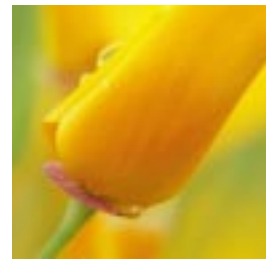


ShinEtsu



The Environment and Shin-Etsu

Environmental Report

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Greetings



The 20th century was the century of science. Now as we move into the 21st century, we can look back and appreciate how science has enhanced our lives but science also left us negative legacies, such as environmental pollution. In recent years the global environment has become a frequent topic of discussion. In the 21st century, environmental concerns will become key management issues.

The Shin-Etsu Group is working to reconcile profitability with environmental protection. Over the past 10 years we have invested approximately ¥15.7 billion in our environmental conservation programs. We have also adopted the ISO14001 system, which is the global standard for environmental management, in an attempt to improve production operations in our factories and plants. Through implementation of this standard, we are endeavoring to minimize the impact on the environment arising from our business activities. Group companies, including Shin-Etsu Chemical and Shin-Etsu Handotai, have already adopted environmental charters and established environmental policies at their plants and offices. All the group members are making sustained efforts to reduce adverse effects on the environment by applying environmental management systems based on these guidelines.

We have published this environmental report to inform the public about the Shin-Etsu Group's commitment to environmental protection. The theme of the report is “The Environment and Shin-Etsu” . It provides a simple overview of our environmental protection efforts in the context of product development and day-to-day activities. We will continue our efforts to protect the environment. We hope that this report will give you an appreciation of how determined the Shin-Etsu Group is to meet the environmental issues for of the 21st century.

Chihiro Kanagawa President & CEO

Environmental Charter

Basic Philosophy

Shin-Etsu Chemical Co., Ltd. recognizes that protection of the global environment is one of the highest priorities for humanity.

Our goal is to contribute to the creation of a society capable of sustainable development through being fundamentally committed to considering the environment in all aspects of our business activities.

Each factory develops its own environmental guidelines based on the environmental charter.



Shin-Etsu Chemical's Basic Orientation Towards Environmental Protection

For Shin-Etsu Chemical, safety and environment come first. Our most important priorities are to ensure safety and protect the environment. We have implemented extensive countermeasures to prevent explosions, fires, serious personal injury, and to ensure environmental accidents.

Action guidelines

Specific Measures

1

In order to promote environmental protection activities, Shin-Etsu organizes and promotes them to enable it carry out environmental management activities effectively.

We will formulate and implement specific company-wide environmental protection measures, and monitor its progress through internal and external audits and hearings.

- Internal Audits. Company-wide environmental audits (Responsible care audits, company-wide hearings)
- External Audits. All The group companies and business establishments completed external auditing in 2000 and successfully obtained ISO14001 certification for their environmental management systems. Company-wide efforts will be made to enhance the systems and their environmental performance.

2

Shin-Etsu aims at accurately grasping any environmental effects caused by its business activities, and establishes technically viable objectives focused on the reduction of wastes and harmful materials, conservation of resources and energy, and the recycling of materials. Shin-Etsu regularly revises its goals to pursue continual improvements in its environmental performance.

All corporate activities will be examined in light of global environmental issues, including the prevention of global warming, energy conservation and waste reduction. Comprehensive measures will be implemented across the entire group with regard to important items in order to improve the group's environmental performance.

- Industry leader
- Introduction of co- generation systems
- Promotion of reuse/recycling

3

Shin-Etsu observes all applicable regional, national, and international laws, regulations, and agreements related to the environment. Moreover, Shin-Etsu also establishes its own standards to prevent environmental pollution.

- Shin-Etsu will fulfill its responsibilities as a chemical manufacturer through compliance with new PRTR and MSDS legislation, improvement of control systems, including those for a small amount of new chemical substances produced, and adaptation to the recently enacted law concerning selective collection and recycling of containers and packing.
- Shin-Etsu will boost public confidence in itself by establishing its own environmental policy and improving its survey and reporting systems, including a phased shift to a JIS-based MSDS, and the implementation of hazard assessments for new and existing chemical substances under the Law concerning the examination and Regulation of Manufacture etc. of Chemical substances and other legislation.

4

Through education and internal communications, Shin-Etsu strives to instill a better understanding among all employees of its environmental charter and raise awareness of environmental issues. Shin-Etsu promotes environmental protection activities from a wide-ranging point of view, expanding from small regional communities to entire global society.

- Environmental safety education and simulation training will be used to prevent accidents and protect the safety of employees.
- The environmental awareness of employees will be raised through environment-related education and training on work standards and manuals, and through the promotion of employee education leading to the acquisition of qualifications.

5

In an effort to minimize any adverse environmental effects in developing new products and technologies, Shin-Etsu aims at assessing their environmental-friendliness, from the fundamental research and designing to the manufacture, distribution, usage, and disposal.

When developing new products and technologies, Shin-Etsu will adopt the most environmentally friendly technologies among all of those that are currently available.

- The most rational methods, such as HAZOP, will be used to check the safety of new plants and other new facilities both at the design stage and upon completion.

Production Facilities



Matsuida Plant

Introducing ISO14001

Philosophy of Coexistence Exemplified in Production Operations at Gunma Complex

Shin-Etsu Chemical has ironclad business philosophy of putting the environment and safety first. This is reflected in its strong commitment to environmental protection, and in a wide range of conservation activities at all its facilities. In July 1996 Shin-Etsu Chemical became the first major Japanese chemical manufacturer to obtain certification under ISO14001/DIS, the international standard for environmental management systems.

Certification was achieved at the Gunma Complex, one of five production centers operated by Shin-Etsu Chemical in Japan. Shin-Etsu Chemical has continued to develop and enhance its environmental management systems.

The Gunma Complex consists of the Isobe Plant, the Matsuida Plant and the Gobara Plant, together with two research centers. Its products include silicones and synthetic quartz. In 1953 it succeeded in industrializing silicone production for the first time using technology developed in

Japan. Since then it has led the development of silicon chemistry in Japan, including the production of silicon.

Silicones are resin made from silicon. At the Gunma Complex it is produced from metallic silicon by means of proprietary organic synthesis technology. In addition to silicones, which are used in numerous fields, the Gunma Complex also produces organic materials for use in electronic components and other applications, and synthetic quartz that include optical fiber.

Overview of Plants and Research Centers

Isobe Plant

This is the largest plant in the Gunma Complex. It produces silicone products, single crystal oxides and various other items. Its facilities include a research center for functional materials for high-precision applications.

Site area: 410,000m²

Products: Silicones, epoxy molding compounds, synthetic quartz, single-crystal oxides, PBN, organic electronic materials



Matsuida Plant

This plant produces silicones and synthetic quartz products. A research facility specializing in silicone-based electronic materials technology is located on its premises.

Site area: 212,000m²

Products: Silicones, synthetic quartz



Gobara Plant

This plant was constructed in the Annaka Industrial Park along the banks of the Usui River. It specializes in the production of silicone RTV rubber and sealants.

Site area: 57,000m²

Products: Silicones



Silicone Electronics Materials Research Center

This is Shin-Etsu Chemical's largest research facility. As an integrated R&D center for silicones and organic electronic materials, it is involved in a wide range of activities at all level from basic research to the development of applications.

Advanced Functional Materials Research Center

This facility specializes in research relating to advanced materials for use in optical and mobile communications. Its research and development activities cover a wide range of fields, including telecommunications applications.

Leadership in Environmental Protection Planning

Shin-Etsu Chemical's approach to environmental protection and specific activities carried out by its production facilities are described below by Takeo Arai, who coordinates the environmental protection activities at the Gunma Complex.



Takeo Arai
General Manager
Environment Control &
Safety Department

The five organizations at the Gunma Complex carry out environment-related activities cooperatively based on ISO14001. Since the complex is involved in both production and research, our environmental efforts encompass aspects ranging from product development and design all the way to waste disposal.

Many environmental elements are present in the area surrounding the Gunma Complex. We are particularly concerned about water. The Yanagise River passes through the complex, and nearby is the Usui River, into which our waste water is discharged. Both are class I rivers. The Complex itself is constantly using large volumes of water. Moreover, rivers in Gunma Prefecture provide drinking water to major cities further downstream, including Tokyo and Kanagawa. We therefore take great care to ensure that our waste water not only satisfies the legal requirements, but also consistently meets the much higher numerical value standards that we have set for ourselves.

Our environmental targets for waste water call for the establishment of a quantitative management system to monitor trace substances, and for absolute reductions in the waste water volumes that will be discharged in the future. We are also making concerted efforts to reduce the amounts of chlorine discharged.

Another major focus for environmental activities is waste disposal. We are working to increase waste recycling. For example, waste hydrochloric acid and sul-

furic acid, which are by-products from our manufacturing processes, are now shipped to other companies as raw materials. Our targets for the current year are a 3% reduction in waste volumes, and a 5% re-use ratio. Nevertheless, waste will always be an issue, and we recognize the need for continuing efforts in this area.

In addition to our efforts at waste reduction, we maintain a responsible approach to the final disposal of unavoidable waste generated within the Complex. All final disposal processes are fully monitored to ensure appropriate disposal.

The key to these and other environmental efforts at the Gunma Complex is the achievement of continual improvement. Under the ISO14001 system that we have introduced, compliance with the law is the minimal requirement. The real issue is the extent to which continual improvement can be achieved to exceed this basic requirement.

The organization of the Gunma Complex is large and intricate. The ISO14001 is essential to the efficient implementation of comprehensive environmental protection measures throughout this organization. ISO's fundamental philosophy calls for "environmental continual improvement". Our mission is to maintain the process of improvement at all times, and to raise our standards year after year. We are determined to stay at the forefront of environmental technology, and to lead the world in the implementation of environmental protection measures.



The Yanagise River
(running through the Isobe Plant)

Contributing to Community Life

Shin-Etsu Chemical has a strong commitment to partnership with local communities. Outlined here are some of its activities relating to the natural environment, which are being undertaken by Gunma Complex.

Jyoyama Park

Jyoyama Park is located adjacent to the Gunma Complex. Shin-Etsu Chemical began to undertake park management as a commemorative project for its 60th anniversary. Today this previously neglected hill area has been maintained entirely by the Gunma Complex. It has become a popular weekend destination for people enjoying barbecues and other activities.



Plant of Cherry Tree

The Gunma Complex planted the rows of flowering cherry trees that adorn each side of the road that runs in front of the Matsuida Plant. Each spring local residents visit the area to enjoy the beautiful blossoms.



Clean-up Campaigns

Shin-Etsu Chemical works closely with local communities. It helps to enhance community environments through such activities as clean-up campaigns and the maintenance of mirrors on road curves.



In the Front Line of Environmental Protection

Environmental protection activities are in progress throughout the Gunma Complex. Described here are facilities and operations with particular environmental significance.

• Incinerator

A new industrial incineration facility was installed at the Gunma Complex in 1997. All industrial waste produced at the Complex is brought to this facility for disposal. Temperature control is crucial. Waste is burned at the extremely high temperature of 850°C. Lower temperatures would reduce efficiency and could lead to other problems, such as dioxin emissions. High-temperature conditions are constantly maintained, for this reason, and the facility is operated around the clock.

Toxic substances in gaseous emissions from the incineration facility are processed using slaked lime and through a dust collection system with bug filters. The cleaning capacity of the incineration facility is extremely high, and energy is recovered as boiler steam.



The Incinerator

• Final Disposal Facility

This facility was built in three stages over a five-year period and was completed in the spring of 2000. The Stage 3 area is 250 meters long and has a capacity of 260,000 cubic meters. Overall, the facility has sufficient capacity to process all waste produced by the Gunma Complex over a 50-year period. It will be used primarily for plastics, incinerator ash, glass and ceramics.

The controlled disposal area consists of a pit lined with high-density polyethylene (HDPE). Beneath that is an impermeable layer (permeability ratio: 1.0×1.0⁻⁷cm/sec.). This dual structure ensures that no toxic material leaches into the ground beneath



Final Disposal Facility

the facility. All contaminated water from waste materials is gathered in one location for decontamination in a treatment plant. Because the final disposal facility is located inside the Gunma Complex, material can be transported easily without disturbing local residents.

• Waste Water Treatment Facility

Toxic substances are broken down by bacteria in aerobic tanks. Large amounts of air are added to the contaminated waste water to stimulate bacterial action. This approach allows large volumes of water to be treated efficiently. After purification, the water is discharged into the nearby Usui River.



Left: The Co-generation System
Right: The Waste Water Treatment Facility

• Co-generation System

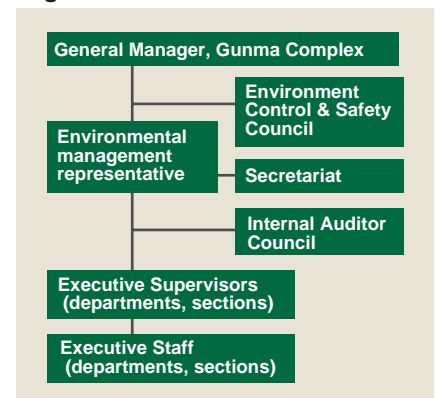
The Co-generation System produces steam and supplies part of the electricity required to drive the back-pressure turbines. This facility is a major part of our comprehensive energy conservation strategy.

ISO14001 Activities at the Gunma Complex

Mr. Ohmori works in the ISO14001 Administration Office. His task is to ensure that ISO14001 standards are understood and implemented throughout the Gunma Complex. We asked him to describe the key aspects and characteristics of ISO14001 management activities at the Complex.

The Environmental Control & Safety Council is the supreme decision-making organ in the Gunma Complex. The Secretariat serves as liaison coordinating supervisors stationed in every department and section.

Organization for ISO14001 Activities



Contributing as a Locally Based Company



Mitsuji Ohmori
Environment Section,
Environment Control &
Safety Department

There were two main reasons for the introduction of the ISO14001 system. The first was recognition of the shortcomings of the previous, reactive approach to environmental problems. The other was our desire to build a better and more reliable environmental management system for our expanding and increasingly complex organization.

We have prepared an “Environmental Manual” defining the environmental management guidelines for effective administration of the ISO14001 system at the Gunma Complex. The Environmental Manual defines our environmental policies and the overall structure of the environmental management system, which is based on a PDCA cycle.

Employees must share the same envi-

ronmental awareness and stance, regardless of their post within the Complex. In addition to its importance as a system management tool, the Environmental Manual is also used to create a uniform awareness of the environment.

As shown in Figure 1, the ISO14001 system begins with the implementation of an environmental impact assessment and the establishment of objectives. An environmental management program is then formulated and implemented as a framework for the achievement of those objectives.

At the environmental impact evaluation stage, all possible environmental aspects are identified. Environmental loads are quantified according to specific criteria, and problems are examined. This process is followed by audits to ensure the ongoing success of improvement efforts. Each year environmental audits are carried out by the directors. In addition, internal audits are implemented at least once a year in each of the 17 divisions by qualified employees who have participated in outside courses or training programs at the Gunma Complex. The important thing is to achieve continual improvement. We must enhance the effectiveness of our efforts with the passage of time. Auditing plays a crucial role in this process.

We have dramatically enhanced our

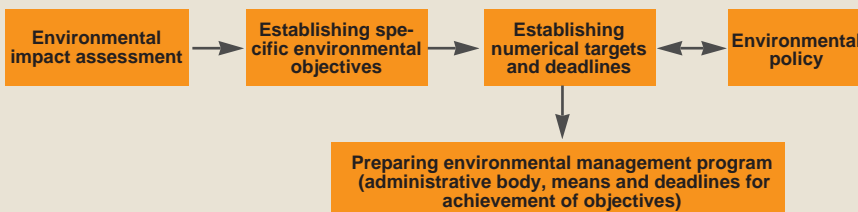
You've seen this booklet everywhere in the Complex. What is it about?

The booklet in question is the Environmental Conservation News, which is available for reading at various locations throughout the Gunma Complex. It is distributed to all corporate divisions as a source of information about environmental protection activities. Production is handled by the Environment Section under the leadership of Mitsuji Ohmori, who aims to publish the News on a bi-monthly basis. Mr. Ohmori recalls that a lack of knowledge initially confined the News to announcements of basic information. Recently, however, its content has become more diverse, with a particular emphasis on legal matters. The booklet is designed to encourage employees to think about the environment in the context of their own work activities.



environmental management system through these activities. The content of our activities has been considerably upgraded in the four years since we achieved certification. Previously we tended to focus on the administration of the system itself, but more recently we have started to place greater importance on outcomes, or environmental performance. We are implementing the system with increasing rigor, to ensure objective monitoring of environmental loads and continual improvement.

The achievement of ISO14001 certification was a major step forward for our environmental protection system. It transformed employee attitudes and motivated them to look for improvements in the context of their day-to-day tasks. We believe that this will enable us to operate a more robust system. Above all, we want to create a workplace in which everyone can feel motivated to work independently. In addition, we have expanded our ties with local people through our active participation in joint disaster prevention drills and other activities with local communities. As a locally based company, we should continue to work in this way.



[FIGURE 1]



Technology and Products to Support Environmental Protection

Products made by Shin-Etsu Chemical are used in construction, electronics, medicine, farming and various other sectors. We will continue our efforts to create environmentally friendly products that are safe, hygienic and energy efficient, and to minimize waste.

Saving Energy with Rare Earth Magnets

Powerful magnets are attracting a great deal of attention as key components for the development of energy-efficient air conditioners and other electrical appliances. They have helped to reduce the size and weight of the motors used in these products, while increasing power output.

The magnets used in these motors must be able to withstand high temperatures and rotation speeds. They must also be able to retain strong magnetic characteristics over long periods. For this reason rare earth magnets are believed to be the best in the world. Made from rare earths, such as neodymium and samarium, they produce a magnetic force dozens of times stronger than that of ordinary ferrite magnets.

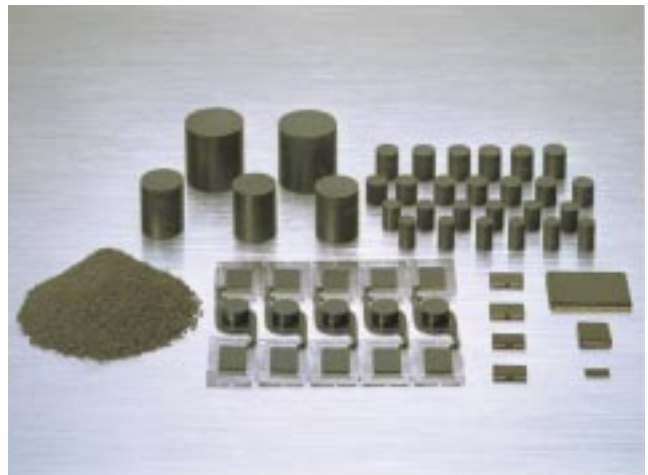
Rare earth magnets also help to enhance the performance of wind power generation systems, which are viewed as an important alternative energy source to take the place of thermal and nuclear energy. Research is also being carried out regarding the use of rare earth magnets in motors designed for use in electric-powered automobiles, which are being developed as clean vehicles for the future.

High-performance magnets manufactured in Shin-Etsu Chemical's Takefu Plant have generated considerable interest from a range of industries. This reflects their potential contribution to efficient energy use, energy conservation and environmental protection.



Rare earth magnets

Leading the Semiconductor Industry in Non-Halogen Epoxy Encapsulating Materials



Epoxy encapsulating materials are used to protect ICs.

Semiconductor devices are covered by black resin encapsulating materials, which protect the ICs and LSIs. To protect semiconductor elements from harsh external conditions, these materials must be able to withstand extremes of heat, humidity, and thermal shock. The encapsulating materials contain flame-retardant substances, which until now have been compounds of either antimony or epoxy resins bromine, both of which have a negative impact on the environment. Shin-Etsu Chemical has been working to develop environmentally friendly resins that do not include these substances.

Last year it produced a new semiconductor epoxy encapsulating material with a silicone-based flame-retardant system. This technology is incorporated into the KMC-EC series of products. The new material meets UL94V-0, which is the highest level of the international standard for flame-retardant materials. With this new technology, Shin-Etsu Chemical is expected to accelerate the shift to non-halogen semiconductor encapsulating materials, which has now just started.

Research into Environment and People-Friendly Solvent-free Varnishes

The characteristics of silicones include resistance to heat, cold and weather. It is also an effective releasant, electrical insulator, water repellent and anti-foaming agent. Because it

has these many desirable characteristics, silicones are used in a wide array of products. Shin-Etsu Chemical alone produces over 4,000 silicones. The range of uses and applications continues to expand in step with technological advances, and it is likely that further technological development is expected with this resin. Future advances are also certain to include technology to support safe, environmentally friendly uses of silicones. One promising area of research is solvent-free varnishes.

Solvents affect both people and the environment. And many solvents also require special handling.

Shin-Etsu Chemical is developing solvent-free varnishes for use as circuit board coatings. Its aim is to create solvent-free products with functional characteristics that are equal or even superior to those of conventional varnishes.

Keeping the Environment Green with Silicone

Recently silicones made by Shin-Etsu Chemical have

helped tree doctors to repair many “wounded” trees. If decayed areas on a tree are left untreated, bacteria will invade, leading eventually to the death of the entire tree. The appropriate treatment is to remove and disinfect the affected area and coat the surface. Various materials, including concrete, have been used to coat damaged areas on trees. However, these can crack due to the contraction and the expansion of the tree or climatic changes. Water then penetrates through the cracks, causing decay again.

Now silicones are being used for this purpose. Silicones are flexible and can withstand harsh weather conditions. It is also easy to remove if further treatment is required. Moreover, silicones can be tinted to match the tree bark color, allowing their natural beauty to be preserved. This silicone-based technology is helping to speed the recovery of damaged trees while preserving their unique character.

Nature-Friendly Products

• Pharmaceutical use Cellulose Derivatives

Pharmaceutical-use cellulose derivatives are used in various coating applications. For example, they can be used to coat tablets so that they will dissolve in the stomach or intestine.



Tablets coated with cellulose derivatives

• Anti-Segregation Additive for Underwater Concrete structures (USCA CLEAN)

When concrete is poured underwater, it tends to segregate and disperse. This not only weakens the concrete, but also pollutes the water. Segregation can be prevented by adding cellulose derivatives to the concrete to increase its viscosity. In recent years this method has been used in various waterfront development projects, including the construction of bridges and embankments.



Concrete samples with (left) and without (right) Usca Clean additive

• Dust-Control Agent for Spray-on Concrete

Tunnel surfaces are normally sprayed with concrete as the tunnel is dug. Dust control agents increase the viscosity of the concrete and reduce the amount of dust produced. In recent years additives of this type have been used increasingly to prevent pneumoconiosis.

• POVAL

Like cellulose derivatives, POVAL is a polymer used in a wide range of applications that take advantage of its solubility in water. Examples of day-to-day products in which it is used

include laundry starch, wrapping films and postage stamp adhesive. POVAL is also friendly to the environment, since it is biodegradable through bacterial action.



POVAL film

• Synthetic Pheromones

Synthetic insect sex pheromones are increasingly gaining a reputation as an alternative to insecticides. When released in small quantities on farms, these substances disrupt mating, thereby helping to prevent infestation. Harmless to people and natural enemies and kind to the environment, pheromones are the ideal weapon against insect pests. In Japan they are widely used by agricultural operations, including apple, peach, pear orchards and tea plantations.



Installing a synthetic pheromone dispenser

• Ine Ichiban

Ine Ichiban fertilizer was jointly developed by Shin-Etsu Chemical and Fukui Prefecture Economic Federation of Agriculture Cooperatives. Its purpose is to improve the soil in order to enhance rice flavor and increase crop yields. The product is also friendly to the environment. It includes lime, which prevents groundwater pollution caused by nitrates and air pollution caused by nitrogen oxides.



Ine Ichiban

PVC with a Low Environmental Impact

Plastics are found everywhere in our lives. The word “plastic” refers to an extremely wide range of materials. One such material is PVC, which, besides being extremely economical, durable and easy to process is also helping to reduce the impact on the environment created by plastic materials. It is used in applications ranging from social infrastructure to the durable consumer goods that we use in our everyday lives. With an annual output of 2.55 million tons from its factories around the world, Shin-Etsu Chemical is the world’s leading producer of PVC resins. We are fulfilling the special responsibilities that attend this pre-eminence by showing leadership in environmental conservation as well.



PVC’s Contribution to Energy Saving

PVC accounts for 17% of total plastic production in Japan and has become a vital material for modern industry and lifestyles. The important feature of PVC is that it has a lower impact on the environment than other plastics. The reasons for this advantage are outlined below.

1. Less Petroleum Used

PVC is 57% salt, one of the most abundant resources on Earth, while petroleum constitutes the remaining 43%. Other plastics are made entirely of petroleum, so by using PVC we can help to conserve the world’s oil resources.

2. Low Environmental Impact

PVC also excels in terms of its life cycle assessment (LCA). According to research by Chem Systems, the amount of energy consumed during the production and processing of PVC is extremely small compared with other plastics.

•Energy Consumption by Type of Material

Material	PVC	Polypropylene	PET Resin
Energy consumption (Mj/kg)	55	79	113
Energy consumption ratio (PVC = 100)	100	143	205

3. Low CO₂ Emissions

The amount of carbon dioxide released during the production and processing of PVC is low compared with other materials. In addition, PVC contains less carbon than other plastics, it emits less carbon dioxide during incineration. This is one of the significant properties, since carbon dioxide emissions are one of the causes of global warming.

• CO₂ Emitted during Perfect Combustion

Material	PVC	Polyethylene	Polypropylene	Polystyrene
CO ₂ emitted (kg-C/kg)	0.38	0.85	0.85	0.93

4. An Alternative to Wood and Paper

As a housing construction material, PVC is used as an alternative to wood and paper in applications ranging from flooring materials to siding. This equates to preventing the logging of approximately 100,000 hectares of forest in Japan and around 1.08 million hectares worldwide. PVC is therefore making a significant contribution to the conservation of forest resources. The area saved is equivalent to about 10% of the total area of forest in Japan.

5. Energy Savings in End Products

PVC is molded into various forms for use in our lives. Take window frames, for example. PVC window frames are extremely effective in heat insulation. When compared with aluminum frames the energy saving is estimated to be the equivalent of 436 liters of kerosene per year per household.



PVC pipes

Activities of the Vinyl Environmental Council

In 1998, Shin-Etsu Chemical and 17 other PVC manufacturers jointly formed the Vinyl Environmental Council (VEC). The objectives of this organization are to disseminate accurate information about PVC, to promote the development of PVC recycling technology, and to conduct surveys and research. In the two years since its establishment, it has carried out experiments with the new recycling system known as “Feedstock Recycling” (see diagram). Recycling rates are already starting to rise.

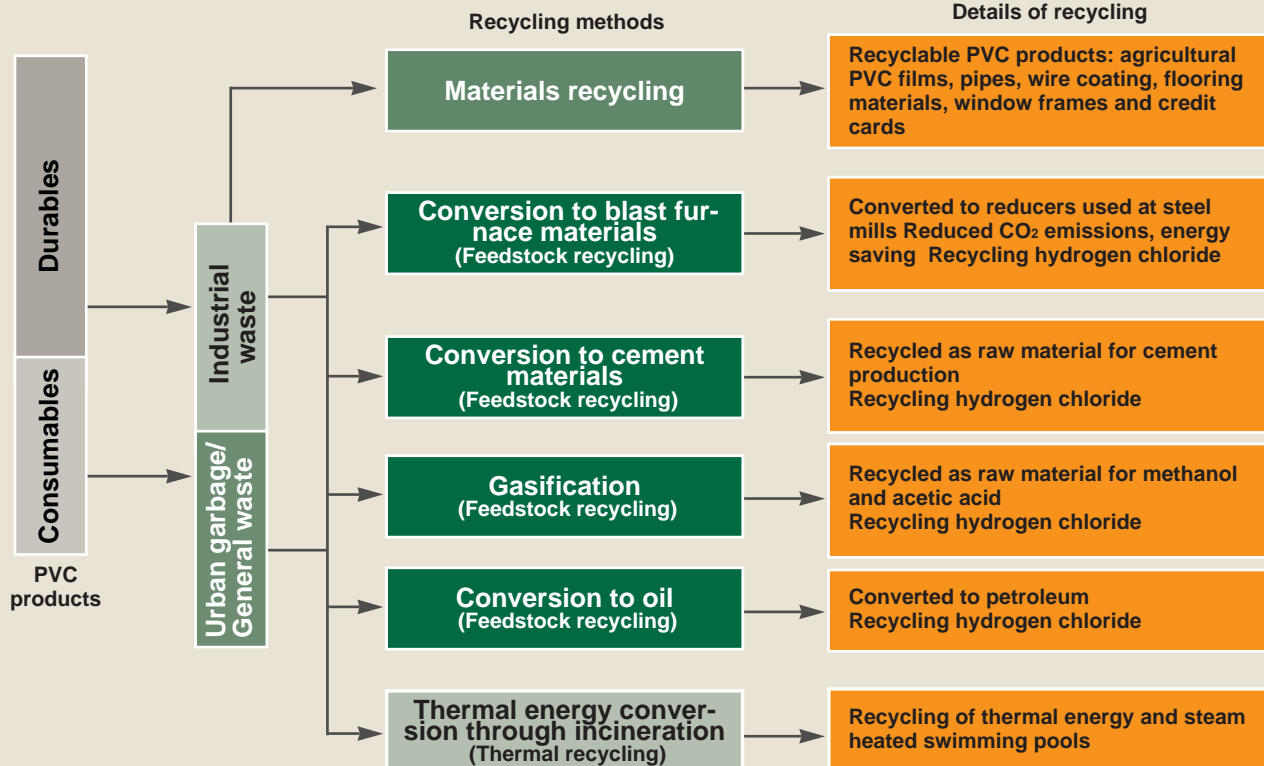
Global environmental problems require global solutions. They cannot be solved through the efforts of a single company. The establishment of recycling and recovery systems and the development of effective utilization technologies can only be achieved through wide-ranging industry cooperation. Through the activities of VEC, Shin-Etsu Chemical plans to make an appeal to the world about the importance of PVC as a material that can help to reduce adverse effects on the environment, to support research into PVC recycling systems, and to contribute to building a society committed to resource recycling.

F.Y.I.

Because PVC is made from industrial salt, which includes chlorine, it was previously suspected that the incineration of PVC products was a major source of dioxin emissions. However, the general view now, based on scientific evidence, is that dioxin emissions are largely determined not by whether the material incinerated contains salt, but rather by the conditions under which incineration occurs. Dioxin production can be suppressed by keeping the temperature above 850°C. In Japan, local governments and incineration contractors are currently upgrading and improving their facilities.



PVC Recycling System



The recycling ratio for PVC has reached about 30% in Japan, which is the highest of all plastic materials. The methods used fall into three categories. First, there is materials recycling, whereby PVC waste is reused as PVC. Second, there is feedstock recycling, which involves the conversion of PVC waste into chemicals, raw materials and fuels, such as cement ingredients or reducers that can be used in place of coke in steel production. Third, there is thermal recycling, whereby energy released during the incineration of PVC waste is recovered as heat and steam. VEC is conducting research into feedstock recycling and is developing practical systems in cooperation with NKK Corp. and Tokuyama Corp.



Contributing to Society through Safety Systems

Social contribution is an important part of the role of businesses. Shin-Etsu Chemical is making its own unique contributions in the following areas.

Shin-Etsu Chemical supports environmental protection activities and environmentally significant research. We will continue to support these activities as part of our strong commitment to the preservation of a green planet for future generations.

• Support for Environmental Protection Activities

The Earth Trust was established to subsidize the projects carried out by the Foundation for Earth Environment. The Foundation for Earth Environment is a public-service organization under the auspices of the Environment Agency. Its mission is to undertake comprehensive environmental projects with the aim of preserving this beautiful planet for future generations. The Shin-Etsu Group has entrusted the maximum



Road cleaning

amount for a single corporation, amounting to 65 million yen, to the Earth Trust. All income from the Trust is used to support the environmental protection activities of the Foundation.

Environmental Business Activities Fukui Environment Analysis Center

The Fukui Environment Analysis Center has been developing analysis and measurement technology for over many years. In March 1972 it began to conduct environmental and pollution-related analysis and measurement programs based on its extensive experience in the field. Since then it has carried out surveys and analyses of various types of pollution, including water and air contamination, foul odors, waste, noise and vibration. It has also conducted workplace environmental assessments for clients/customers. Another aspect of its work is scientific testing, which is an essential part of the new product development process.

Recently the Center carried out a project on dioxins and other endocrine-disrupting chemicals in the environment and is now supplying important data on this issue. It carried out all aspects of this work, from sampling and measurement through to the preparation of reports.



Water sampling

Safety Systems to Help Protect the Environment

As evidenced demonstrated by recent incidents, we need to be aware that accidents and disasters can have a major impact on the surrounding environment. Thorough training and a heightened awareness of safety play a vital role in protecting the environment.

• Comprehensive Disaster Prevention Exercises

Every plant and facility holds regular disaster-prevention exercises to prepare employees for accidents and emergencies. Exercises differ in scale and magnitude are held on various scales, from those requiring company-wide participation down to drills held in individual section. In the unlikely event of an accident, trained environment teams are ready to swing into action to minimize the impact on the around a plant, such as by isolating chemical spills and carrying out environmental assessments.



A disaster prevention exercise

• Safety Built in from the Design Stage

Shin-Etsu Chemical has introduced the HAZOP system, which is an internationally-recognized method based on the organized efforts having an integrated approach to promoting safety in chemical plants. Under this system, safety measures are factored into the equation when new facilities are still at the design stage. In addition, labor and management work together to ensure safety by staging regular “Labor-Management Safety Patrols”

• National Safety Week

Every July, Shin-Etsu Chemical implements a National Safety Week. Ceremonies are held at each plant to pray for safety in the up coming year. Moreover, awards are presented for exemplary workplace safety records. The program also includes safety lectures and seminars. This initiative helps to raise safety consciousness among individual employees.

Contributing to Local Communities and Raising the Environmental Awareness of Employees

The Shin-Etsu Group is involved in various voluntary activities and greenery planting campaigns. These activities not only contribute to local communities, but also help to raise environmental awareness among our employees. A recent increase in the number of environment-related suggestions submitted by our employees indicates that there has been a sustained rise in environmental awareness.

• A Member of Local Communities

Shin-Etsu Chemical supports a variety of voluntary activities, including road and river clean-ups, as well as riverside weeding projects as part of “spring beautification projects” in areas around its plants. Many employees from Shin-Etsu Chemical plants in Takefu (Fukui Prefecture) participated in voluntary oil recovery efforts after an oil spill in the Sea of Japan several years ago. Shin-Etsu Chemical participates in environmental seminars and other regional events. It also contributes to regional environmental activities through its own programs, including factory tours.

As a private business enterprise exists in partnership with regional communities, Shin-Etsu Chemical will continue to maintain harmonious relationships with local residents and communities. Every opportunity will be taken to promote exchanges with as many people as a possible.



Cleaning curve mirrors

• Incentives for Attainment of Qualifications

Shin-Etsu Chemical has established incentive programs to reward employees who obtain environment-related statutory qualifications in such areas as atmospheric and water pollution, dust, noise and vibration. Through these programs, the Company is working to increase the knowledge, abilities and awareness of its staff in relation to environmental conservation. Many of our employees who acquire national qualifications are contributing to environmental protection efforts.

• Planting Greenery at Factories and Business offices

Factories and business offices in the Shin-Etsu Group actively participate in greenery planting campaigns as part of their environmental activities. Of particular significance is the adoption of the “industrial park” concept at Shin-Etsu



The Shirakawa Plant received an award from the Prime Minister for its efforts to promote environmental beautification.

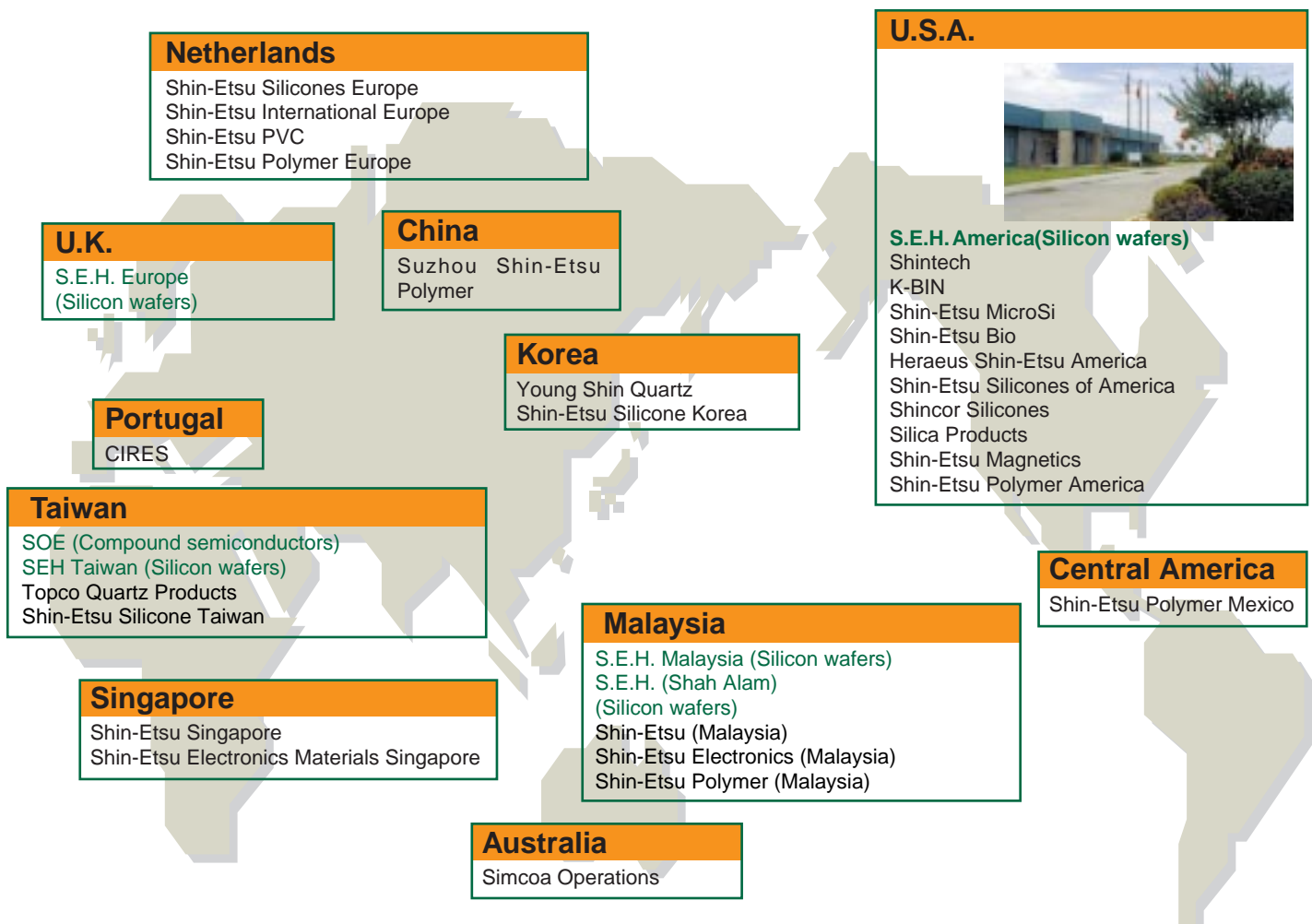
Handotai Shirakawa Plant. In fact, greenery covers approximately half of the plant’s 466,000m² site. The exterior and layout of the plant were designed to harmonize with the surrounding environment, and nearby areas of natural forest were preserved. In June 1996 the plant received a special award from the Japanese Prime Minister in recognition of its contribution to the promotion of environmental beautification.

Recent Milestones in Environmental and Voluntary Activities

- Silicone Electronic Materials Research Center holds annual second-hand book market.
- Voluntary clean-up activities are undertaken in the area around the Naoetsu Plant.
- A clean-up campaign is held in the area around the Shin-Etsu Handotai Saigata Plant
- The Naoetsu Plant holds its annual commemorative tree-planting.
- The Takefu Plant participates in a “no-car day” to encourage the use of alternative means of transportation.
- The Naoetsu Plant hosts an environmental seminar on the subject of developments in laws and regulations relating to industrial waste.
- Elementary school children from Sabae City visit the Fukui Environment Analysis Center to learn about water testing and other activities.
- The Gunma Complex receives awards from the Prefectural Government and the Road Association in recognition of its annual clean-up activities in the surrounding area.
- A group of representatives from the Gunma Complex participates in a Regional environmental seminar.
- Shin-Etsu Chemical participates in an international environmental exhibition for a member of the Vinyl Environmental Council (VEC).
- The Takefu Plant co-sponsors a magnet contest.
- The Takefu Plant participates in a spring-thaw community clean-up campaign.
- The Takefu Plant participates in “Earth Day Takefu” and promotes environmental protection activities.
- The Kashima Plant participates in an environmental beautification and clean-up activities in cooperation with various petrochemical manufacturers operating in the neighborhood.

Our International Network and the Environment

The Shin-Etsu Chemical Group has built a global network and many of its products are manufactured overseas. These overseas production plants all have environmental action programs, and more and more are gaining ISO14001 certification. The Shin-Etsu Chemical Group will continue to work to improve the global environment. (* Plants that have already gained ISO14001 certification are indicated in green.)



SEH America Receives Environmental Award

At its ninth award ceremony on June 7, 2000, the Association of Washington Businesses (AWB) presented SEH America with its award for companies achieving excellence in environmental performance (100 or more employees). The award was in recognition of SEH America's achievements in 1999, including a 25% reduction in waste disposal costs, a 10% reduction in final disposal waste volumes, and the recycling of 1.2 million pounds of silicon waste. These results were made possible by the determination and efforts of individual employees involved in recycling activities, waste reduction, pollution prevention and water quality control. The award gave considerable encouragement to all employees engaged in environmental activities.

Ecology Award for Simcoa Operations

In October 1999, the Australian company Simcoa Operations received its third ecology award from the Waste Management Advisory Committee, a regional government organization in southwestern Australia. The award, in the private enterprise section of the program, was in recognition of years of effort by Simcoa Operations to reduce and recycle waste products. The prize money was donated to Ms. McNeil of Eaton Primary School, which won the award for schools. The money will be used to establish and run a worm farm to help solve the school's rubbish problem.



[Environmental Protection Information]

Environmental Protection Mechanisms, Environmental Auditing Systems, ISO-Related Activities

Organizations and Auditing Systems

Respect for humanity is a basic tenet at for Shin-Etsu Chemical. This is reflected in the fundamental policy of putting “safety first” in all our corporate activities. It is also reflected in our consideration, as a manufacturer, for the global environment as manufacturer. We believe that the first priorities for our business activities must be the maintenance of a safety management system and the achievement of harmony with the environment must take precedence in all our business activities.

Organizational Structure for Environmental Protection Efforts

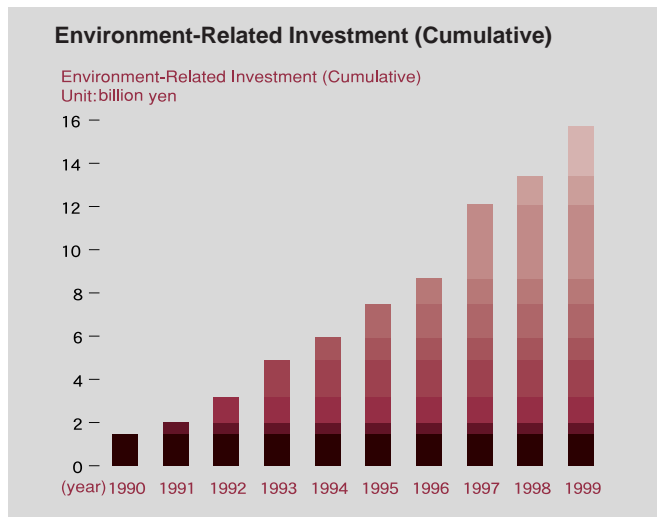
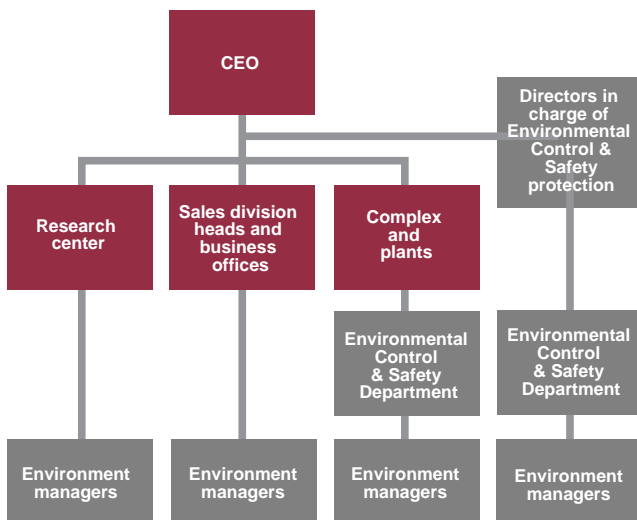
Shin-Etsu Chemical is strongly committed to the environment, safety and health. We established an Environment Control & Safety Department in 1970, and between 1990 and 1999 we invested approximately 15.7 billion yen in environmental facilities. We hold regular Environment Control & Safety Conferences and Global Environmental Issues Countermeasures Committee meetings as part of our own environmental initiatives (RC*Responsible Care).

* Responsible Care (RC) Activities

RC programs are internationally recognized voluntary programs, under which companies that manufacture or handle chemical products make public pledges in their corporate policies that they will protect the environment, safety and human health and promote safety throughout over each product's life cycle, from production through all the way to use and ultimately to disposal or recycling. Activities include environmental, safety and health countermeasures, and continuous improvement efforts.

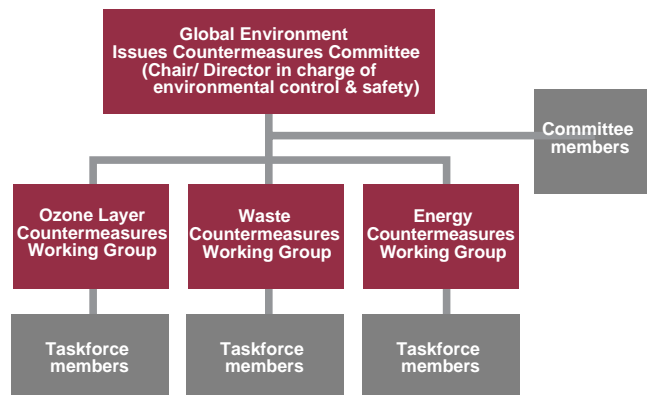
1. Line Organization

Shin-Etsu Chemical has established the following organizational structure for environmental protection activities in the context of day-to-day operations.



2. Committee Organization

Shin-Etsu Chemical has established environmental task forces to deal with specific issues, such as the ozone layer depletion, waste and energy. Representatives from the various divisions and departments are selected to serve on these task forces. They coordinate company-wide efforts to address issues and alleviate problems.



Internal Audit and Monitoring Systems

Sustainable environmental protection and safety are not possible without periodic checks. We have established various organizations and systems in each of our plants to carry out internal audits and monitoring. They carry out their own control activities based on close cooperation between labor and management.

• Environmental Control & Safety Audits

Audits are carried out by audit teams that include the director in charge of environmental control & safety audit committee chairperson and technical as well as safety experts. They check the specific content and results of environmental safety measures efforts and identify future issues through on-site inspection and documentation review. After the surveys, meetings are held to present reports to each plant as well as to the entire board of directors. These findings are followed up in subsequent audits.

• Safety Examination Committees

These committees consist of key plant staff, including the plant manager. Their tasks are to examine the installation and safety performance of new facilities, to examine the environmental and safety implications, and to identify areas that require improvement.

• Labor-Management Safety Patrols

Key labor and management personnel periodically carry out patrols to check safety conditions in existing plant facilities.

• HAZOP*

HAZOP (hazard and operability study) is designed to improve work procedures and facilities by attempting to anticipate environmental contamination resulting from malfunctioning production facilities and other equipment problems. HAZOP is implemented by designers and facility managers whenever every time new facilities are designed, and the results will be are then used to improve safety designs. Operators also inspect Existing facilities are also inspected by operators, and their so that findings are can be reflected in ongoing improvements to operating procedures and facilities.

*HAZOP

The HAZOP (hazard and operability study) concept was developed by the British company ICI as a safety evaluation system for chemical plants. Since it is highly systematic, involving the entire organization, it is unlikely that problems will be overlooked. The system has gained widespread international acceptance been widely introduced internationally as a safety evaluation procedure for chemical plants.

Self-Monitoring and Audit Programs (Unit: Number of cases)

year	1985	1990	1995	1996	1997	1998	1999
Environmental Control & Safety audits (including special audits)	3	4	8	8	11	10	12
Safety Examination Committee	24	51	47	34	53	45	48
Labor/ Management joint safety patrols	30	30	30	30	30	30	30
Number of HAZOP studies	-	-	45	38	41	43	38

History of Environmental Measures Taken Efforts by Shin-Etsu Chemical

April 1953	Work manuals and work standards formulated.
November 1953	Third Deming Prize* received.
September 1955	Education and training committees established.
March 1961	R&D Committee and Chemical Industry Council established.
June 1961	Safety Council established.
October 1961	First safety audit carried out.
November 1966	Health and Hygiene Committee established.
October 1970	Environmental Control & Safety Department established.
February 1971	Waste water treatment facility completed at Isobe Plant.
March 1972	Large-scale hydrochloric acid recovery facility (bypro-incinerator) completed at Kashima Vinyl Monomer plant.
March 1972	Fukui Environment Analysis Center established.
November 1973	Control & Safety Countermeasures Department established.
February 1974	Environmental Control & Safety Sections in each plant placed under direct jurisdiction of plant general managers.
August 1975	Environmental Control & Safety Management Regulations and Emergency Response Regulations formulated.
October 1989	CFC Control Countermeasures Committee established.
May 1990	Global Environment Issues Countermeasures Committee established. (By reorganising CFC Control Countermeasures Committee)
February 1994	Final disposal facility built at Gunma Complex
March 1995	Participation in RC activities.
July 1996	ISO14001 certification obtained for Gunma Complex.
August 1998	Environmental Charter adopted.
March 2000	ISO14001 certification obtained for all production plants in Japan.

*Deming Prize

This prize was established by the Union of Japanese Scientists and Engineers. It is awarded to individuals and companies that have contributed to improvements in the quality management systems employed in the manufacture of for industrial products.

External Audit and Inspection Systems

In July 1996, ISO14001* certification was obtained by our Gunma Complex. Shin-Etsu Chemical was the first major Japanese chemical company to meet the requirements for the certification. Since then we have progressively attained certification at other facilities, and in 2000 we had all of our plants achieved certification under ISO14001. Each plant has regarded made certification as an the opportunity to renew its

endeavours efforts. We will continue to maintain our ISO14001 compliant systems, and to work actively to improve our environmental safety activities.

*ISO14001

The International Organization for Standardization (ISO) establishes uniform international standards for the specifications of products and systems. ISO14001 is an international standard for environmental management activities and inspections. Requirements for certification include independent efforts by the company as well as an active and continuous commitment to the improvement of environmental activities and not to mention full compliance with environmental laws and regulations.

ISO14001 Certification of the Shin-Etsu Group in Japan

Company	Plant	Products	Location	Certification Date	Certification Number	Certifying Agency
Shin-Etsu Chemical	Isobe	Silicones, oxide single crystal	Gunma	1996. 7. 1	JCQA-E-002	JCQA
	Matsuida	Silicones, synthetic quartz	Gunma	1996. 7. 1	JCQA-E-002	JCQA
	Gobara	Silicones	Gunma	1996. 7. 1	JCQA-E-002	JCQA
	Silicones-Electronics Materials Research Center	Silicone research	Gunma	1996. 7. 1	JCQA-E-002	JCQA
	Advanced Functional Materials Research Center	Research into oxide single crystal, etc.	Gunma	1996. 7. 1	JCQA-E-002	JCQA
	Takefu	Rare earths, rare earth magnets	Fukui	1998.12.25	JQA-EM0298	JQA
	Naoetsu	Cellulose derivatives, synthetic quartz, photoresists	Niigata	1990. 5. 31	JCQA-E-0064	JCQA
	Kashima	PVC	Ibaraki	2000. 3. 21	JCQA-E-0126	JCQA
Shin-Etsu Handotai Group	Shirakawa	Silicon single crystal, wafer processing	Fukushima	1997. 1. 21	E9073	SGS-Yarsley
	Takefu	Silicon single crystal	Fukui	1997. 7. 24	E10362	SGS-Yarsley
	Isobe	Silicon single crystal, wafer processing	Gunma	1997.11.10	E11339	SGS-Yarsley
	Saigata	Silicon single crystal	Niigata	1997.12.16	E11540	SGS-Yarsley
	Mimasu Semiconductor	Wafer processing	Gunma	1998. 1. 19	E11804	SGS-Yarsley
	Nagano Electronics Industrial	Wafer processing	Nagano	1998. 2. 20	E12319	SGS-Yarsley
	Naoetsu Electronics Industrial	Wafer processing	Niigata	1998. 7. 28	E13930	SGS-Yarsley
Shin-Etsu Engineering	Kashima		Ibaraki	2000. 3. 21	JCQA-E-0126	JCQA
Nisshin Chemical Industry			Fukui	2000. 4. 24	JCQA-E-0137	JCQA
Shin-Etsu Quartz Products	Takefu		Fukui	2000. 1. 5	35154	ABS-QE
	Koriyama		Fukushima	2000. 6.14	35155	ABS-QE

ISO14001 Activity Promotion Organizations

• Takefu Plant



• Naoetsu Plant

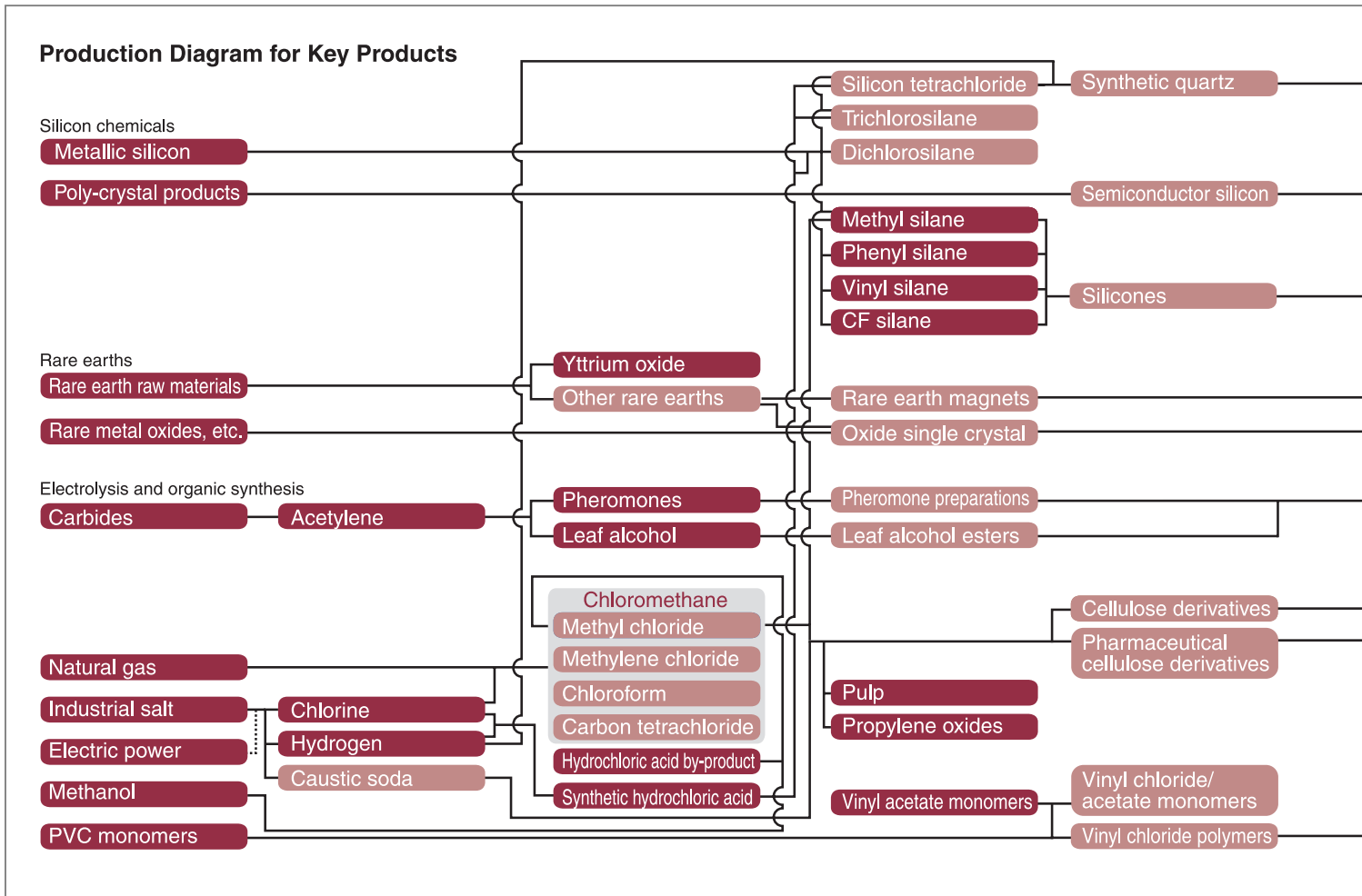
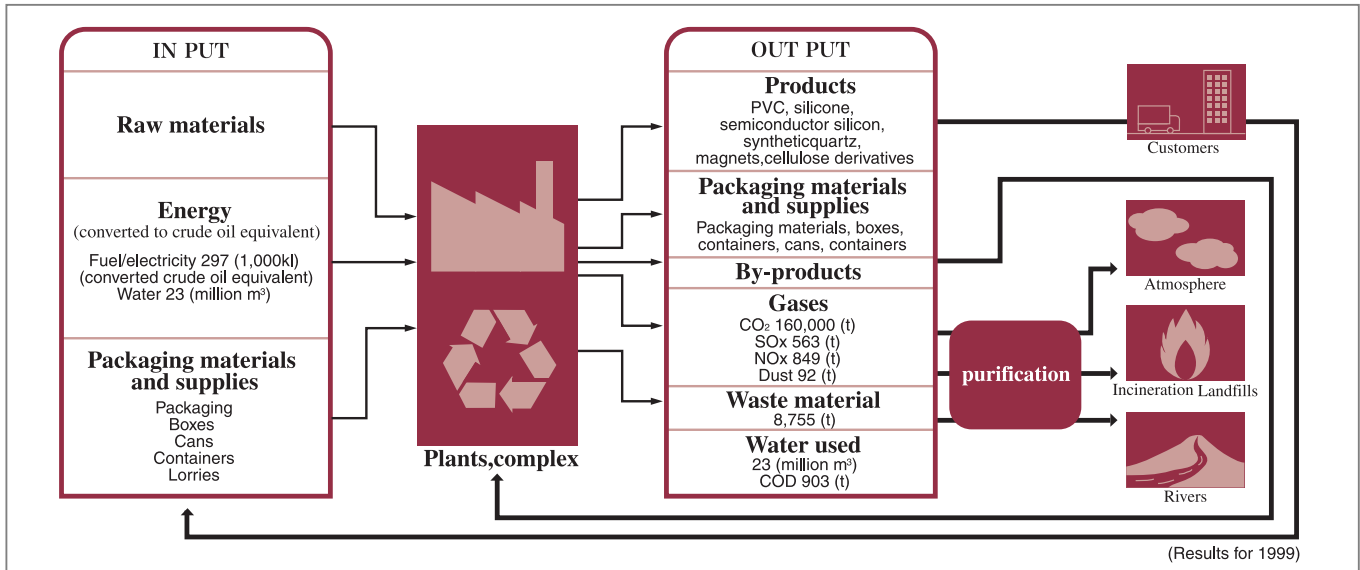


• Kashima Plant



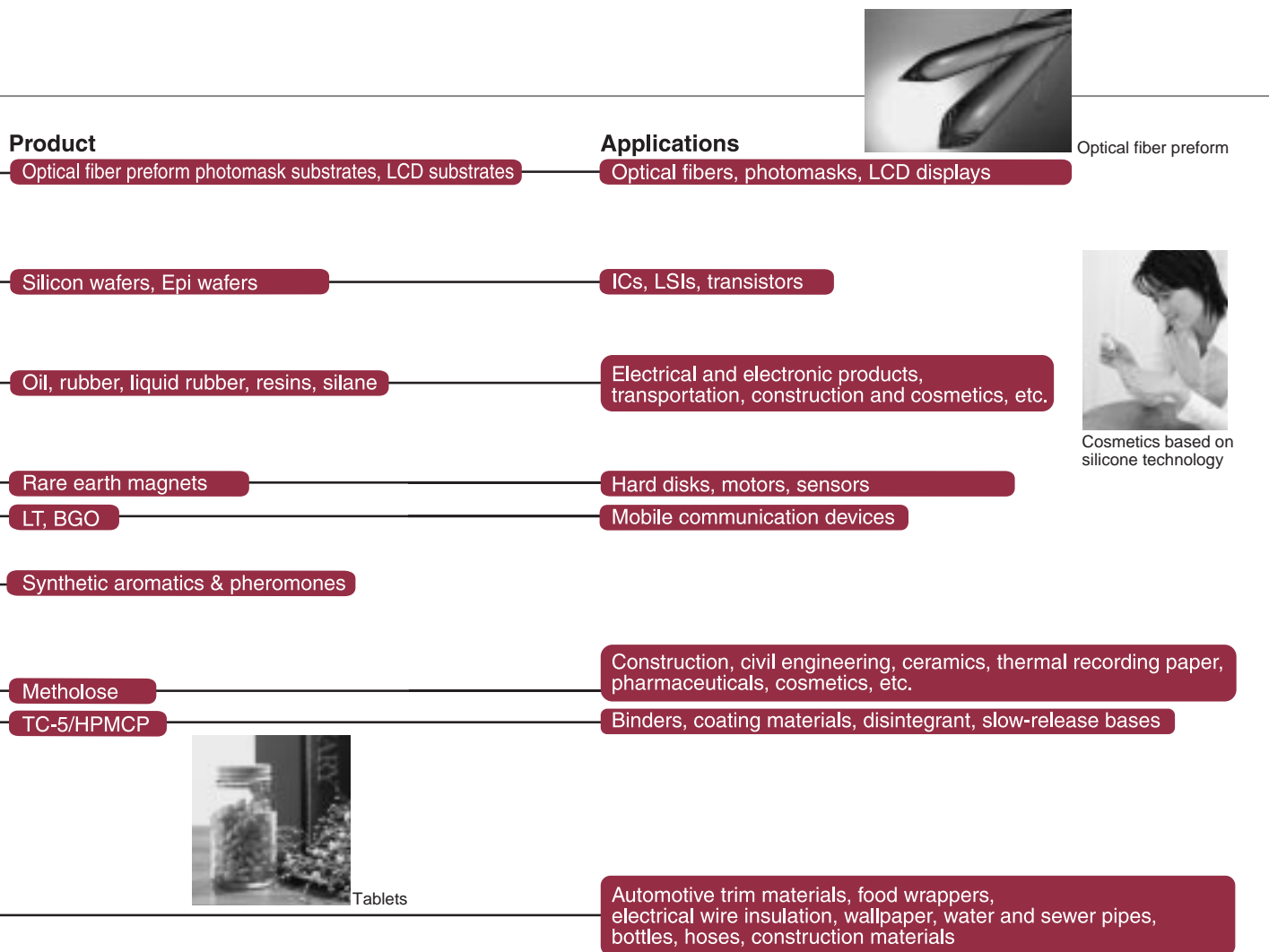
(Gunma Plant / See.p.8)

From creation to recycling



The Shin-Etsu Chemical Group aims to go beyond its role as a chemical manufacturer to also become a producer of various high-tech materials. At present, it produces polyvinyl chloride, silicones (silicon resin), semiconductor silicon, synthetic quartz, methyl cellulose derivatives, rare earth magnets and various other products at its five major plants in Japan.

The manufacturing processes yield not only products, but also by-products, waste water, gases and other materials. These are recycled as much as possible, and materials that cannot be recycled are reduced in volume and detoxified before they are released into rivers and the atmosphere or buried in proper disposal sites. The flow of materials in Shin-Etsu Chemical plants is shown in the following diagram.



Protecting Water Quality and Managing Effluents

Shin-Etsu Chemical wants to make absolutely sure that its production activities will not have an adverse effect on rivers and other bodies of water near its business offices and plants. It voluntarily undertakes a wide range of environmental protection initiatives, including the periodic monitoring of water quality in inspection wells.

Protecting Water Quality and Managing Effluents

Water is used in various production processes either as “process water”, which is employed mainly to wash products, or “coolant”, which is used to water-cool manufacturing equipment and other tools.

Process water may become contaminated with organic chemicals and other substances. It is therefore treated thoroughly to ensure that pH*, BOD* and SS* (suspended solids) levels do not exceed the standards stipulated in the Water Pollution Control Law*.

Where possible, cooling water is repeatedly recycled within the plant. Before water is discharged, it is checked to ensure that it meets all requirements.

We analyze and monitor the pH levels of discharged water around the clock. Other parameters are analyzed at regular intervals as part of our quest efforts to maintain the quality of discharged water and not to disrupt the river environment.

*Water Pollution Control Law

This law took effect in 1961. Its purpose is to maintain water quality. Provisions of the Law cover such aspects as waste water regulations, countermeasures relating to household waste water, regulations concerning ground contamination by polluted water (toxic substances), monitoring of water pollution, liability compensation, and penalties.

*pH

This is a unit of hydrogen ion exponent ($-\log[H^+]$). It indicates whether a solution is acidic ($<pH7$), neutrality ($=pH7$) or alkaline ($>pH7$).

*BOD

Biochemical Oxygen Demand (BOD) indicates the amount of oxygen required for water-borne microorganisms to break down contaminants in water. It is used as an indicator of water pollution.

*SS

This indicates the amount of suspended solids in water. Suspended solids cause turbidity, and in large amounts they can affect aquatic life.

Total Discharge Volumes and Water Analysis Results

Year	Government requirement	Prefectural requirement	1985	1990	1995	1996	1997	1998	1999	Detection limit
Total discharge volume (10,000 m ³ /year)			2200	2200	2200	2200	2200	2300	2300	
pH	5.8-8.6	5.8-8.6	7.4	6.7-7.6	6.7-7.8	6.4-7.8	6.5-7.9	6.3-7.7	6.2-7.7	
BOD (ppm)	160	25-70	8.2	5-14	2.6-22	1.7-27	1.8-23	1.5-35	1.5-34	0.5
SS (ppm)	200	20-120	5.1	7.7-13	0-10	0-25	2.3-24	4.3-40	4.0-20	1

(Prefectural requirements vary according to the prefecture in which each plant is located.)

Total Discharge Volumes and COD* Discharge Volumes

By saving water through recycling we have successfully contained the total volume of waste water discharged so that it has remained constant, despite increases in production volumes. COD discharge volumes have been falling since 1997, even though production volumes are rising.

*COD (Chemical Oxygen Demand)

This is an indicator of the amount of oxygen that is chemically consumed. It represents the level of oxygen required to oxidize pollutants in water using oxidants. It rises in proportion to the amount of contaminants in water.

*TOD (Total Oxygen Demand)

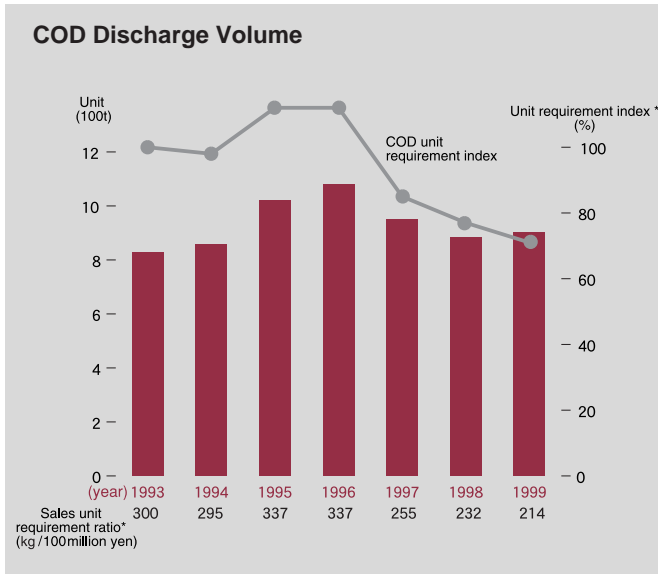
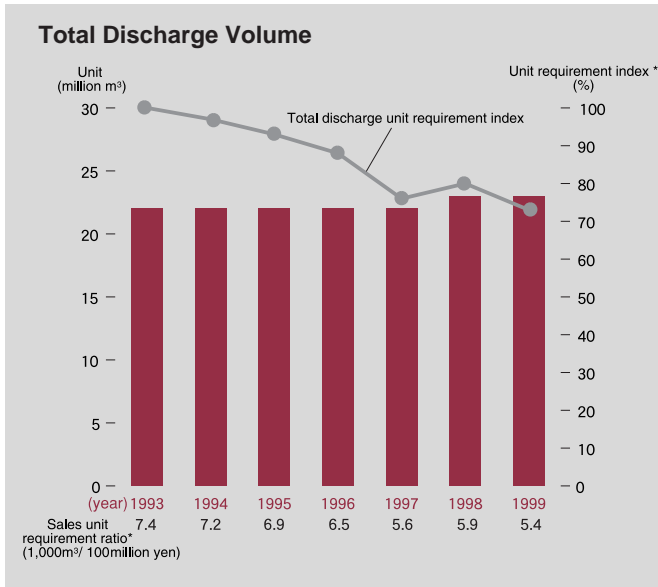
This indicates the amount of oxygen required for the combustion of a specimen.

Groundwater Contamination Monitoring

We maintain inspection wells in our plants for use in groundwater monitoring. Current figures do not show contaminants at problematic levels in any of our facilities. We will endeavor to maintain good level in this regard.

Discharge Monitoring (Gunma Complex)

Inspection method (item)	Frequency Continuous	Range of standard values	Normal value
pH	24 Hr	5.8-8.6	6-7
*TOD (total oxygen demand)	1 time/ 4 Hr	-	200-300ppm



*** Sales unit requirement ratio**

This indicates consumption or discharge volumes per unit of sales. It shows what amount of materials must be consumed and discharged to generate a certain level of sales. It is used as an indicator of the efficiency with which consumption and discharge volumes are being controlled.

*** Unit requirement index**

This shows subsequent increases and decreases with the sales unit requirement in a given year set at 100.

Controlling and Reducing Greenhouse Gases

Carbon dioxide, methane and CFCs are all known as “greenhouse gases” because of their role in global warming*. We are working to reduce emissions of these gases from our plants, as well as to eliminate use of all specified CFCs.

* Global warming This refers to rises in the average surface temperature of the Earth due to the effect of carbon dioxide and other greenhouse gases.

Reducing CO₂ Emissions through Introduction of Cogeneration Systems

Cogeneration systems reduce fossil fuel consumption and emissions of carbon dioxide and other greenhouse gases by ensuring efficient use of energy. Systems are already in operation at the Gunma Complex and the Naoetsu Plant. In 1999 carbon dioxide emissions were reduced by approximately 24,000 tons (equivalent to 6,600 tons of carbon), which means a reduction of about 10% in the amount of carbon dioxide produced in our plants. Since their introduction in 1988, these systems have reduced carbon dioxide emissions by a total of 180,000 tons (equivalent to 50,000 tons of carbon).

Complete Elimination of Specified CFCs

Specified CFCs* are used as refrigerants and cleaning agents. They are toxic gases with the potential to cause ozone layer depletion*. Their use in manufacturing has been banned since 1996 under the Montreal Protocol based on the Vienna Convention.

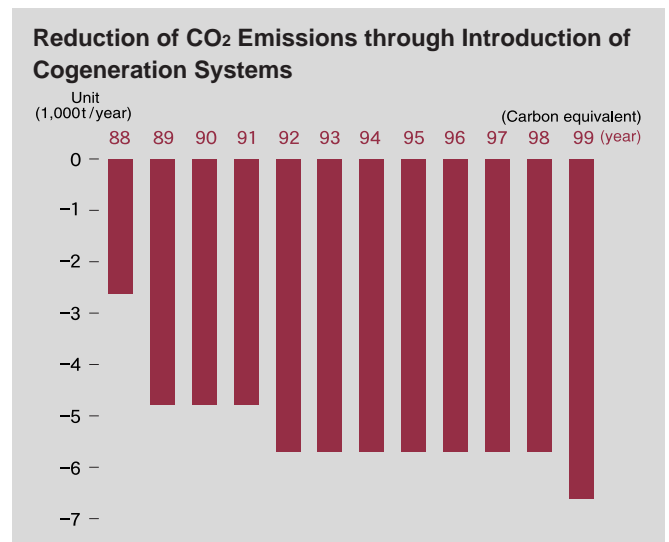
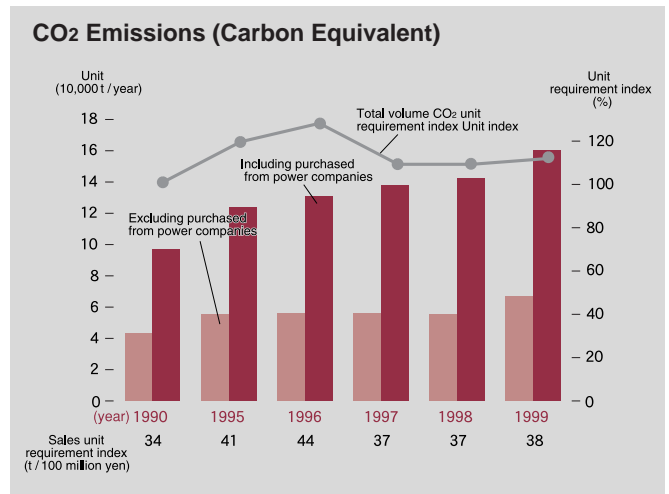
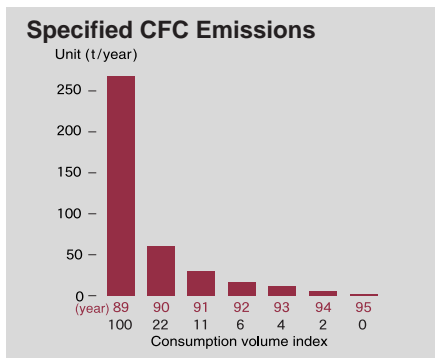
We previously used these substances as refrigerants, as cleaning agents in semiconductor fabrication processes, and as processing materials (sprays, etc.). In 1990 we began to study alternative technologies, and by 1995 we had totally eliminated all specified CFCs.

*Specified CFCs

When CFCs break down in the stratosphere, they release chlorine atoms, which attack the ozone layer. Specified CFCs (CFC 11, 12, 113, 114, 115) are especially hazardous to the ozone layer. Their production was terminated at the end of 1995.

*Ozone layer depletion

The altitude of the ozone layer is between 12,000 and 50,000 meters above the surface of the Earth. It absorbs most of the UV rays that are harmful to humans. Ozone layer depletion is the process whereby this layer is destroyed by specified CFCs and other substances.



*Cogeneration systems

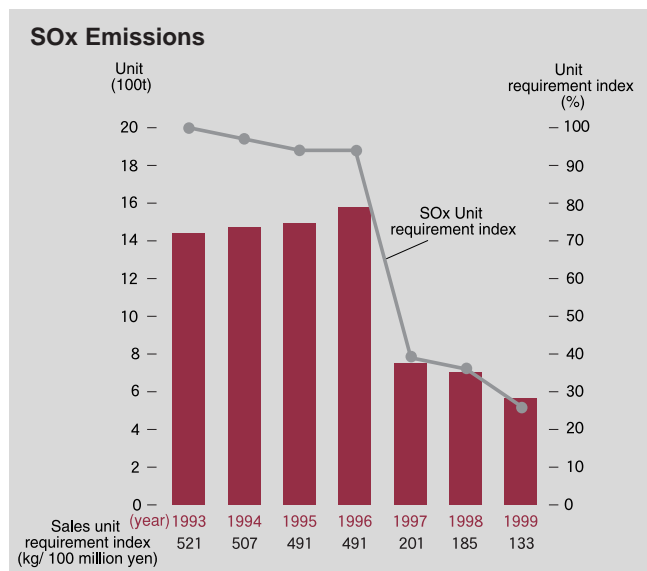
These systems produce electric power and heat simultaneously. Waste heat from power generation is used as thermal energy, allowing the consumption of fossil fuels to be reduced. This also leads to a reduction in emissions of carbon dioxide and other greenhouse gases.

Disposal of Carbon Tetrachloride*

Carbon tetrachloride is a by-product of the methane chloride production processes. Like specified CFCs, it is harmful to the ozone layer, and its production was banned in 1996. We previously manufactured and sold carbon tetrachloride as a kind of methane chloride. However, we have now discontinued the sale of this product, except for its approved uses in certain products, such as agricultural chemicals. Carbon tetrachloride is produced as a by-product during the manufacture of other methane chlorides, but is decomposed in processing facilities installed for that purpose in our factories.

*Carbon tetrachloride

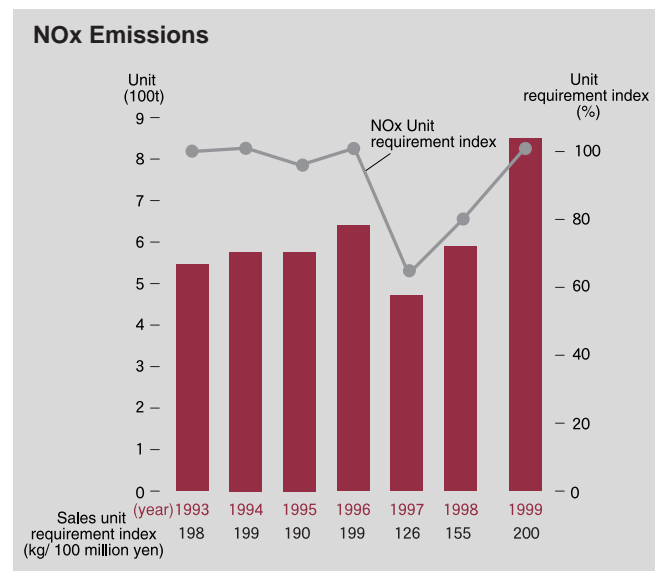
Carbon tetrachloride is an organic chemical and CFC ingredient. It was previously used to degrease machinery and as a stain remover or insecticide.



•Reduction of Other Gas Emissions Boiler Exhaust

Boilers are used to heat water and produce steam. They combust heavy oil or other fuels with air. The exhaust gases produced include carbon dioxide, as well as small amounts of nitrogen oxides* (NOx), sulfur oxides (SOx)*, dust* and other substances.

We reduce the amount of contaminants released during combustion by using only high-grade fuels. We also analyze and monitor exhaust gases around the clock to ensure that NOx and SOx levels are below the limits stipulated in laws, local government regulations and agreements.



Monitoring of Boiler Exhaust Gases (Gunma Complex)

Item	Monitoring Frequency	Standard value	Normal Value
Generator boiler SOx	Continuous (24 hours)	K17.5	K4
Generator boiler NOx	Continuous (24 hours)	150ppm*	130ppm

*ppm (parts per million) This is a unit of concentration.

Boiler Exhaust Analysis Results

Year	Government Requirement	Prefectural Requirement	1985	1990	1995	1996	1997	1998	1999
Dust (g/Nm ³)	0.15		<0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
NOx	150-230	150-230	<200	<200	<150	<150	<150	<150	<150
SOx	K17.5	K17.5	<15	<15	<15	<15	<15	<15	<15

(The standard for boiler NOx varies according to the type of boiler. The range of standard values for the equipment concerned is shown here.)

Incinerator Exhaust

Waste from factory production activities, including by-products, rubbish, waste solvents and sludge, is burnt in incinerators. The resulting exhaust gases include carbon dioxide, as well as small quantities of nitrogen oxides* (NO_x), sulfur oxides (SO_x)*, dust, and trace amounts of dioxins*.

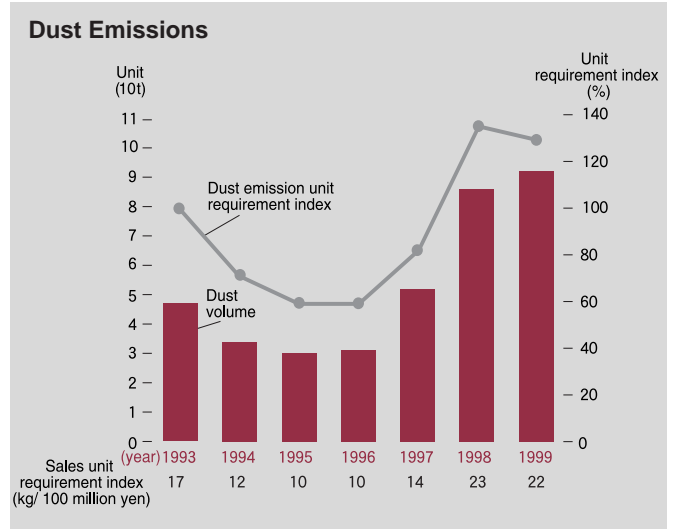
Exhaust gases are monitored and analyzed around the clock to ensure that levels of carbon monoxide (CO), nitrogen oxides (NO_x), sulfur oxides (SO_x) and hydrochloric acid (HCl) do not exceed the levels stipulated in laws, local government regulations and agreements.

*Dioxins

This generic name is applied to Tetrachlorodibenzo-para-dioxins and Tetrachlorodibenzofurans that have chlorine in their molecules. These toxic substances cause cancer, deformities and reproductive problems. Dioxin production is negligible when material is incinerated at high temperatures (800°C or higher). The improvement of incineration methods is therefore an effective way to control such emissions.

*ng

This is an abbreviation for nanogram. In the international list of unit prefixes, "nano-" means one-billionth. So a concentration of 1ng/m³ means that there is one-billionth of a gram of a substance present in each cubic meter. Recent research has confirmed that some substances, such as dioxins, can affect human health even in these minuscule concentrations. It is therefore necessary to monitor the levels of these substances in extremely small units.



Incinerator Exhaust Monitoring (Gunma Complex)

Item	Monitoring Frequency	Standard value	Normal Value
Incinerator HCl	Continuous (24 hours)	700mg/Nm ³	16mg/Nm ³
Incinerator CO	Continuous (24 hours)	100ppm	50ppm

(The figures for CO are maintenance values.)

Incinerator Exhaust Analysis Results (Gunma Complex)

Year	Government requirement	Prefectural requirement	1985	1990	1995	1996	1997	1998	1999
Dust (g/Nm ³)	0.15	0.15		<0.2	<0.2	<0.2	<0.1	<0.1	<0.1
NO _x (ppm)	300	300		<100	<100	<100	<100	<100	<100
SO _x	K17.5	K17.5	<2	<2	<2	<2	<2	<1	<1
Hydrogen chloride (mg/Nm ³)	700	700		<300	<300	<300	<300	<300	<300
Dioxins (ng*/m ³)	80(1998.12-2002.11)							<0.01	<0.01

(The dust levels stipulated in government and prefectural regulations had been 0.5 until March 1999 but were changed to 0.15 beginning in April 2000.)

Achievement of Energy Conservation

We use various energy conservation methods not to waste to preserve the Earth's precious and limited resources. We think of it as a higher priority than the reduction of production costs.

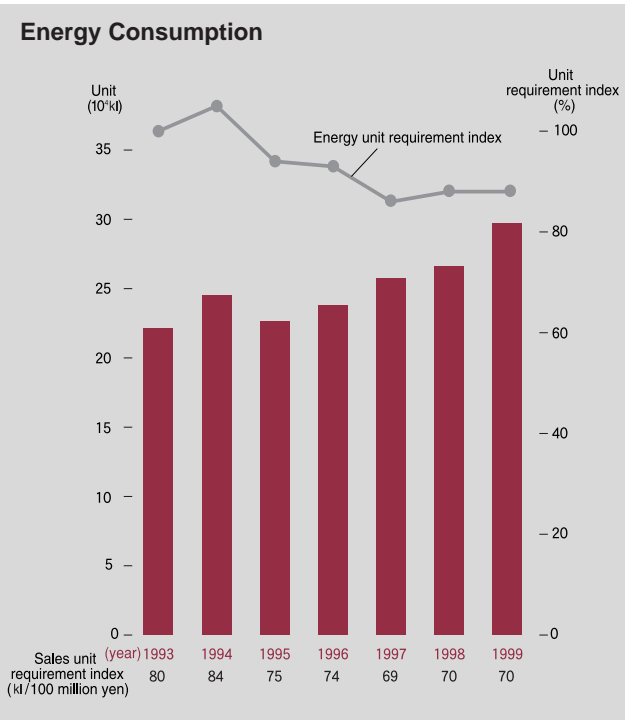
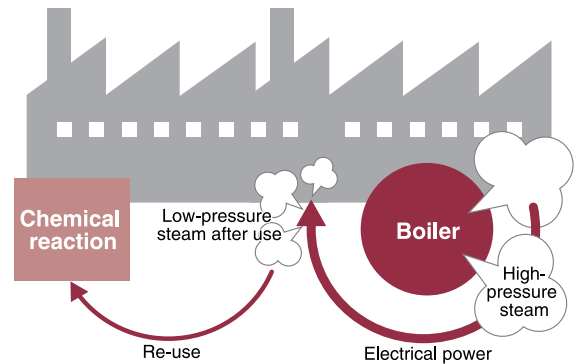
Conserving Energy

We use large amounts of thermal and electrical energy to provide heat and motive power in our production processes, including the synthesis, refining and processing of various products. Thermal energy is provided in the form of steam from boilers, while electrical energy is either purchased from power companies or generated in-house.

We are working to improve our energy efficiency and meet energy conservation targets by improving our technology and energy uses in various ways, including the introduction of cogeneration technology (see p.24). Over the past three years our energy consumption (as converted to crude oil equivalent) has risen because of increases in production volumes. However, energy consumption per unit of sales has remained level.

“Energy Savings Achieved through Cogeneration Technology”

Cogeneration systems recover heat produced during electric power generation and re-use it as energy, providing dramatic improvements in energy efficiency. Many factories use electric power and heat at the same time, so major benefits can be achieved by the introduction of cogeneration systems. We have actively applied this technology to our power generation systems. High-pressure steam from boilers is first used to produce electricity. The low-pressure steam emitted from this process is then used as a heat source for chemical reactions. In this way, we achieve the goal of energy conservation.



Controlling Chemical Substances Properly

We handle numerous chemical substances as raw materials and products. Various methods are used to monitor the quantities of substances handled and to control their physical and chemical characteristics, including potential hazards and toxicity. Every effort is made to ensure that chemical substances are managed properly according to their specific chemical characteristics.

Legal Compliance

We comply with all applicable laws and regulations, including notification requirements for new chemical substances* and notification requirements for new chemical substances used in small quantities*.

*New chemical substances

Notifications of new chemical substances are obligatory under the Law Concerning Regulations for the Inspection and Manufacture, etc., of Chemical Substances and the Law on Industrial Safety and Hygiene. The former requires notification to the Ministry of International Trade and Industry (MITI) and the Ministry of Health and Welfare, and the latter to the Ministry of Labor.

*A small amount of new chemical substances products

Even when manufactured and handled in small quantities, certain new chemical substances must be notified under the aforementioned laws.

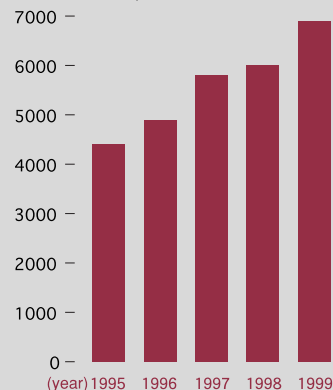
Creation and Provision of Material Data Safety Sheets

To ensure that chemical substances are handled properly for reasons of safety and environmental protection, we prepare material data safety sheets (MSDS) containing as much information as possible about each substance we use. These documents are provided to employees and customers as part of our continuing efforts to protect the environment and maintain high safety standards. MSDS documents are obtained from suppliers of raw materials to ensure proper handling of these substances by our employees.



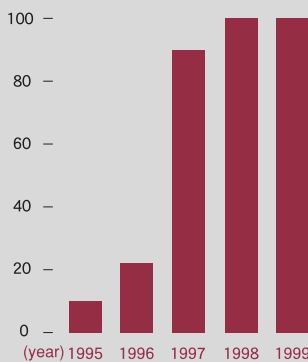
Number of Material Data Safety Sheets Prepared

(Number of cases)



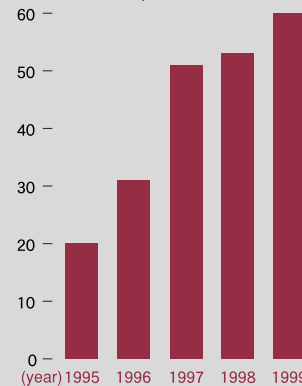
Number of Yellow Cards Issued

(Number of cases)



Number of Substances Subjected to PRTR Notification Requirement

(Number of cases)



Preparation and Issuance of Yellow Cards

Yellow cards* contain information about the appropriate action to be taken by truck drivers in emergencies, such as traffic accidents. We are distributing the cards to those involved in the transportation of hazardous chemicals as part of our efforts to ensure that these substances are managed safely while in transit.

*Yellow Cards

Truck drivers conveying hazardous substances carry the yellow cards. They contain information on the safety precautions for the substances concerned and the appropriate handling procedures, etc.



Management through Pollutant Release and Transfer Registers

There is growing international interest in the use of Pollutant Release and Transfer Registers (PRTR)* to ensure that environmental risks associated with chemical substances are managed properly during the manufacture and use of those substances. We use PRTR data to reduce releases of individual substances and lower the environmental risk.

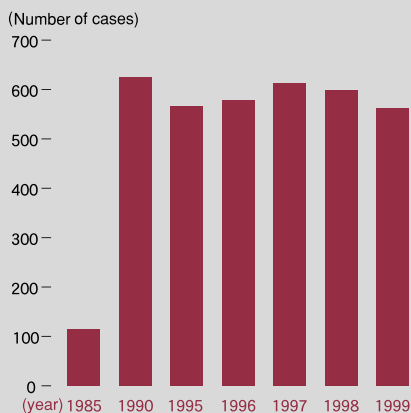
* Pollutant Release and Transfer Registers (PRTR)

This registration system is used by companies to measure and report the amounts of target environmental pollutants that are released into the environment via the atmosphere, water or soil, or transferred as waste material. The system was enacted by law in 1999, and mandatory reporting to the government of releases and transfers for the preceding year will begin in 2002.

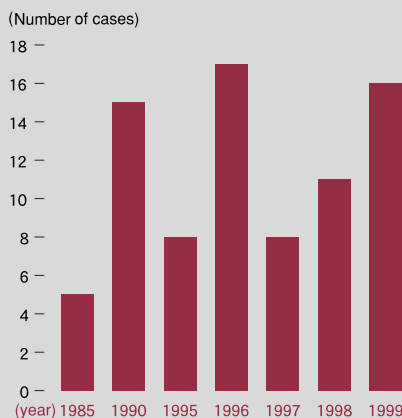
Endocrine-Disrupting Chemicals

Many chemical substances are suspected of disrupting the synthesis, secretion, transportation, bonding, action or excretion of natural hormones in the body. Monitoring and research are being carried out by the OECD at the international level and by the Environment Agency in Japan. We are also concerned about this problem, and are working with various organizations, including the Japan Chemical Industry Association, the Vinyl Environmental Council (VEC) and the Japan Plasticizer Industry Association, to gather accurate information.

Number of Small-Quantity Chemical Substance Notifications



Number of New Chemical Substance Notifications



Reducing Waste and Promoting Recycling

Waste materials generated by our production activities include sludge*, acids, alkalis and oil. Because toxic substances are commonly found in these waste materials, we analyze them before disposal and take appropriate management steps to deal with them, including chemical treatment.

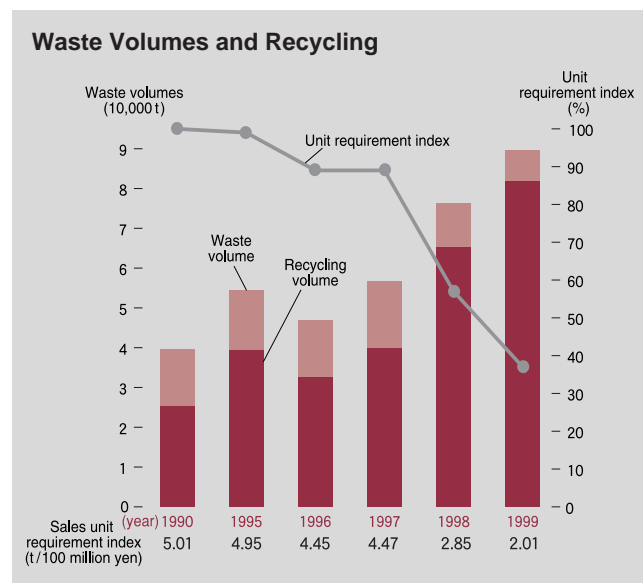
* **Sludge** This mud-like material is separated from water through sedimentation in waste water treatment facilities.

Reducing Waste and Increasing Recycling

The amount of waste produced tends to rise in conjunction with increased production activities in response to market demand. We are applying life-cycle assessment (LCA)* perspectives and methods to the reduction of waste volumes through such means as re-use, recycling, water treatment and incineration. Solvents are covered by PRTR procedures. We are working to reduce the amounts used through recycling and the introduction of non-solvent production methods. We also attempt to reduce the amount of solvents released into the atmosphere through incineration. Inorganic sludge and other inorganic substances are buried in disposal sites after proper treatment. Though we are constantly improving our recycling ratios, the volume of waste continues to increase in absolute terms due to the expansion of our new business activities.

*Life Cycle Assessment (LCA)

By applying this method, the environmental impact of products is assessed at each stage of the product life cycle, from manufacture through to use and ultimately to disposal or re-use. The quantities of energy and materials used, the amount of carbon dioxide released, and other factors are analyzed at each stage. This information is then used to formulate prioritized countermeasures to minimize the environmental impact of each product.



Handling Waste

We make every effort to handle all industrial waste, including controlled waste products*, by referring to manifests*. By monitoring our balance sheet for waste generation, we have been able to raise the consciousness of all employees' about the need for waste reduction.

*Special Controlled Waste Materials

These are substances that are potentially harmful to human beings and the environment. Waste disposal and Public Cleansing Law stipulates stringent requirements with regard to disposal methods and other matters.

*Manifests

A manifest is a form given to waste disposal contractors by companies that wish to dispose of waste. It is used to indicate the type and quantity of industrial waste, its format, the names of the transportation and disposal contractors, and special handling requirements. This document provides a way of monitoring and controlling the movement of industrial waste.

DATA

Company Profile (as of March 31, 2000)

Date Founded	September 16, 1926
Capital	107,663 million yen
Consolidated sales	678,858 million yen
Consolidated operating income	87,465 million yen
Consolidated net income	48,229 million yen
Number of employees (With all group companies combined)	18,754
Areas of business	Organic and inorganic chemicals, electronic materials, functional materials, international business
President & CEO	Chihiro Kanagawa
Address	Asahi Tokai Bldg. 6-1, Ohtemachi 2-chome, Chiyoda-ku, Tokyo 100-0004 Tel: +81-3-3246-5091 (PR Dept.)

Production Plants locations (5 locations)

- **Naoetsu Plant**
28-1, Oaza Nishi-fukushima, Kubiki-mura, Naka-kubiki-gun, Niigata, 942-8601
Specialty Chemicals Research Center
- **Takefu Plant**
1-5 Kitago 2-chome, Takefu-shi, Hukui, 915-8515
Magnetic Materials Research Center
- **Gunma Complex**
 - **Isobe Plant**
13-1 Isobe 2-chome, Annaka-shi, Gunma, 379-0195
Advanced Functional Materials Research Center
 - **Matsuida Plant**
1-10 Oaza Hitomi, Matsuida-cho, Usui-gun, Gunma, 379-0224
Silicone-Electronics Materials Research Center
- **Kashima Plant**
1 Oaza Towada, Kamisu-machi, Kashima-gun, Ibaraki, 314-0102
PVC Research Center
- **Nanyo Plant**
4985 Kaisei-machi, Shinnanyo-shi, Yamaguchi, 746-0006

Branches and Sales Offices (10 locations)

- **Osaka Branch**
- **Nagoya Branch**
- **Fukuoka Branch**
- **Niigata Sales Office**
- **Hokuriku Sales Office**
- **Hiroshima Sales Office**
- **Sendai Sales Office**
- **Sapporo Sales Office**
- **Nagano Sales Office**
- **Kita Kanto Sales Office**

ShinEtsu