



Asahi Glass  
Environmental Report  
2000

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## The Scope of this Environmental Report

This report concerns what Asahi Glass has done to help protect the environment. Focussing on factories in Japan, it covers our main efforts up to 1999. The data is from the non-consolidated statements usually used by Asahi Glass.

### Company Outline

Company name:	Asahi Glass Co. Ltd.
Founded:	September 8, 1907
Established:	June 1, 1950
Equity capital:	JPY 90,472,386,328 (as of March 31, 2000)
Address:	New Yuraku-cho Bldg., 12-1 Yuraku-cho 1-chome Tokyo, Japan 100-8405
Employees:	7,453 (as of March 31, 2000)
Consolidated subsidiaries:	194 companies (incl. 114 overseas)
Employees in above:	43,217 (as of March 31, 2000)

## Message from the President

Manufacturers have contributed to the enrichment of society by making useful products. However, it cannot be denied that their corporate activities have also created environmental problems.

These days, everyone is becoming aware that, to make life better, safer, and more comfortable for people all over the Earth in the 21st century, all economically active sectors of society have to reduce their impact on the environment.

The business of Asahi Glass revolves around processing materials that have a relatively high impact on the environment. That is why, in our operations, we voluntarily place so much emphasis on actively tackling environmental protection issues. We are concretely acting in five key areas: active management and information disclosure, measures against global warming, reduction of industrial waste and recycling, responsible management of chemicals, and promotion of environmental business. Through participation in the Japan Responsible Care Council and the WBCSD (World Business Council for Sustainable Development), we are making every effort to exchange information about the environment and to work jointly with other enterprises in Japan and overseas to tackle environmental issues.

This report describes some of the successful environmental activities and performances that we have undertaken. We hope that this report helps you to understand how Asahi Glass is dealing with these important issues.

So many new schemes to ensure sustainable development have been introduced in Japan this year that it has been called the first year of the sustainable society. Asahi Glass welcomes this development and is working to introduce LCA (life cycle assessment) and environmental accounting. Going further, as a leading company in the basic materials sector, we are committed to a pioneering role in showing consideration for the environment. We are confident that our stakeholders understand and support our efforts.



Shinya Ishizu, President



# Asahi Glass Environmental Policy and System

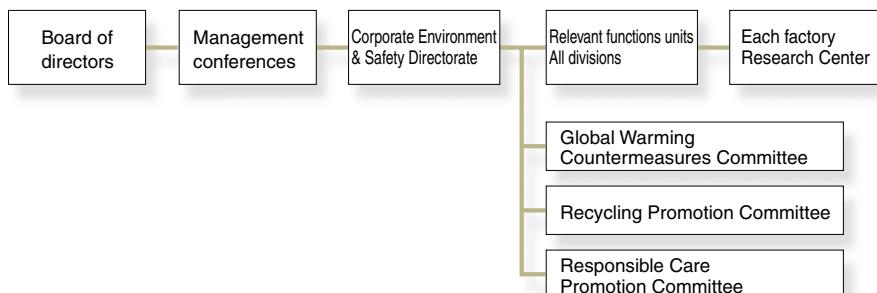
## Basic Environmental Policy

Asahi Glass works actively to protect the global environment, striving to extend that protection to all aspects of corporate activities, and providing support for various activities relating to environmental protection.

## Environmental Ethics

Employees must comply with environment-related laws and ordinances, work to protect the environment at all times, and cooperate with company policies aimed at reducing the impact on the environment at each stage of the company's activities from technological development, through design, production and sales, to recovery of products.

## Organizations Concerned with the Environment



### Coordination of company activities

To generally control environmental policies, including those involving global issues, and to coordinate and promote action, the Corporate Environment & Safety Directorate has been set up under the leadership of an executive vice president.

The activities of the Directorate are listed below.

1. Keep abreast of relevant environmental issues in and outside the company
2. Establish the company's policy toward environmental issues
3. Identify practical themes for environmental activities
4. Set up policies and promote actions to arrive at concrete results

In some cases, specific policies are examined and expedited by the groups organized within the Directorate.

### Action teams

Action teams are deployed in every division and at each factory to carry out concrete activities in accordance with the decisions of the Corporate Environment & Safety Directorate.

To give two examples: a team has been drawn from the flat glass and fabricated glass divisions to work out how to recycle automotive glass; another team to collect and recycle used CRT glass bulbs was formed in the display division.

### Staff

To carry out the administrative tasks required by the Corporate Environment & Safety Directorate, the Environment & Safety Dept. has been set up at the company head office. Meanwhile, the heads of each factory and of the Research Center have also set up Environment & Safety Depts. under their direct supervision.

## **1 Active Management and Information Disclosure**

The Corporate Environment & Safety Directorate both draws up the company's annual environment plan and carries out environmental audits. Moreover, to stringently deal with environmental problems, all the factories in Japan will soon be ISO14001 compliant.

By sharing all the relevant information, the company also tries to motivate both directors and employees to tackle environmental problems. In addition, we actively disclose information to customers and others outside the company.

## **2 Measures Against Global Warming**

In addition to releasing large amounts of CO<sub>2</sub> in energy-intensive production processes, Asahi Glass has long been producing other gases now known to have a greenhouse effect. Fully aware of these facts, we take our responsibilities seriously and are intent on minimizing the environmental impact of our operations. This is not only discharging our responsibility to society, we see it as essential to ensure the continuing existence of the company.

Naturally, we are doing our best to cut down on energy consumption in our day-to-day operations, however, we are also actively innovating to come up with process technology that will contribute to solving the problem of global warming.

## **3 Waste Reduction and Recycling**

Waste reduction is a major issue for the materials processing industry in general. Asahi Glass has set and publicly announced clear quantitative targets and is dealing firmly with the problem. We are also seeking the cooperation of users so that products made with our products can be collected and recycled when they end their useful life.

## **4 Responsible Management of Chemicals**

Although many chemical substances have proved useful in helping us achieve convenience and comfort in life, the effects of some of these substances are causing concern because of their harmful effects on health and the environment.

We are working to minimize the amount of chemicals leaking from the site of production into the air and water. At the same time, to ensure that chemicals are properly handled during transport, use, and final disposal, hoping to prevent problems, we continuously try to support customers.

## **5 Environment-Related Business**

Asahi Glass has been increasing its presence in the environmental business field. Rather than take a purely defensive stance, we actively seek to anticipate and meet social needs as they arise. We are taking advantage of our strengths as a materials company to develop new businesses, seeking to anticipate and meet social needs by producing materials that are energy efficient or free from harmful substances.

The people at Asahi Glass are seriously committed to providing products and technologies that have no impact on the environment and to making their own special contribution to society.

# Environmental Management System



## Complying with ISO14001

As soon as the ISO14001 global standards for environmental management were published in February 1997, we made it company policy to bring every factory up to standard.

Already seven of our ten factories have been formally certified. Among these, the Keihin, Sagami, and Takasago factories were in the news as the first factories in Japan to be certified in the flat glass, automotive glass, and TV tube sectors.

Work is proceeding at each of the remaining factories towards achieving certification during the coming year.

### Progress toward complete ISO14001 certification

Facility name	Certification date	Accreditation Body
Keihin factory	Feb. 1998	Japanese Standards Association
Sagami plant	Aug. 1998	Japanese Standards Association
Takasago factory	May 1999	Japanese Standards Association
Kashima factory	Oct. 1999	Japan Chemical Quality Assurance Ltd.
Aichi factory	Mar. 2000	Japan Quality Assurance Organization
Funabashi factory	May 2000	Japanese Standards Association
Research Center	Jul. 2000	JIC Quality Assurance Ltd.
Kansai factory	During 2000	-
Kitakyushu factory	During 2001	-
Chiba factory	During 2001	-



The launch of the environmental ISO meeting





## Environmental Auditing

As part of our effort to improve the company's overall environmental record, to get a clear picture of what we are doing we started environmental auditing in 1994. Now we evaluate the operations at all of our factories and the Research Center.

Actual procedures include annual auditing of the records and documents from each facility. When the findings indicate the need for action the head of the Corporate Environment & Safety Directorate goes to the site and supervises an environmental survey.

The results of this are included in the report that the head of the directorate mentioned above makes to the president of the company.

### Environmental auditing over the past three years

Year	Surveys	Monitoring procedures
1997	Kitakyushu factory, Takasago factory Chiba factory, Kashima factory	All the factories in Japan including those on the left and the Research Center.
1998	Keihin factory, Funabashi factory Aichi factory, Sagami plant	As above
1999	Kitakyushu factory, Chiba factory Kashima factory	As above



### Safety at Subsidiary Companies

Asahi Glass is committed to minimizing the environmental impact of its operations. Whether a subsidiary is in Japan or overseas we ensure that the company has effective environmental measures. Since 1995 we have carried out environmental audits of overseas chemical companies and we started auditing Japan subsidiaries in June 2000.



Environmental auditing  
at an overseas subsidiary:  
Engro Asahi Polymer and  
Chemicals, Pakistan



# Responsible Management of Chemicals

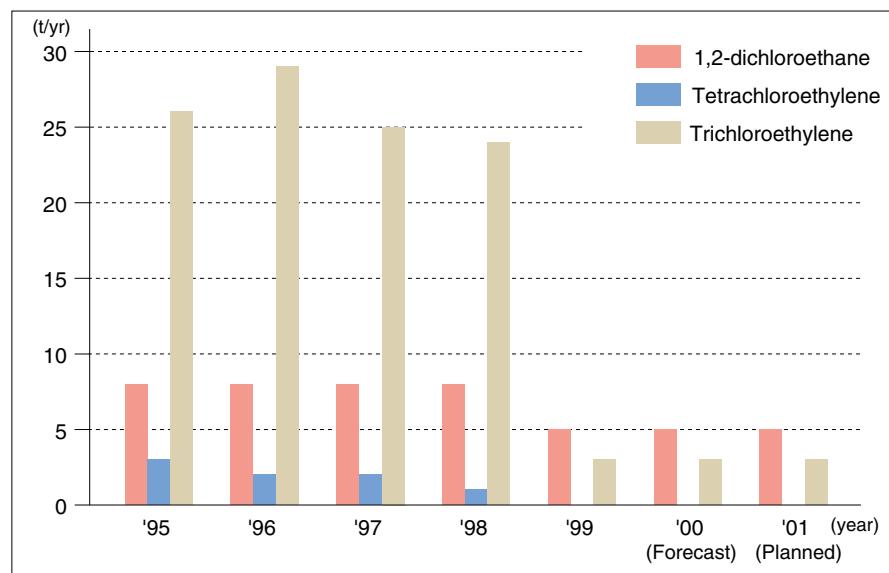
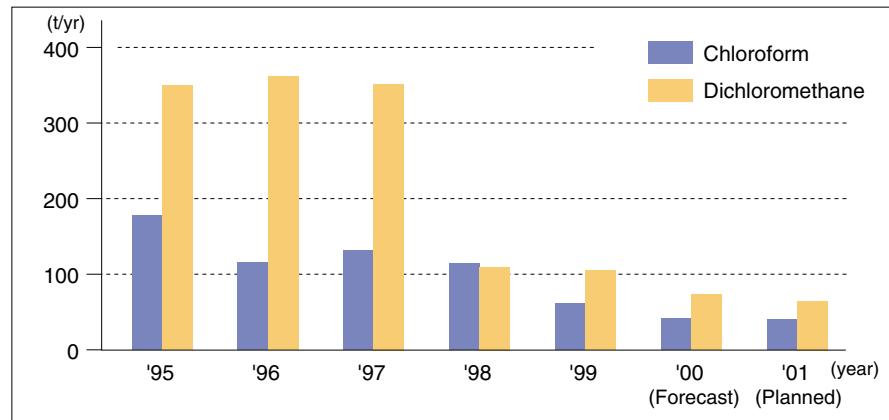


## Action at site of production

### Ascertaining and reducing amount of pollutants released

Under the Pollutant Release and Transfer Register Law (PRTR), from 2001 each factory is required to ascertain the pollutants that it releases and from 2002 to submit reports to the government.

Recognizing our international environmental responsibilities, Asahi Glass takes an active role in the Responsible Care movement. Even before the law came into effect, we voluntarily implemented pollutant monitoring and planned and carried out effective reduction measures.



In 1999 we achieved zero emissions for tetrachloroethylene.



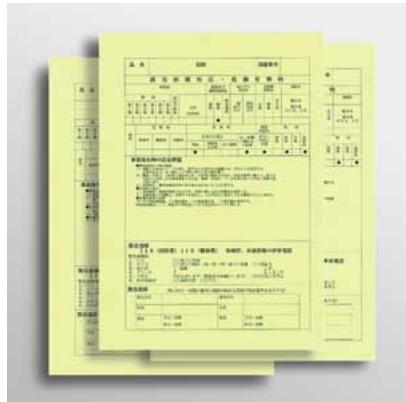
## Actions Concerned with Distribution

### Yellow card system

To be prepared for any contingency during the transport of potentially hazardous loads, drivers receive yellow cards.

These cards have instructions about what to do if an accident happens when chemicals or high-pressure gas are being transported. If there is an emergency, for the driver, those present at the scene, the fire services, the police, and the highway authority, they contain advice about what to do.

As of March 2000, the company had produced 43 types of yellow card.



Yellow cards



When a shipment goes out  
the driver gets a yellow card.

### Transport vehicle accident mutual support group membership

#### 1. Local High-Pressure Gas Fire Prevention Association

To minimize the effect of any accident that may occur involving transport vehicles, Asahi Glass is part of this mutual support system covering the whole of Japan.

#### 2. Company facilities registered with Japan Chemical Industry Association

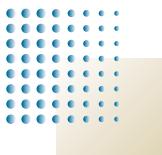
as able to provide neutralizing agents in the event of accidents.

If an incident occurs, facilities may be called upon to provide neutralizing agents (soda ash, slaked lime).

### Distribution safety inspections

To ensure the safe transportation of chemicals, safety inspections are carried out at distribution depots.

☆ In 1999, there was one serious accident involving products in transit. (To deal with spillage of sodium hypochlorite we dispatched an expert from our transportation department.)



## Safety During Use and Disposal

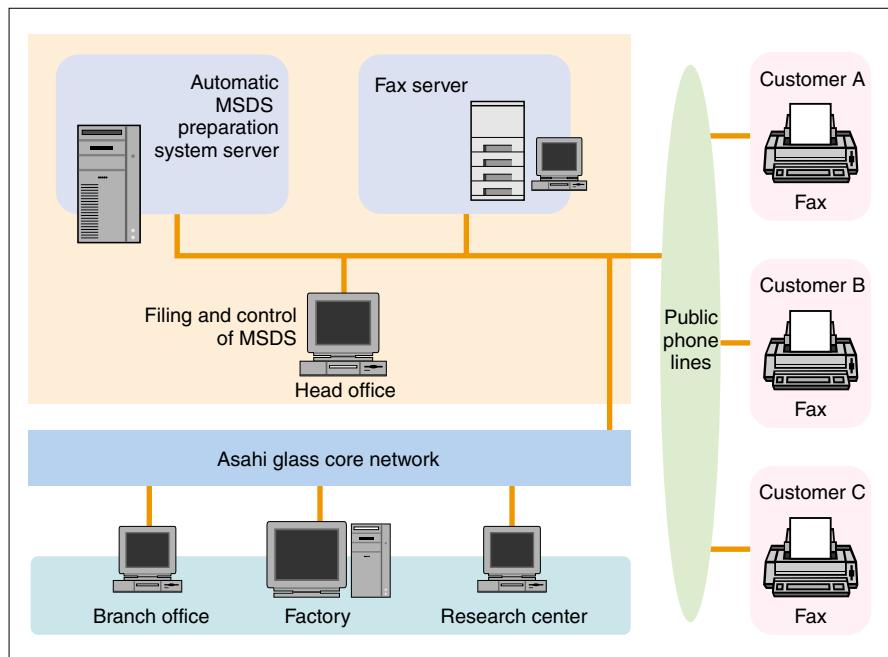
### Material Safety Data Sheet System

Since 1992, Asahi Glass has used Material Safety Data Sheets (MSDS) to communicate the proper handling, characteristics, and environmental impact of products during use and at the disposal stage. To ensure that all customers, without exception, receive this information we have set things up so that company-prepared MSDS are automatically issued via the company LAN.

#### Distribution of MSDS

Types prepared (Japan)	Types prepared (Other languages)	Total distribution
870	300	12,300

#### MSDS system schematic



When an MSDS is created or revised, the relevant sales representative is automatically informed, and the MSDS is simultaneously forwarded to registered customers by fax.

# Reducing Impact on Air and Water



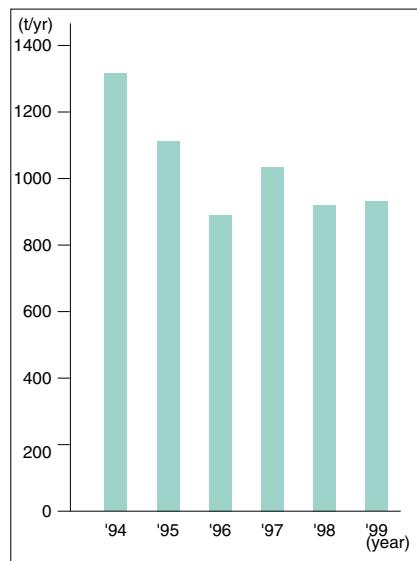
## Record of effective measures

To reduce the levels of SOx, NOx, COD, and other adverse effects of emissions on air and groundwater quality, we have entered into agreements on pollution prevention with the municipalities in which our factories are located. In compliance with the law, our factories are equipped with desulfurization, denitration, and other antipollution equipment. We are strongly committed to further reducing emissions and are actively seeking effective ways to decrease environmental impact.

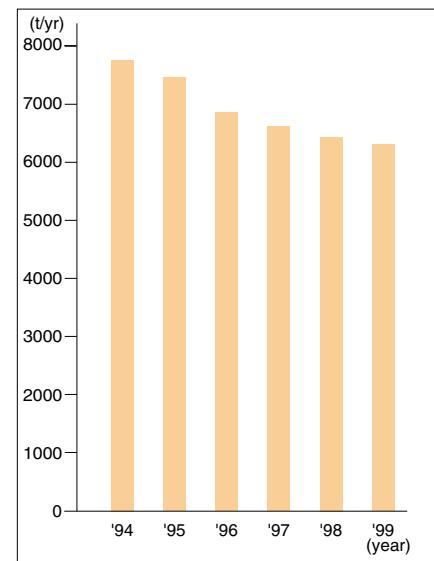
We place particular emphasis on the reduction of NOx, and have plans to equip more of our glass furnaces with oxygen combustion technology.

Indices for major emissions that affect the environment

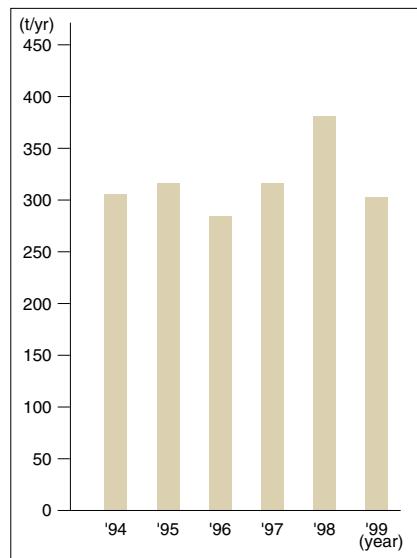
■ SOx



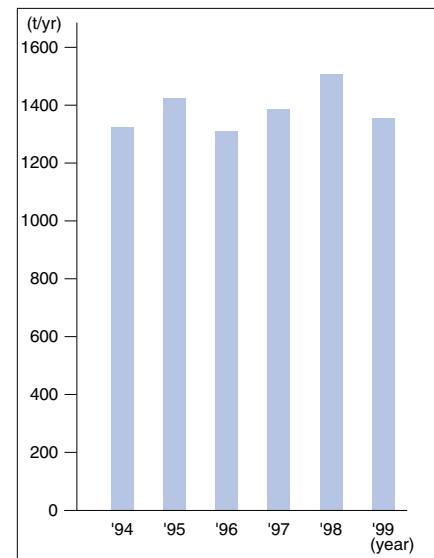
■ NOx



■ Particulates



■ COD



# Measures Against Global Warming



## Greenhouse gas guidelines

Energy-intensive processes, such as oil-fired glass fusion and salt electrolysis, which uses electricity, cause relatively large CO<sub>2</sub> emissions. Moreover, as a producer of HFC and SF<sub>6</sub>, two of the types of greenhouse gas targeted for reduction at COP3, we are seriously committed to reducing production site emissions.

Well in excess of the national target of minus 6% between 2008 to 2012, the company is on track to reduce its CO<sub>2</sub> emissions this year to 12% below the 1990 baseline. Great improvements in energy efficiency have come from plant intensification and innovative technology: at subatmospheric pressure flat glass refining can be done at a lower temperature (SAR method); oxygen combustion developed for bulb manufacture has been extended to flat glass; and at the Kashima Plant the IM method has reduced the power requirements for salt electrolysis.

### Major measures against greenhouse gases

Category		Chemicals	Glass and ceramics
CO <sub>2</sub>	Due to energy use	More energy-efficient salt electrolysis	SAR,* oxygen combustion technology,** plant intensification, switch from fuel oil to LNG
	Not due to energy use***	Switch to natural ash	-
SF <sub>6</sub> HFC	-	Emissions from production and filling processes	-

\* See Eco Plant on p. 13 for details

\*\* A typical source of CO<sub>2</sub> emission not due to energy use is the release of gas from reactions during soda ash production.

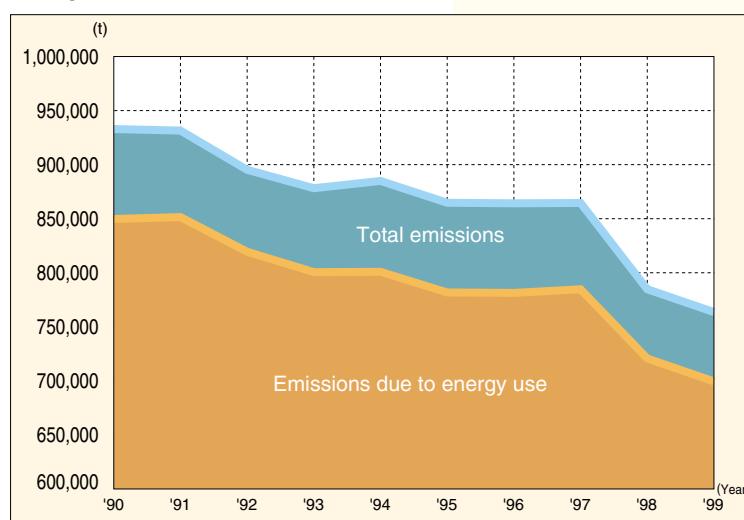


## Results

As you can see from the graphs below, Asahi Glass has been steadily reducing CO<sub>2</sub> emissions.

Based on 1990 totals, 18% curtailment in 1999 exceeded the target of 12% reduction by 2000.

### Changes in the amount of CO<sub>2</sub> emissions



### Related data: Oil-equivalent energy use (kℓ/yr)



# Measures Against Industrial Waste



## Guidelines

Asahi Glass is in industries, like chemicals and glass production, that tend to generate relatively large volumes of wastes. Our responsibility to society calls for a strong commitment to actively reducing the volume of such wastes. We have set the very high target of reducing total waste output to 10% of the 1995 level by the end of FY2000.

The Recycling Promotion Committee, responsible for checking the overall progress being made, is organized as a cross-section of the entire company, and also decides policy and the actions to be taken.



Recycling Promotion Committee



Bins to segregate waste

We already use as raw materials glass cullet and cerium glass grindings from CRTs and have cut waste. Almost all concrete siding and soda ash scrap is being recycled.



## Recycling of manufactured goods

Coming into effect in May 2000, the Basic Sustainable Society Law emphasizes the concept of extended producer responsibility. Now, during planning and production, manufacturers have to pay close attention to the social issues regarding the potential for reuse and recycling of the products they make. Asahi Glass makes many products that eventually find their way to consumers after undergoing processing by other companies. Nevertheless, as a materials supplier we are actively working out effective recovery and recycling technologies for our products. So far, we have enabled the reuse of automotive laminated glass and CRT glass. Other successes include the reuse and recycling of fluoropolymer films and a business of destroying CFCs and HCFCs.

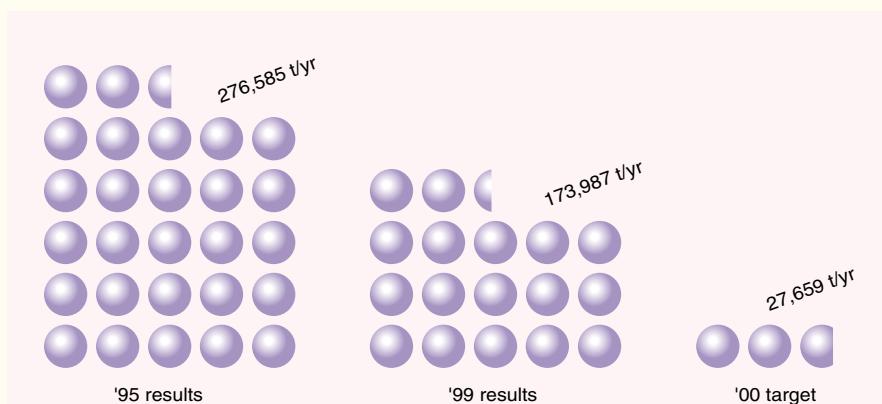
For more information see p.14 *Eco Service and Eco Business*.



## Results

Our plan to cut the 1995 level of waste by 90% began in 1998. The figure below shows the results for FY 1999. We are making a major effort to achieve our FY 2000 deadline.

### Waste reduction targets and results



# Environment-Related Business

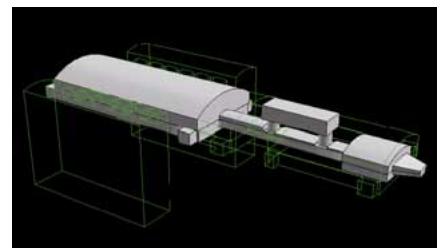
By actively applying our core competence in glass and chemical technologies we are developing a broad range of environment-related businesses.

## Eco Plant

Power-efficient processes and plant

### SAR: Subatmospheric glass refining process

Subatmospheric refining (SAR) is a new technology that allows bubbles, which mar the quality of commercial glass, to be removed at a lower melt temperature. Reducing the pressure means that gas inclusions can be removed at 1500°C rather than 1600°C, and this results in large fuel savings of around 30%. The combination of oxygen combustion technology and SAR has also meant a stunning reduction in emissions: 50% for CO<sub>2</sub> and 75% for NOx. SAR is such an effective green technology that we are not only deploying it at all our plants but also planning to sell SAR technology other glass makers all over the world.



### Oxygen combustion technology for CRT glass fusion furnaces

By using oxygen instead of air in the furnaces for CRT glass it is possible to greatly reduce the amount of exhaust gas. Emission of nitrogen oxides (NOx) is cut by half and 20%–40% less fuel oil is needed. The technology was introduced to the Funabashi Plant in 1998 and we plan to install it at other plants in Japan. Asahi Glass Group companies overseas are considering implementation, especially after seeing the excellent results already obtained by SAT in Thailand and VGI in Indonesia.



### Ion-exchange membrane electrolysis plant: AZEC

In 1982 we pioneered the application of ion-exchange membrane (IM) technology to salt electrolysis. Since then we have continued with an integrated energy-efficient approach and our AZEC system has enabled substantial energy savings. Furthermore, Asahi Glass Flemion membrane is considered to provide optimal energy efficiency because it requires minimal voltage. In fact, using Flemion together with our latest AZEC-B1 Electrolyzer can save close to 40% of the power required by previous mercury or diaphragm methods. The AZEC system has a more than 20% share of the global IM electrolysis plant market.



## Eco Service and Eco Business

### Recycle systems

#### Recycling of television tubes

When the Electric Appliance Recycling Law comes into effect in 2001, thorough recycling of TV parts will begin. To actively develop technology for recycling the tubes of old TVs, Asahi Glass took part from the outset in the TV Working Group of the Association for Electric Home Appliances. We have already made progress with cullet evaluation technology and a method of monitoring cullet in fusion furnaces. We are well on the way to setting up the technology needed to build a sound recycling system.



#### Automotive glass recycling

The relevant divisions in Asahi Glass have created, from the plant level upwards, an Automotive Glass Recycling Team that is also working with related companies in the sector to aggressively deal with the issues. Ensuring quality is the biggest problem preventing us from recycling the cullet from end-of-life vehicles in the same way as we have succeeded with CRTs. Asahi Glass is developing technology to allow the receipt of automotive glass scrap and for float-tank evaluation of this type of cullet. We are pressing on to fill the urgent need for a system to recycle automotive glass.

### Collection and breakdown of environmentally detrimental substances

#### Collection and breakdown of specified fluorocarbons

Based on international resolutions to preserve the ozone layer in the Montreal Protocol and to prevent global warming in the Kyoto Protocol Asahi Glass is actively endeavoring to cooperate through process control and the development of replacement products. Along with these efforts, in 1998 we started commercial operations to safely collect and dispose of unwanted CFCs and HCFCs. By March 2000 we had processed 53t of these substances. Moreover, after decomposing HFC23, which has high global warming potential, we synthesize fluorite for further recycling into hydrofluoric acid.

We have received public funding for ongoing technical development of a plasma method for breaking down halon, a high-tech substance with high ozone depletion potential.

#### Measures for CFCs and similar substances

Substance	Main application	Relevance to international agreement		Company efforts	
		Ozone layer conservation	Anti global warming	Manufacturing	Destroying
CFC (specified FC)	Coolants, solvents, foaming agents	○	×	Discontinued	Underway
HCFC (repl. FC)		○	×	Phasing down production	Underway
HFC (new FC)		×	○	Controlled exhaust emission	Underway
SF6	Insulation, etching agent,	×	○	Controlled exhaust emission	Underway
Halon	Fire extinguishing agent	○	×	Discontinued	Under devpt.

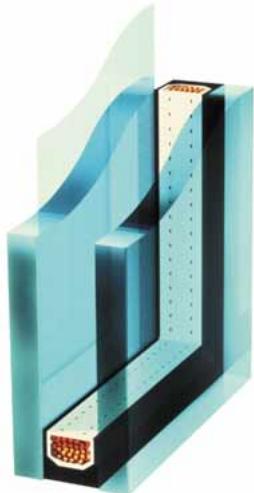
# Environment-Related Business

## Eco Products

Products that help prevent global warming

### Energy-saving sheet glass

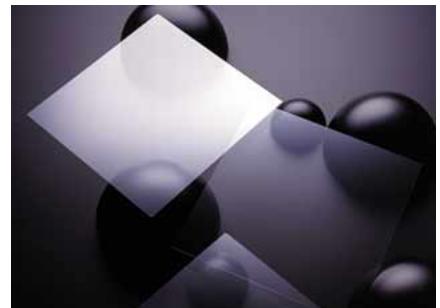
Double glazing, heat-reflecting glass, and heat-absorbing glass will play a large role in boosting efficient energy use. If all residences in Japan were fitted with double glazing glass, and had their walls and floors brought up to next-generation standards, estimates show that there would be a potential decrease in annual carbon dioxide emissions of 4,000,000 t. This amount is equivalent to 1.2% of the total emissions from Japan in 1996.



Products free from hazardous substances

### Arsenic-free glass for liquid crystal panels

When the glass used for TFT-LCD panels contains arsenic, the scrap glass generated during processing is harmful to the environment. By proactively removing arsenic, the source of the problem, Asahi Glass was ahead of the industry.



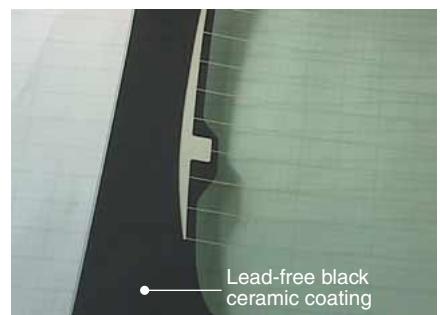
### Chrome-free bricks

All the bricks that we make for cement kilns are completely chrome-free. Cement works all over Japan use these bricks because they contribute to a better environment.



### Lead-free coating for automotive glass

As soon as we recognized the problem we got rid of the lead form the black ceramic enamel that is used for coating the periphery of the windshield and back windows of automobiles. We now provide lead-free products to the automotive industry.



## Extended-life products

### F-Clean

Fluoropolymer film for greenhouses

Extended product life will make a big difference to the form that our sustainable society will take.

F-Clean, the fluoropolymer film developed by Asahi Glass for hothouses, is a long-life product that makes good use of the excellent stain and weather resistance of fluoroplastics: it can be used for 10–15 years. Furthermore, to facilitate the recycling of valuable fluoroplastic, we have created a system to collect, process, and give it a new lease of life to old fluoropolymer film.



## Products that help prevent air pollution

### Eco Safe

System to clean black smoke from stationary diesel engines

Although diesel engines are more energy efficient and emit less CO<sub>2</sub> than gasoline engines, their great drawback has been harmful particulate matter that makes the exhaust gas black. Asahi Glass developed a device to solve this problem by cleaning the gas. This product won the year 2000 Industrial Technology Institute Director's Prize.



## Products that help reduce waste water

### AC Coat

An epoch-making surface treatment for TV tube glass, AC Coat (anti-contamination coating) makes it possible to wash off dirt using just a little water and without any need for hydrofluoric acid. Customers who formerly used hydrofluoric acid for washing can now get by with much less water. Asahi Glass was the first company in the world to enter volume production of glass that can receive AC Coat, and CRT makers are using it for increasing proportion of tubes.

# Environmental Awareness Education

In line with our policy of ensuring the effective promotion of environmental protection by an aware workforce, Asahi Glass is committed to environmental education and the sharing of information.

## Instruction and training

### Company-wide environmental training

For employees from anywhere in the company, instruction sessions integrate content that is legally required for environmental education and the general regulations concerned with disaster security. To teach the practical aspects, instructors use case studies, including official documents that have to be prepared for buildings and construction.



### Division-based environmental education

Education is promptly given locally as required to cover the technical and legal aspects of activities in each division. For example, in the Chemicals Division, at a branch office, at their factory, or at the divisional R&D facilities, employees may receive instruction concerning environmental technology or explanations of changing laws and regulations. At factories that have received ISO14001 certification, as part of the continuous improvement policy, employees at every level receive environmental education.

## Sharing of information

The Environment Homepage is accessible to all company employees and heads of divisions and facilities receive the *Environment Quarterly*. We try to keep the whole company up to date by sharing and communicating the latest environmental information from both within and outside the company.



Environment Homepage on the company LAN

Environmental Quarterly Report

# Commendation & Assistance for Environmental Efforts

The Asahi Glass Foundation, which was established in 1933, commends funds to worthy projects and provides assistance to people who are working to solve global environmental problems or carrying out associated technical research.



## Blue Planet Prize

In 1992, the year of the Earth Summit in Rio de Janeiro, the Asahi Glass Foundation established the Blue Planet Prize. This international prize is an annual award given in recognition of individuals or organizations that have made major contributions to solving global environmental problems.

The prize is a way of showing sincere appreciation for the achievements of winners who can be expected to continue their important work. The prize was also set up in the hope that if activities associated with the award make even only a few more people on Earth more deeply aware of the global environmental issues, they will act from wherever they are to do something about the problems.



The winners of the world's largest international environmental prize commanding work for the global environment are chosen from candidates nominated in Japan and overseas. Every year, two award recipients are chosen. Each winner receives a certificate and a trophy, along with a supplementary award of JPY 50 million.

Named the Blue Planet Prize, this award also embodies the desire that, on our shared blue Earth, the common possession of all people, life will remain sustainable into the future.

### Areas for Recognition

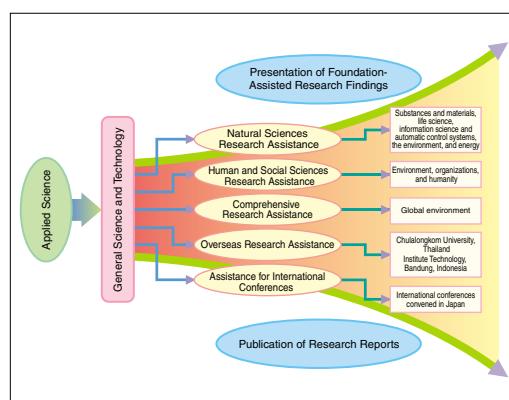
- Environmental problems such as global warming, acid rain, ozone depletion, tropical rain forest destruction, destruction of ecosystems and species extinction, desertification, water pollution, and environmentally induced afflictions.
- Environmental issues related to energy, population, food, water, environmental ethics, policies, disease caused by environmental change, waste treatment and recycling.

**Prizewinners of 1999:** Dr. Paul R. Ehrlich, U.S.A.  
Professor Qu Geping, China



## Research assistance

Since its launch in 1933 as the Asahi Foundation for Chemical Industry Promotion, the foundation has built up a long record of grant programs, mainly in applied chemistry. In 1990, to symbolize a broader concern with public benefit, the name changed to the Asahi Glass Foundation. At the same time, the focus expanded to the encouragement of pioneering research, with support for 'Scientific technology to open the way to the 21st century,' including in the environmental field.



Research grants as of March 31, 2000

Period 1933–1999

No. of grants 5,057

Total amount JPY 5.42 billion

### Seminars to report research results

Japan	7 meetings
Thailand	8 meetings
Indonesia	5 meetings
U.S. (Oklahoma)	1 meeting
Czech Republic	1 meeting
Reserach reports	76 volumes

Research assistance in 1999 totaled JPY227.5 million in 152 grants.



Responsible Care

## ASAHI GLASS CO., LTD.

*Environment & Safety Dept.*

**Corporate Environment & Safety Directorate**

1-12-1 Yuraku-cho, Chiyoda-ku (New Yuraku-cho Bldg), Japan 100-8405

Tel. (03) 3218-5639 Fax (03) 3218-7801

URL <http://www.agc.co.jp/>



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