increase

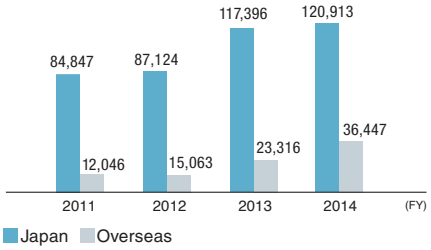
Electricity consumption

(Million kWh)



CO_2 emissions from energy consumption

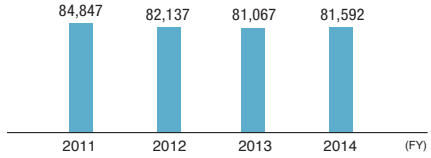
(Tons)



* CO_2 emissions in fiscal 2012 totaled 87,124 tons minus a 50,000 ton reduction brought about through the use of a domestic clean development mechanism (CDM)*1

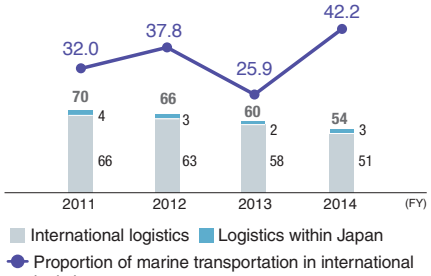
CO_2 emissions in Japan with the same emission factor for electricity consumption for fiscal 2011

(Tons)



CO_2 emissions from logistics and the proportion of marine transportation

(Thousand tons)



Plant and office initiatives

In the TEL Group, each plant and office chooses the appropriate metric (e.g., floor area) to measure their energy consumption by, and has set the goal of reducing energy consumption by at least 1% each year. In order to achieve this, initiatives such as the energy saving operation of clean rooms used in product development and manufacturing, optimum temperature settings for office cooling and heating, and introduction of equipment with leading-edge energy-saving efficiency (e.g., LED lighting) are being implemented. At TEL FSI, Inc., the boilers were replaced with new ones, reducing natural gas use by 22% from fiscal 2013. In Japan, the Taiwa Plant, Yamanashi Plant, Koshi Plant, as well as some overseas plants adopted photovoltaic power generation systems to generate renewable energy. The TEL Group generated 4,724 MWh in fiscal 2014, a 22% increase from fiscal 2013.

As a result of efforts such as this, in fiscal 2014, nine of the 14 TEL plants in Japan and overseas that set this goal achieved it. However, due to worsening power emission factors in Japan and an increase in the number of overseas plants, power consumption across the entire TEL Group was 295 GWh, about an 11% increase from fiscal 2013. CO_2 emissions from energy consumption by source* was 157,000 tons, an increase of about 11%. However, CO_2 emissions per unit of energy consumed in fiscal 2014 has decreased from our fiscal 2011 levels.

In fiscal 2015, we also plan to set targets for overseas plants as we strive to continue reduction activities on a global scale.

* We used adjusted emission factors for individual electric power providers for the emission factor for electricity consumption in Japan in fiscal 2014. For the emission factor for electricity consumption overseas, we used estimated factors calculated by the Federation of Electric Power Companies of Japan based on values published by the International Energy Agency (IEA).

Tokyo Electron Miyagi Limited Head Office

Logistics initiatives

The TEL Group is making efforts to reduce environmental impact caused by transporting its products by promoting modal shift*2 for domestic and overseas transport and adopting packaging methods with a smaller environmental footprint.

In fiscal 2014, we reduced CO_2 emissions of domestic and international shipments to about 54,000 tons for our products by about 10% from fiscal 2013. The share of marine transportation used for exports increased by 16 points from fiscal 2013 to 42.2%. This increase is due to the fact that there has been an increase in both semiconductor production equipment purchases shipped to our customers by sea, and FPD production equipment shipped by boat. We are promoting a modal shift by switching to marine and other transportation methods that have a lower impact on the environment, in addition to reduction of production lead time.

| Glossary |

*1 Domestic clean development mechanism (CDM): The approved mechanism for CO_2 emissions reduction under Japan's Domestic CDM System (a Japanese government scheme that allows small and medium-sized businesses to receive funding, technology, and technical support from large businesses in order to work collaboratively to reduce CO_2 emissions and trade the reduced amount as emission credits)

*2 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.

Efforts to conserve resources

Reducing water consumption

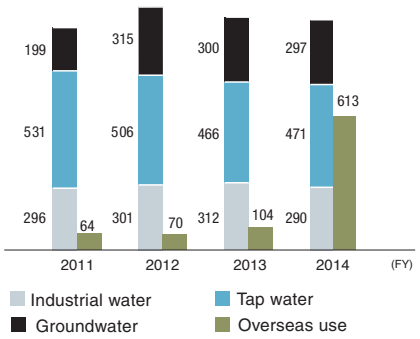
Based on the basic metric set by each plant, the TEL Group has set an environmental goal of keeping water consumption at the same or lower level than that of fiscal 2012. In fiscal 2014, we achieved 11 out of the 18 goals set regarding water used at TEL plants in Japan and overseas.

In order to achieve these goals, each plant is its streamlining pure water facilities used in the evaluation of semiconductor production equipment and diverting surplus water for use in other areas of the plant. In fiscal 2014, the TEL Group conducted a study to determine the amount of water used in exhaust-gas treatment equipment. Other measures currently being used to reduce water use include watering grass with rainwater, ensuring intermittent operation of cafeteria faucets, using rinse-free rice, and using toilet flushing sound simulators. We have implemented these policies across the entire TEL Group, and each plant has effectively put these measures into practice.

As a result of all of these efforts, we were able to reduce water consumption by approximately 2% in Japan compared to fiscal 2013. However, because we have recently added new plants and offices outside Japan, the TEL Group's total water consumption for fiscal 2014 increased by about 40% compared to fiscal 2013.

For fiscal 2015, we plan to set similar goals for our overseas plants that do not yet have resource consumption targets and continue our resource conservation efforts globally.

Water consumption



Achieving a recycling rate of 97% or more

8 consecutive years

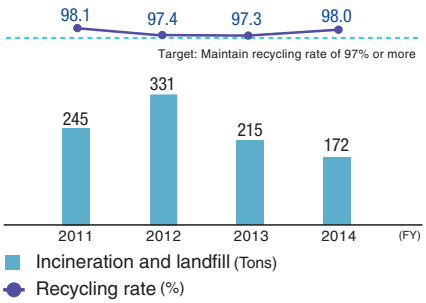
Initiatives for reducing waste

In its efforts to minimize waste, the TEL Group recycles as much generated waste as possible, and disposes of the remaining non-recyclable waste in a proper and responsible manner.

Our goal is to maintain a recycling rate* of 97% or more in Japan. With a recycling rate of 98.0% in fiscal 2014, the TEL Group has consistently achieved this goal for eight years since fiscal 2007. Also, in fiscal 2014 the Group measured the volume of waste generated at its plants and offices outside Japan, and confirmed a recycling rate of 68.6%. Tokyo Electron Taiwan Limited (TET) set a goal of a 66% or higher recycling rate and achieved a 97% recycling rate for fiscal 2014 as a result of its efforts.

We will continue to monitor the volume of waste generated as accurately as possible and implement measures to reduce waste across the TEL Group.

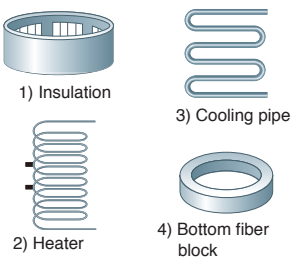
Recycling rate and generation of incinerated and landfill waste (Japan)



In Focus Reuse of the heater unit

Up until now, when the heater used in a thermal processing system deteriorated and could no longer be used due to continuous use, the entire heater was replaced with a new unit, however, these days replacing with reconditioned equipment that optimizes reusable parts has become mainstream. This helps to keep waste to a minimum, and also achieves cost reductions.

Replacement parts during recovery



| Glossary | * Recycling rate: Recycled amount ÷ amount of waste generated × 100

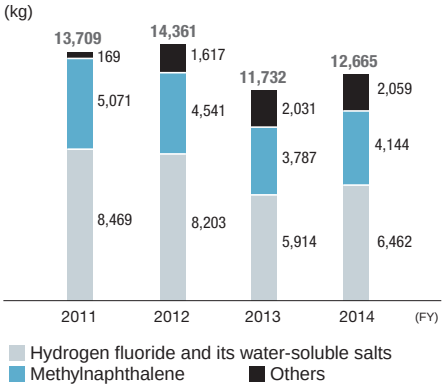
Ratio of RoHS compliant components for EU

98.5% or more

Equipment containing 98.5% or more parts that meet the EU's RoHS

Thermal processing system
Single wafer CVD system
Wafer prober
Etch system
Coater/developers
Surface preparation system
Wafer bonding/debonding system

Volume of PRTR Class I designated chemical substances handled (Japan)



Visiting a quartz glass manufacturer

Initiatives for chemicals

Chemicals contained in products

Reducing regulated chemical substances contained in products is essential when manufacturing environmentally friendly products. We freely disclose chemical substance safety data sheets – (M) SDS – based on GHS[*1] safety regulations as well as safety information on any substance of very high concern (SVHC) that is more than 0.1% present in our products, according to the EU's REACH regulation[*2].

In addition, we strive to stay up to date on the regulatory situation in every country, respond quickly to any changes, set our own standards, and develop equipment that will reduce the use of regulated chemical substances. For example, we implemented measures to manufacture equipment that complies with the EU's RoHS Directive[*3] and is at least 98.5% composed of substances that meet the directive. In fiscal 2014, we achieved this standard in an additional 10 models, and as a result, nearly all of our products now comply with the RoHS Directive. Furthermore, to effectively become compliant with the EU's REACH regulation as well, we introduced a new examination process for chemicals contained in our products based on the JAMP AIS[*4]. By the end of March 2015, we aim to completely switch from using our supplier's chemical survey method to the TEL Group's new examination process.

In the future, we will continue to quickly respond to all laws and regulations in every country and share our initiatives both within the TEL Group as well as outside companies to promote the global effort to reduce harmful chemical substances.

Management of chemical substances

The TEL Group uses chemical substances mainly in the development and manufacturing phases of our products, and in accordance with the Japanese PRTR[*5] law, we ensure that chemical substances regulated under the law are managed and the amount used and discharged is consistently monitored. In fiscal 2014, we handled 12,665 kg of PRTR Class I designated chemical substances. In addition, whenever we introduce a new chemical substance or change how a previous substance was used, we make sure to check for environmental, health and safety risks and take the necessary measures before adopting the new substances or method. Furthermore, we make sure to properly dispose of the hazardous substances after use through either specialist waste disposal contractors or our in-house processing equipment.

Green procurement

The TEL Group, in cooperation with our suppliers, is promoting initiatives to reduce the impact we have on the environment. We have posted the Guideline for Green Procurement on our website, and in addition to increasing awareness of the TEL Group's approach to green procurement, conducted surveys with our main suppliers, summarized and gave feedback based on the results. Using this as a foundation, we are continuing efforts with our suppliers to carry out environmental activities.

In addition, to continue to create an open dialogue between us and our suppliers, we visited a quartz glass manufacturer in fiscal 2014 that produces an important part for our semiconductor manufacturing equipment. We received a factory tour, attended a presentation on the quartz glass life cycle and the factory's environmental initiatives, and introduced the TEL Group's own environmental initiatives.

| Glossary |

*1 GHS: Globally Harmonized System of Classification and Labelling of Chemicals. 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.

*2 REACH: Registration, Evaluation, Authorisation and Restriction of Chemicals. A regulation pertaining to the registration, evaluation, authorization and restriction of chemicals. For products containing SVHC amounting to more than 0.1 wt% 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.

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

*4 JAMP AIS: Article information sheet (AIS) promoted by the Joint Article Management Promotion-consortium (JAMP). This sheet is used to deliver basic information on regulated chemical substances.

*5 PRTR: Pollutant Release and Transfer Register. A system under which the use of chemical substances that may be hazardous to human health and the ecosystem, their release into the environment, and their transfer (contained in waste) off the original business premises are identified, tabulated, and disclosed.