

Tokuyama Corporation

RC Administration Division

Shibuya Konno Bldg. 3-1 Shibuya 3-chome,

Shibuya-ku, Tokyo 150-8383 Japan

Telephone: 03-3499-8478

FAX : 03-3499-8967

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

e-mail : rc-toukatsu@tokuyama.co.jp

Recycled paper

I•Promotion. 99103000
Printed in JAPAN



Tokuyama's Responsible Care Program

Tokuyama answers society's needs, while keeping in harmony with the global environment

Fundamental Policy

Our fundamental corporate policy is one of contributing to society while keeping in harmony with the environment. As a member of the Japan Responsible Care Council, we promote programs that contribute to product safety control, fostering environmental protection, disaster prevention, workers' health and safety, and safety of chemical products. All of our programs are developed in strict accordance with domestic and international laws and regulations.

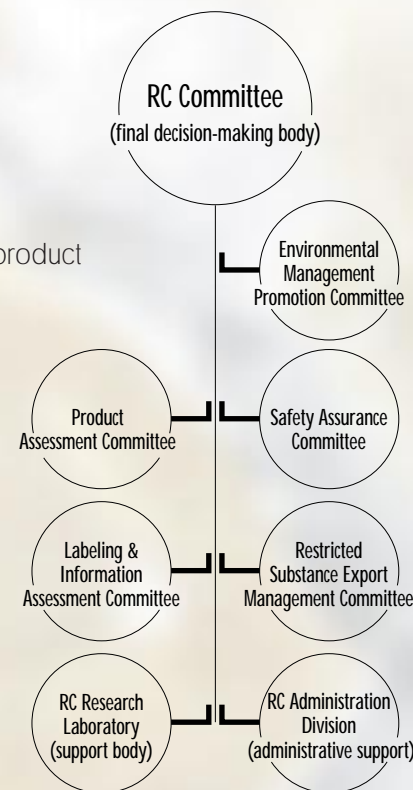
Action Objectives

- 1 Environmental Preservation, Disaster Prevention, Health and Safety**
Reduce the environmental impact of industrial processes
Aim for zero accidents and disasters
- 2 Product Safety Control**
Ensure strict product safety standards
- 3 Restricted Substance Export Control**
Ensure strict export control
- 4 Promotion of Energy and Resource Conservation**
Reduce unit energy consumption by 2005 to 85% of 1990 levels
Achieve industry – leading levels of unit energy consumption per product
- 5 Recycling and Proper Waste Disposal**
Promote plastics material and thermal recycling
Promote office paper reduction and recycling
Increase waste recycling ratio up to 91% by 2005
- 6 Internal and External PR Activities**
Foster public awareness of environmental issues

CONTENTS

President's Message.....	01
Recent Environmental Activities.....	02
Environmental Impact Management.....	04
Recycling Wastes.....	06
Global Warming Prevention.....	09
Safety Measures.....	10
Total Safety Management of Chemical Products.....	12

Responsible Care Promotion Organization



Emphasizing "Environmental Management" as a Means of Responsible Care



Recycling Leads to Growth

Tokuyama was founded 81 years ago as a manufacturer of ammonia process soda ash and some 20 years later, we initiated cement production from soda ash byproducts and coal ash from power plants. Since then we have continued to diversify and expand our business through the recycling of byproducts and waste.

The expansion of our production scale during Japan's economic boom in the 1970s was accompanied by a social emphasis towards preventing environmental pollution in and around factories. We began to aggressively implement environmental preservation measures. Recent years have witnessed an even greater worldwide demand for global environmental preservation such as global warming control and ozone layer protection, surpassing pollution control measures of the seventies.

Adopting Responsible Care

Companies in the chemical industry have long been providing essential materials for sustaining and enriching our lives. Yet these same corporations also have a large responsibility throughout the entire chemical cycle — manufacture, distribution, use, recovery, and disposal — for maintaining a proper environment that does not pose health hazards.

We pledged to adopt Responsible Care at the same time as the establishment of the Japan Responsible Care Council in 1995, and have since initiated aggressive Responsible Care activities which extend beyond environmental and health issues. In May 1999, a new facility was added to our Tsukuba Research Center to support

the RC (Responsible Care) Research Laboratory, a key component of our responsible care activities.

Promoting Environmental Management

The concept of "Environmental Management" is at the core of the managerial strategies in our new mid-term plan. It highlights our social mission to aggressively tackle and solve environmental issues, which will in turn drive corporate development. We regard environmental issues as a central theme in Tokuyama's business approach, encompassing product development, production, sales, and corporate management.

Last year our Tokuyama and Kashima factories obtained ISO14001 certification, the global standard of environmental management. Future plans for a unified environmental program include perfection of control systems as well as daily production methods in harmony with all environmental activities. We will also continue to reinforce programs such as zero emissions and effective waste utilization.

We publish this Responsible Care report on an annual basis in order to foster public awareness of our environmental policies. With each year, the report becomes fuller and more detailed, reflecting both our deepening commitment to environmental issues and our growing expertise. We hope that your interest in and understanding of our programs will increase and we welcome your opinions and comments.

Yuichi Miura
President
October 1999



Recent Environmental Activities

Environmental Issues Are an Important Management Agenda

As one of the leading companies in the Japanese chemical industry, we view environmental issues as one of our most important management policies. This awareness led us to establish an Environmental Management Promotion Committee in April 1988. Since then, this issue has become a core element of our managerial strategy, with top managers making a firm commitment to strengthening our position in the industry. This effort is exemplified by obtaining of ISO14001 and ISO9000 certifications in 1998, and accompanied by the development of recycling technology for polyvinyl chloride wastes and plastic sash wastes and the building of a fuel plant for recycling waste plastics in cement kilns.

All Plants Receive ISO14001 Certification

Over the past few years, we have implemented an environmental management system in phases to reduce environmental impact. As a result of these efforts, we obtained a certificate for environmental management system, ISO14001, for the Tokuyama factory in December 1998, and for the Kashima factory the following month. We will adopt and implement a number of new environmental protection programs.



Kashima factory

More ISO9000 Certifications

Tokuyama is pursuing acquisition of ISO9000 certifications to reach new levels of quality. In 1998, we obtained certificates for aluminum nitride and high performance powder products, following previously certified products such as electronic industry chemicals, cement, and dental materials. Products slated for certification in 1999 include polypropylene and polypropylene film, chemical products, and polycrystalline silicon.



ISO9001- certified aluminum nitride products

Recycling Program for Waste Polyvinyl Chloride Plastics

Although polyvinyl chloride has a high recycling ratio among plastics, existing methods limit an increase in this ratio. From April 1998, in concert with three other organizations*, Tokuyama initiated the development of

new recycling technologies for polyvinyl chlorides. Our engineers have built a prototype at the Tokuyama factory and started operations from July, 1999.



Prototype plant

In this factory, polyvinyl chloride is degraded for the purpose of reusing recovered chlorine and utilizing the resin residue as fuel for cement manufacture. The technologies developed at the prototype factory will be implemented at a new facility in the beginning of the 21st century.

*The Vinyl Environmental Council, the Plastic Waste Management Institute, and the Japan PVC Environmental Affairs Council.

Sash Recycling Breakthrough – First Full-Scale Recycling in Japan

Home construction site clean-up has become a social issue, and plastic sash comprised mainly of polyvinyl chloride is part of the problem. Although all plastic sash manufacturers have developed propriety technologies for recycling single color finished materials, approximately half of all plastic sash is multi-colored.

Multi-color plastic sash still remains colored after melting and recycling, presenting a formidable obstacle to developing a brand new plastic sash product. Tokuyama has solved this problem by establishing new equipment for recycling plastic sash without ruining its commercial value. Operations have



Plastic sash

Recycled plastic parts

already begun, enabling the recycling of used sash recovered from waste separation, and opening the way for Japan's first full-scale plastic sash recycling operation.

Utilizing Waste Plastics as Fuel and Materials for Cement Production

Tokuyama has been using waste and byproducts as fuel and materials at our cement plants since the early years of the company. Based upon these technologies, we built a recycling fuel plant for waste plastics in August 1999. The plant allows large amounts of waste plastics, which had been disposed of in landfills, to be used as fuel and raw materials at cement plants. The waste plastics are completely burned at the maximum temperature of 1800°C, resulting in no environmental pollution. This new system was chosen as a model energy saving enterprise by the New Energy Development Organization (NEDO) in 1998.



Fuel plant

Participation in HPV Program

The large amounts of various chemical substances produced worldwide affect the environment and our lives in ways which we may not even be aware of. The ICCA*¹ plays a leading role in examining the safety of chemical substances that are produced in high volumes. This is called the HPV Program*², whereby chemical companies and industries around the world investigate chemical substances with an annual production volume of 1000 tons or more in two or more countries. Basic information on potential risks is scheduled to be gathered and summarized by 2004.

Tokuyama is one of the chemical manufacturers pledged to participate in the program for 16 substances.

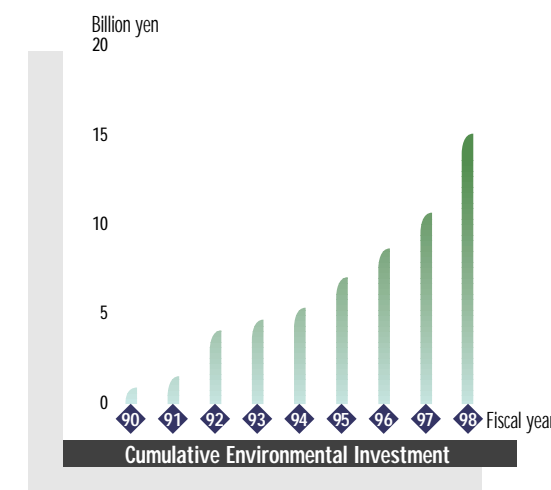
*1 International Council of Chemical Associations.

*2 High Production Volume Chemicals Testing Program.

Financial Investments for Reducing Environmental Impact

Tokuyama invested ¥4.4 billion in our environmental programs in fiscal '98. Of particular note was a large investment in exhaust gas desulfurizers and denitrizers used to reduce SOx and NOx emissions at the new Power Plant. This was the cause of a larger year-on-year increase than any previous year. Other investments made in waste water processing and specified chemical substance processing facilities resulted in cumulative investment of approximately ¥15 billion since 1990.

Mid-term and long-term investment plans have been formed which are evaluated before implementation for effectiveness.





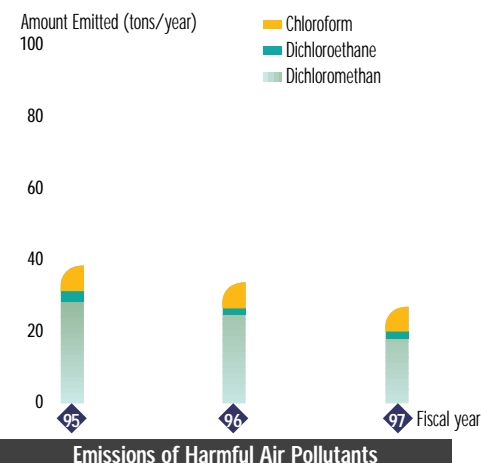
Environmental Impact Management

The Path to Becoming an Eco-Friendly Chemical Company

Reducing the environmental impact is one of the most important aspects of Environmental Management. Tokuyama currently has a number of air, water, and soil pollution prevention programs underway. Progress is shown by an actual reduction of pollution emissions in 1998.

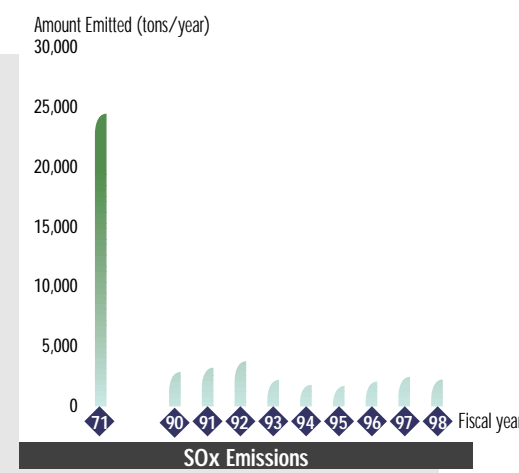
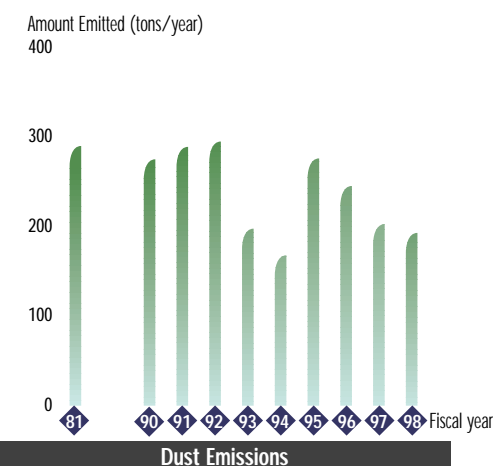
Programs for Reducing Harmful Air Pollutants

The Japan Chemical Association proposed a program in which the amount of chemical substance emissions will be reduced by 30% of 1995 levels by end of 1999. According to this program, we will focus on reducing the emissions of three substances manufactured in our plants — chloroform, dichloroethane and dichloromethane — through close check of the production, storage, and consumption processes.



Reduction of Dust Emissions

Fuel combustion at power plants and cement kilns results in dust pollution. These facilities are equipped with electrostatic precipitators and/or bag filters.

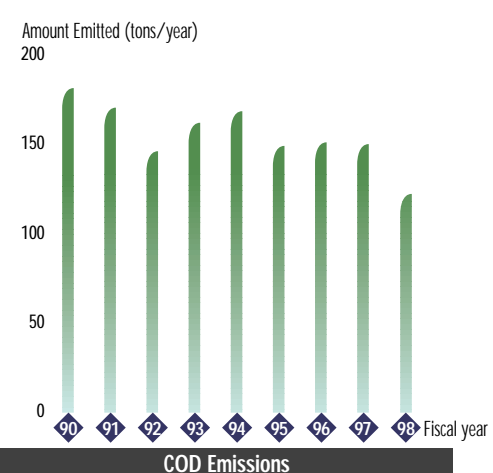
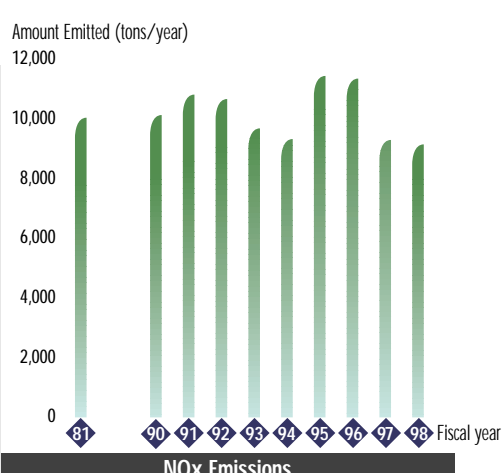


Reduction of SOx (sulfur oxides)

SOx is emitted from boilers, kilns, and dryers when heavy oil and coal are burned. Tokuyama intends to reduce these emissions by equipping power plant boilers, the primary producers of SOx pollution, with exhaust gas desulfurizers. We have made substantial progress, and current SOx have been reduced to about 10% of 1971 levels.

Reduction of NOx (nitrogen oxides)

The emission mechanism for NOx is nearly the same as that for SOx, however, effective methods to remove this substance had been virtually non-existent and emission levels have remained nearly fixed. In response, Tokuyama has constructed new power plants equipped with recently developed exhaust gas denitrizers that are expected to meet NOx reduction targets.



Reduction of COD (chemical oxygen demand)

COD is an index of water pollution, indicated by the amount of oxygen consumed by organic substance degradation by oxygen. Chemical production requires large quantities of industrial-grade water and introduces traces of organic substances. Through various measures including activated sludge process equipment, COD emissions are expected to meet reduction targets.

Contributing to Recycling through Our Cement Business

Cement is an inorganic substance composed of minerals such as limestone, clay, silica and iron oxide. Since many of these minerals are contained in waste materials, various wastes can be used in cement manufacture. Also, cement kilns, capable of sustaining intensely high temperatures between 1000°C and 1800°C, are used to completely incinerate the non-mineral, combustible waste portions. Thus, all the components of waste materials can be effectively recycled into either energy or minerals for cement manufacture, with no risk of environmental pollution. As a result, cement factories are making an enormous contribution to recycling.

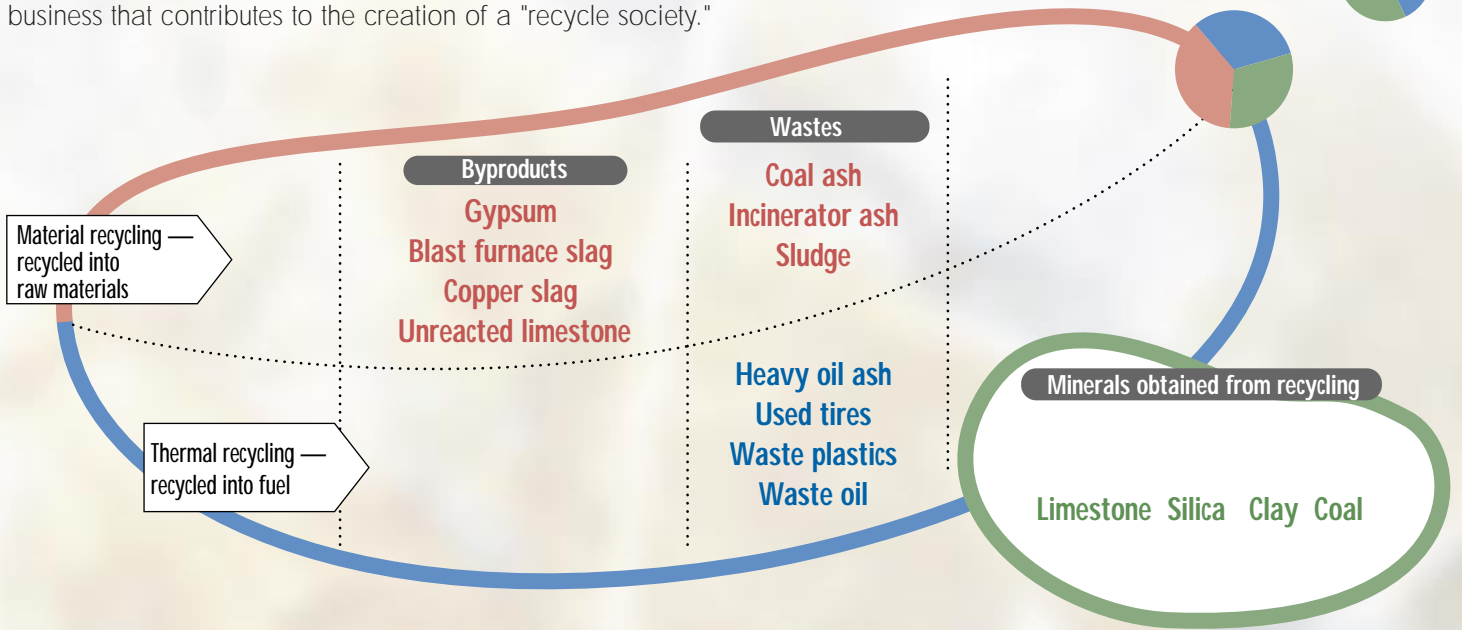
Accepting Waste from Outside Sources — A Huge 1.38 million tons in 1998

Since our business began some 60 years ago, Tokuyama's cement plants have recycled large quantities of industrial wastes and byproducts generated both internally and externally. Slag from the steel industry, coal ash, sludge and incinerator ash are used as raw materials for material recycling,

while used tires and waste plastics are used as fuel for thermal recycling. The total amount of recycled wastes and byproducts was 1.63 million tons in 1998, including 1.38 million tons from outside the company. We plan to continue increasing the quantity of recycled waste.

Recycling Waste into Resources and Fuel

Tokuyama's recycling programs go far beyond traditional methods of internal waste recycling. By fully utilizing the capabilities of our cement plants, we can recycle all kinds of internally generated and externally sourced industrial wastes as raw materials for cement manufacture and fuel for cement kilns. By recycling precious resources in an environmentally friendly, pollution-free manner, we have challenged ourselves to build a cement business that contributes to the creation of a "recycle society."



Recycling of Various Wastes

Full-Scale Recycling of Waste Plastics
 Tokuyama built a recycling fuel plant to crush and cut waste plastics that began operating in August, 1999. The plant, with a capacity of 15,000 tons of plastics per year, crushes and cuts various plastic shapes into blocks between 20mm and 30mm square for incineration in cement kilns.

Increased Recycling of Coal Ash and Sludge
 Tokuyama is utilizing more coal ash and sludge each year. In 1998 we received a total volume of 230,000 tons of coal ash and 70,000 tons of sludge.

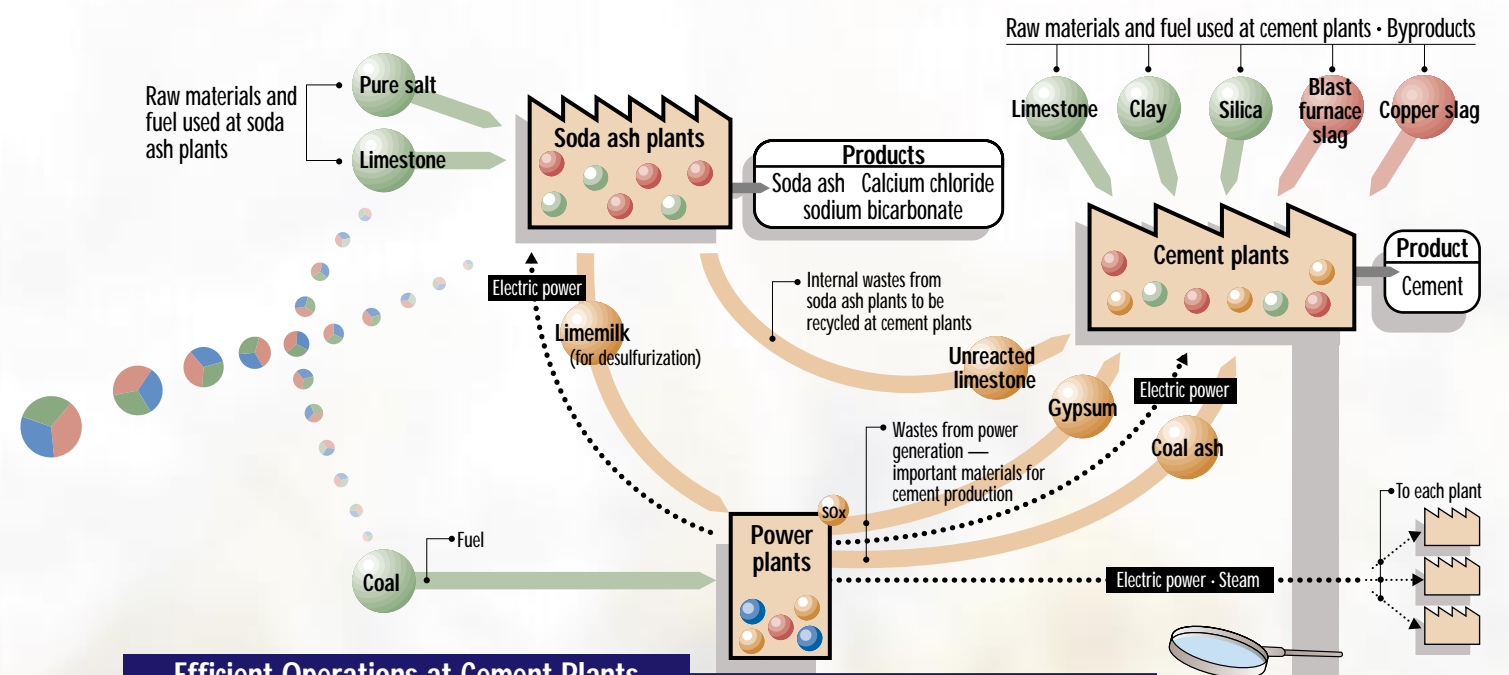


Crushed and cut waste plastics

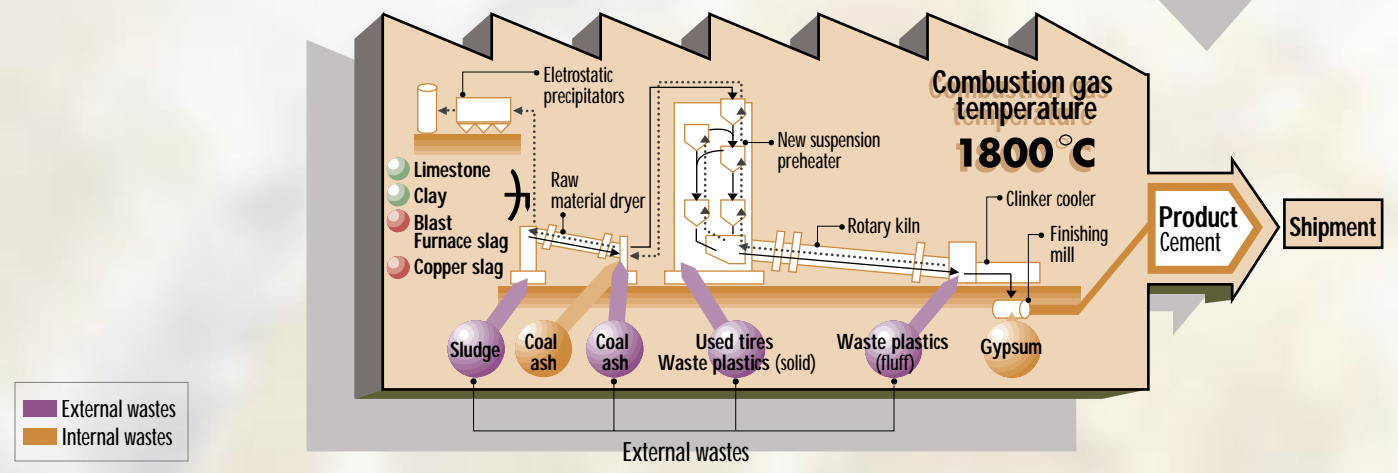
Cut used tires

Recycling of 20,000 Tons a Year of Used Tires
 Tokuyama possesses the facilities to receive and load cut tires into cement kilns, and is currently recycling approximately 20,000 tons per year.

Recycling of Internally Generated Wastes



Efficient Operations at Cement Plants

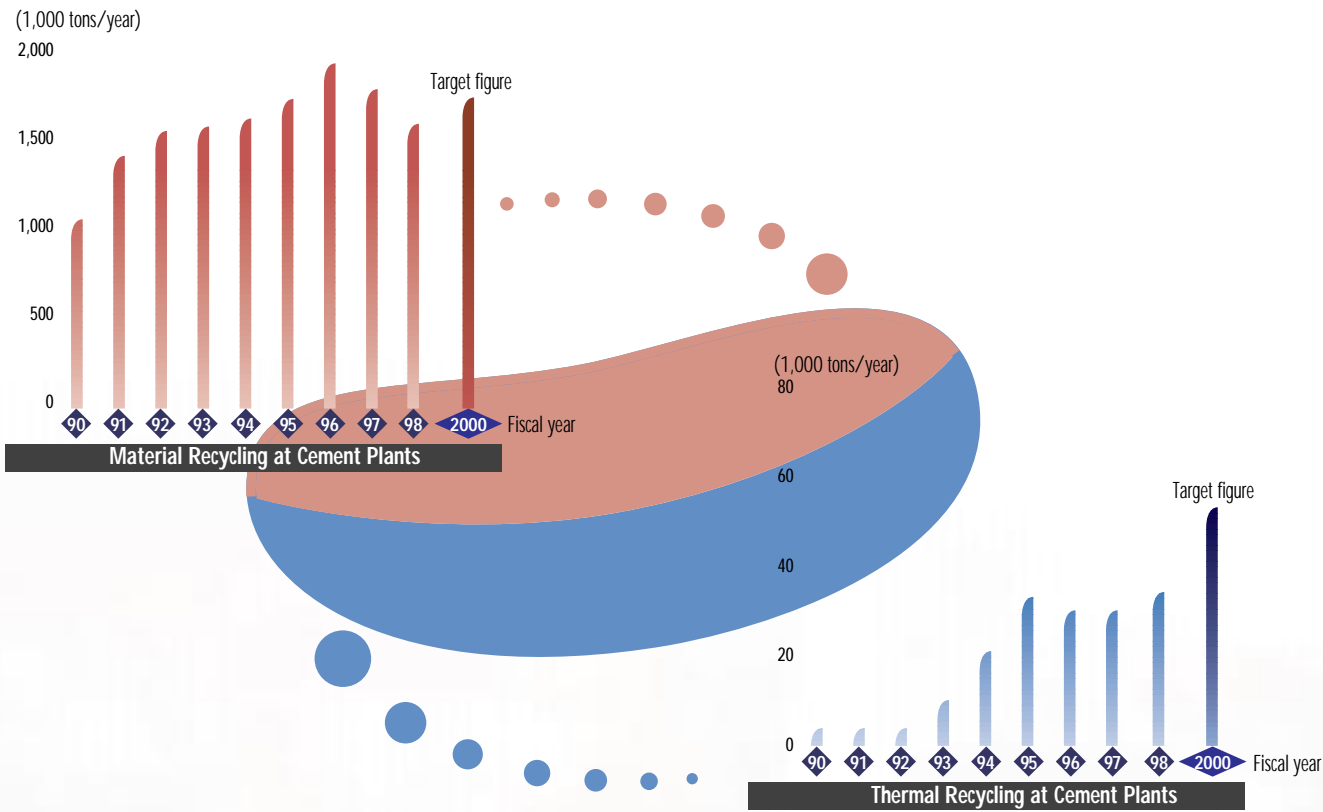




Global Warming Prevention

Contributing to the Protection of the Global Environment through Energy Saving Strategies

Due to an increase in the amount of wastes generated from human economic activities, the earth cannot sustain itself on its own. The phenomenon symbolic of this is global warming, generally regarded as being caused by CO₂, methane, and dinitrogen monoxide that are emitted to the environment. Tokuyama devotes itself to preventing global warming by promoting energy saving through reduced unit energy consumption.

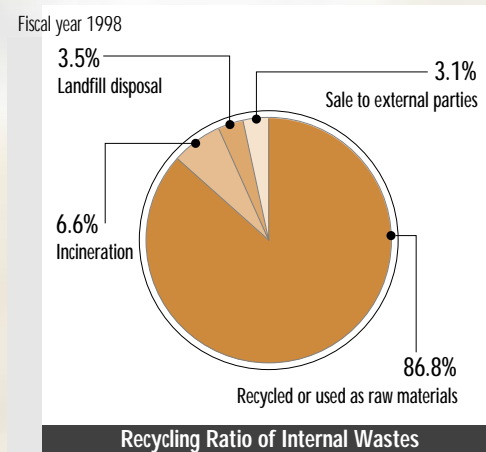
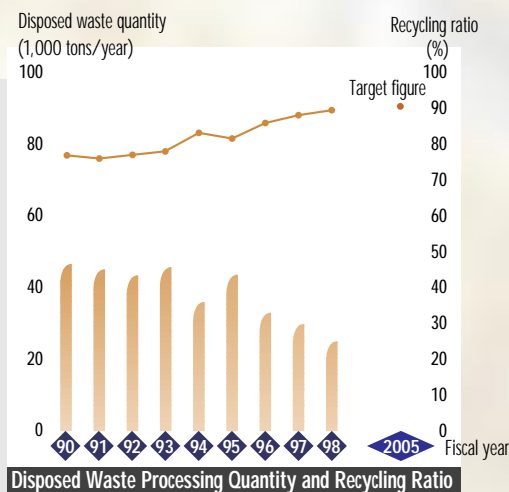


Recycling 90% of Internal Wastes

Tokuyama is working to increase internal waste recycling efficiencies and decrease the amount of disposed waste at all of our plants and factories. By 2005 we aim to reach a recycling ratio of 91% under existing programs; a 90% level has already been reached for 1998.

Of that 90%, we turn roughly 87% of the

internal wastes into raw materials or fuel for cement production, and sell 3% to external parties as materials for recycling. The remaining 10% becomes landfill or is disposed of by incineration. The amount of disposed waste is decreasing as recycling programs progress. This policy of increasing recycling ratios and reducing disposal will continue into the indefinite future.



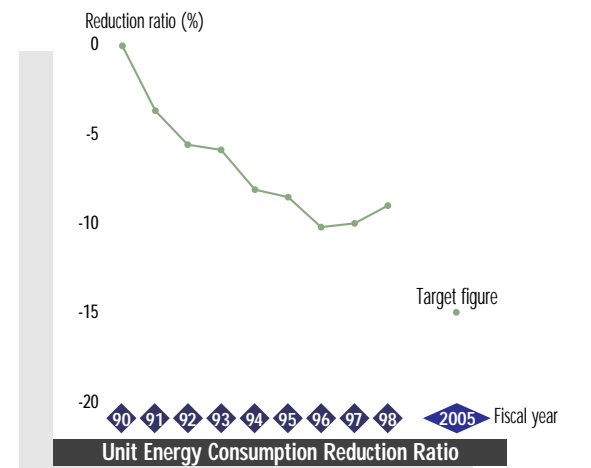
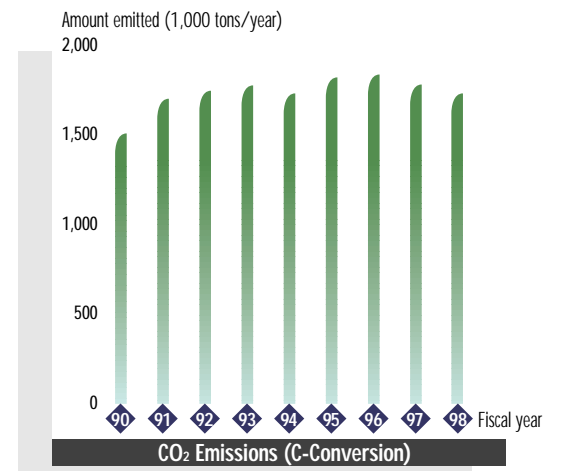
Reduction of CO₂ Emissions

An increasingly environmentally aware public is calling for reduced CO₂ emissions. At the Tokuyama factory, CO₂ emissions have remained the same over the last few years in the face of increased production volumes. This containment of emissions is due to our emphasis on reduced unit energy consumption.

Reduced Unit Energy Consumption

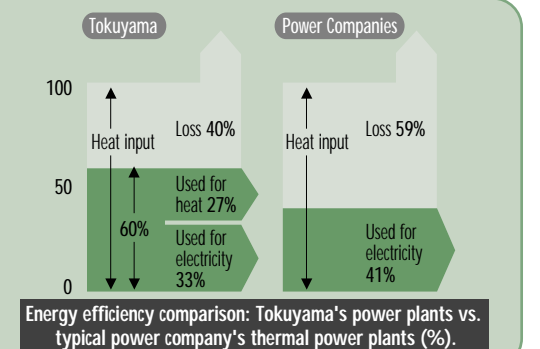
The demand for energy saving acquires more importance in a world of limited resources and where the detrimental effects of global warming, such as rising sea levels, become painfully obvious. The Tokuyama factory, our main production facility, has been instituting energy saving programs with the goal of reducing unit energy consumption to 90% of 1990 levels by 2000, and then to 85% by 2005. A reduction ratio of 9% was achieved in 1998.

We will strengthen our programs even further by improving power generation efficiency and steam utilization efficiency at new power plants, as well as waste recycling ratios at cement plants.



Private Power Generation with High Energy Efficiency

In addition to high electricity use, the Tokuyama factory relies heavily on steam as a heat source for condensing, drying, distillation and heating. Most of the electricity and steam are generated by our own power plants. The combined use of electricity and steam allows energy efficiency as high as 60%, a level higher than typical thermal power plants that run entirely on electricity.



Ensuring Safety Is the First Step in Being a Good Corporate Citizen

Based upon our corporate philosophy, "Safety is the foundation of our activities, and ensuring safety is the first step in being a good corporate citizen", Tokuyama creates a program of safety control activities every year, taking various measures to achieve no accidents and disasters.

1999 Basic Safety Policies

Basic Stance for Ensuring Safety

— Safety is the basis of our production activities —
 Ensuring safety is the first step in being a good corporate citizen

Three Principles for Ensuring Safety

Social Mission
 Ensuring safety is our social responsibility as a corporate citizen

Proactive Mission
 Ensuring safety is a proactive process

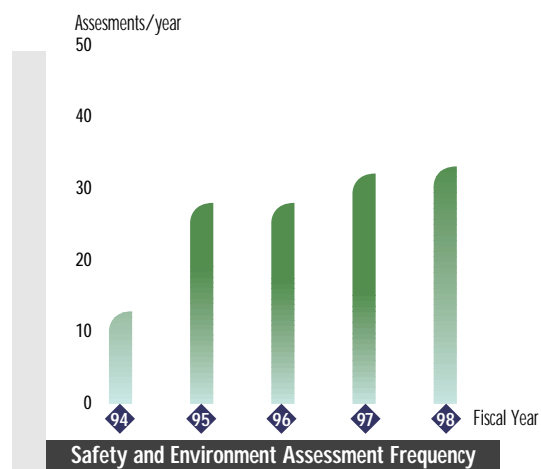
Responsibility Mission
 Safety is born out of awareness and action shouldered by responsible people

Facilities that Are Easy to Maintain

Tokuyama carries out assessments of safety and environment impact prior to construction or modification of plant facilities. These assessments include facility design, materials handling, and emergency response readiness in conformity to laws and regulations with a strong emphasis on safety and environmental impact. This results in facilities which are safe and easy to operate, easy to maintain, and are safeguarded against accidents and disasters. The assessments consist of three steps: "Basic Plan Assessment", "Design Assessment" and "Pre-Operation Assessment".



Pre-operation assessment



Extensive Disaster Prevention Activities

The Tokuyama factory is equipped for accident and disaster prevention, including such items as an altitude water cannon carriage, three chemical fire engines, an ambulance, and oil fences. A special organization for preventing disasters has been formed and comprehensive disaster drills are conducted every year.



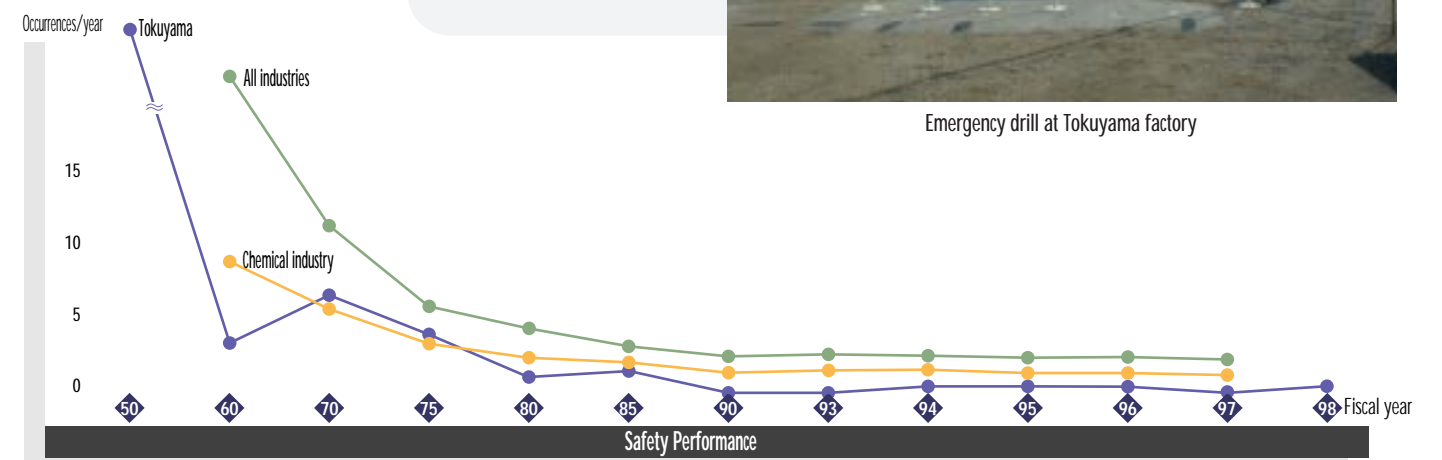
Emergency drill at Tokuyama factory

Safety Programs for Zero Accidents and Disasters

Each work area creates safety programs based on the concepts of "creating high awareness of unsafe actions and conditions" and "creating safety measures based on thorough assessments." These concepts are the foundation of Tokuyama's safety programs.



Emergency drill at Tokuyama factory





Total Safety Management of Chemical Products

Ensuring Environmental and Human Safety throughout the Entire Product Life Cycle.

Tokuyama conducts safety and environmental assessments of facilities, product safety assessments, and product labeling assessments, as well as gathering and providing safety information on our products. Furthermore, we provide our customers with instructions and training on the proper handling of our products that are potentially hazardous.

Chemical Product Safety Database

Tokuyama has developed an extensive chemical product safety database that includes information on physical and chemical characteristics, hazards, and the laws and regulations concerning the 321 chemical substances contained in our products. The database is referenced when publishing MSDS (Material Safety Data Sheets) for products and Yellow Cards, including emergency procedures in case of accidents during transportation. The information on 106 chemical substances of our products is incorporated in our information system, and can be reviewed by all employees.



Safety Database

Three Product Assessments

We promote safety by conducting three assessments throughout the product cycle – R&D, equipment design, and delivery. These assessments are:

- 1 Product Safety Assessment**
Assess the safety of the products.
- 2 Safety & Environment Assessment**
Assess the safety of manufacturing and its effect on the environment.
- 3 Labeling Assessment**
Assesses the appropriateness of product labeling and descriptions.

Additionally, as part of a feasibility study, Tokuyama conducts product safety assessments that extend to the potential risk of every component. This study also includes an examination of component safety during customer use.

Product Stewardship Activities

Tokuyama publishes MSDS, available to customers, offering guidance and instructions on the proper handling of products from use to disposal. We also offer professional technical information and safety information as needed, and hold periodical seminars to explain laws and regulations. The total number of MSDS published is now 302 items.

Safety Management at the Distribution Stage

Tokuyama provides transportation companies with instructions on product characteristics and handling recommendations based upon MSDS. We also require these companies' drivers to carry Yellow Cards describing emergency procedures, ensuring that they can quickly respond to prevent disasters or injury when accidents occur during transportation. Further more we periodically hold distribution safety meetings with these transportation companies at distribution bases throughout the nation, and promote distribution safety management through safety audits at each distribution base and participation in safety meetings.



Yellow Card

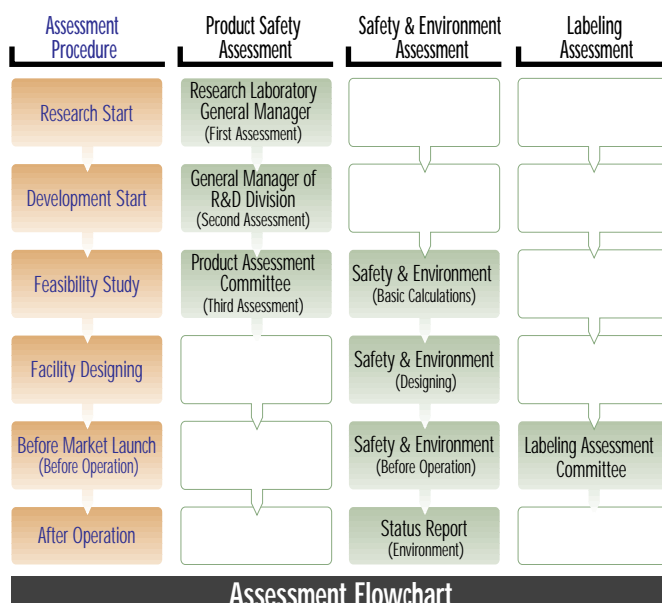
Committee (see Assessment Flowchart on page 12), and serve to ensure the safety of our products sold on the market.

RC Audits

Tokuyama creates a Responsible Care action plan every year, and carries out internal audits and surveillance in the following three areas in order to check the actual implementation of the scheduled RC activities:

- 1 Environmental Audit**
- 2 Plant Safety Surveillance**
- 3 Quality and Product Liability Audit**

In addition, we undergo external audits based upon ISO14001 and ISO9000 for environment and quality management. These audit results are reported to the Japan Responsible Care Council on a regular basis.



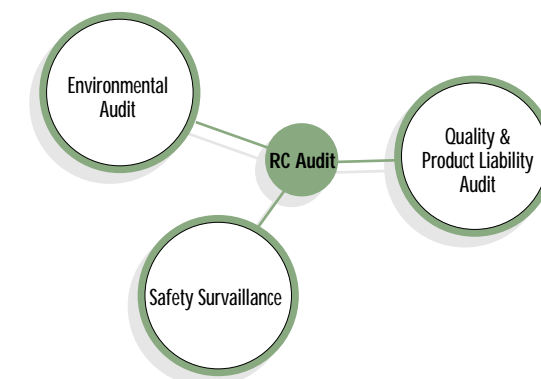
RC Research Laboratory Supports Responsible Care

We have established an RC Research Laboratory to support our Responsible Care system. The laboratory organization for RC programs consists of:

- 1 Analysis and Evaluation Team**
- 2 Environmental Analysis Team**
- 3 RC Assessment Team**

The RC Assessment Team's primary function is to gather a wide range of safety information on our products and their potential risks. The team also reviews the accumulated data when product safety assessment is required.

This is carried out by database implementation which includes forecasts of potential risks according to the chemical structures of the products. The results of product safety evaluations by the RC Assessment Team are reported to the Product Assessment



RC Research Laboratory