

# CSR Report and Corporate Profile 2015

Online PDF Version

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● 1 Achieving Safety Worthy of a "First-Rate Cement Plant"

Special Feature 1: Achieving Safety Worthy of a "First-Rate Cement Plant"

## Making One of Japan's Largest Cement Plants Safer and Stronger

At the Tokuyama Factory's Nanyo Plant, three large kilns yield the highest single-plant production capacity in Japan. Tokuyama rigorously implements environmental preservation and safety measures, and treats safety as an absolute prerequisite for all operations.



### How Tokuyama Ensures Safety at Its Cement Plant

A cement plant is a very hazardous workplace. Massive equipment operates at high voltage and extreme temperatures, and numerous conveyor belts pose further risks. Moreover, a cement plant consumes huge quantities of mineral and wastes, as raw materials, which means fine-tuning of operations is required. Frequent stops and starts are handled remotely in a central control room, so it is extremely important that each worker be very safety-conscious.

With this in mind, Tokuyama has undertaken many different activities. These include: discussions based on accident case histories to identify the causes of accidents, and prevent them; hands-on learning activities to provide experience with operation of actual machinery; and "5S model workplace\*" activities designed to show how problems and accidents can be avoided by maintaining a clean and orderly workplace.

To ensure safety and quality, and to improve productivity, more than 30 years ago we set about a wide range of

improvements. These tasks have now been implemented at the various workplaces under our Cement Manufacturing Department, and are now being carried out on a continuing basis as voluntary management initiatives.

### Problems and Accidents That Have Happened Both in the Company and Elsewhere Used to Enhance Safety Consciousness.

Discussions of accident case histories are among the voluntary management initiatives carried out at Tokuyama. In these discussions, we focus on selected accidents that have actually occurred to encourage employees think about whether the potential for the same sorts of accidents exists, and to devise measures to prevent them. Our goal is to increase everyone's safety consciousness.

\* The term "5S" refers to the 5S principles (a system in Japan for promoting sorting, setting in order, systematic cleaning, standardizing, and sustaining discipline).

### The importance of safety-conscious individuals and thorough information sharing

**Kenji Tanaka**

Manager, Manufacturing Section,  
Cement Manufacturing Dept.



During periodic maintenance, more than 400 workers and dozens of items of heavy equipment enter the premises, and ordinary operations take place right alongside inspections and repairs. Hazards therefore increase on such occasions. Safety patrols, maintenance meetings, and other such activities carried out together with contractors serve to share information and ensure safety. At everyday work locations, as well, information on near-miss accidents is shared among all workers, and corrective action is taken to eliminate latent hazards before they cause accidents.

● 1 Achieving Safety Worthy of a "First-Rate Cement Plant"

Special Feature 1: Achieving Safety Worthy of a "First-Rate Cement Plant"

類似災害防止対策活動板



Information on accidents that have occurred is publicly posted.



Tokuyama's Materials Office has been certified as a "5S model workplace."



Hands-on learning activity

We organize hands-on learning activities using actual equipment so that participants can experience the feel of dealing with hypothetical hazards. The idea is to instill an awareness of the importance of safety activities.

Our "5S model workplace" activities focus on such things as equipment storage locations and quantities. In addition to ensuring safe passageways through the workplace, these activities also instill an awareness of the need to maintain a clean workplace, which has the added benefit of increasing efficiency.

**Safety Activities Provide a Forum for Active Communication, and Generate Trust**

Descriptions of voluntary management initiatives are publicly posted so that everyone can see the state of progress at each company division. This generates a spirit of com-

petition, and spurs stronger communication within and among company divisions, which leads to greater trust and cohesion.

Last year, Tokuyama's Kiln No. 5 operated for 128 days in a row. It is no mean feat for the high-temperature, high-voltage equipment at a cement plant to operate continuously for so long, because the plant processes huge quantities of materials, including waste matter. It is Tokuyama's painstaking dedication to safety that enabled this achievement.

**Going all out in the conduct of safety activities**

**Koji Uchiyama**

Foreman, Cement Manufacturing Dept.



In our voluntary management initiatives, we are working to install safety railings on our conveyor belts. Some have commented that the railings are "hard to inspect," but we're moving ahead, with the idea that we'll go to any length for the sake of safety.

**Building a plant where people are educated so nothing will daunt them**



**Kazuhiro Yoshioka**

Doctor of Engineering  
General Manager,  
Cement Manufacturing Dept.

Manufacturing cement involves a lot of complex processes. If there's a single person around who isn't highly safety conscious, it can lead to a major accident. The "safety first" ethic is shared throughout the Manufacturing Department, and we've taken it to such a height that, no matter who you ask about something, you're going to get the same response. It's important to conduct daily operations on the basis of this ethic.

We have a great personnel training program in the Cement Manufacturing Department. Veterans provide instruction right on the production floor. The trainees take notes, which they take back to their desks to review. This basically means that each employee, in addition to the Company's operations manual, has a completely original set of teaching materials in his or her possession.

I want to declare my determination to create a "first-rate cement plant." What that means, in a word, is that "no matter happens, we'll remain undaunted." It means that we're self-sufficient, and can act flexibly to make corrections and improvements in response to a changing environment. To be able to do that, safety is an absolute necessity.

We broke the record last year for consecutive days in operation at a cement kiln. We intend to see that all of our employees keep taking corrective actions and putting forth an effort so that we can continue to operate safely and maintain a zero accident record. Also, I'd like to see Tokuyama train people so that they're prepared to work anywhere in the world. We've begun shipping concrete overseas. If we cultivate people who can compete overseas, then I do believe we will continue to be a "first-rate cement plant."

Special Feature 2: Analysis and Evaluation Capabilities Driving Development and Safety

## Advanced analytical Techniques Support Development of Safe, Reliable Products

Globalization has triggered increasingly fierce R&D competition, and chemical manufacturers are expected to exercise Responsible Care. It is the RC Research Department's cutting-edge analyses and assessments that enable Tokuyama to address these needs so successfully.



### Specialists in Analysis and Evaluation, Environmental Analysis, and Risk Assessments

#### Q What is the organizational structure of the RC Research Department ?

The RC Research Department has an Environmental Analysis Team and an Analysis and Evaluation Team. The Environmental Analysis Team analyzes and monitors the air pollutants and effluent that are discharged by the Tokuyama Factory. This team plays an important environmental protection role through its use of advanced environmental analysis and risk assessment techniques.

The Analysis and Evaluation Team, which operates out of the Tokuyama Factory and the Tsukuba Research Laboratory, works together with outside organizations to support development. One way it does this is by assessing the safety of new compounds. In this and many other ways, this team contributes to improved product safety and quality.

### Commitment to Responsible Care

#### Q What is Tokuyama doing to ensure that its chemical products do not pose safety concerns?

Production processes are expected to be safe, with as little environmental impact as possible. The Company carries out daily monitoring under the Tokuyama Factory's safety management policy and environmental policy to be sure that prefectural and city discharge standards (which are even more stringent than national standards) are being met. In addition, the Company also monitors to ensure that the even-stricter voluntary management standards of each manufacturing division are being satisfied. Even when all standards are being met, any unusually high reading will be reported to the Environmental Management Section and to the manufacturing division, which will check on the situation and take any necessary response measures.

#### Q So even the tiniest anomalies at a production site are discovered?

### Developing the trained eye of an analyst

#### Yoshiyuki Kitajima

General Manager, RC Research Dept.



As an analyst, you need two different skill sets. You have to have expertise as an analyst, and you also have to be able to decide what is to be analyzed and how to go about it. To develop these skills to the highest level, you have to be able to think about how your analysis will be put to use in the Company's operations. I want to train people with this type of ability.

Whenever a reading is out of the ordinary, feedback is provided immediately to the production site. Our goal is to improve production processes and enhance quality. We stay in close touch with production sites in order to nip problems in the bud and continue operating stably.

## Contributing to Neighboring Residents' Safety and Peace of Mind

**Q** You're expected to maintain the impartiality of a third party, right?

The Tokuyama Factory is located near a residential area. To gain the trust of neighboring residents, we measure the presence of harmful substances on the factory premises and in the air. Also, for substances requiring priority action—which may eventually subject to regulatory restrictions—we have developed analytical techniques, and voluntarily measure their presence.

### The critical essence of analysis—questioning the fundamentals



**Shota Honda**

Research Chemist, RC Research Dept.

When someone comes to you needing analytical support, the key thing you've got to do is to ask questions about the fundamentals. If you know what someone is really trying to achieve, you'll just naturally see what analytical techniques will be needed. I want to develop my analytical skills, one day at a time, one small job at a time.

## Counterproposals Lead to Breakthroughs

**Q** What kind of support role do you play in the R&D process?

One example of our support role would be the manufacture of bulk pharmaceuticals, which constitute the active ingredients in generic drugs. The first step in the R&D process is to analyze the original drug and determine what the active ingredients are. Once the active ingredients are known, you can decide how to approach the making of a generic version, and set your objectives. Also, if you discover impurities during the course of development that could cause side effects, you then have to determine the molecular structure and find a way to reduce impurities. The R&D department also does analysis, but we are the ones who specialize in analysis and evaluation.

**Q** So analysis drives R&D?

As an in-house research department, the RC Research Department is valuable to Tokuyama not just because it provides the results of its analyses. In addition, our laboratory can also take the findings from an analysis and put forward a counterproposal for a solution.

When we see value generated that is different from the results of analysis done by the R&D department, we provide feedback, including an explanation of how to interpret the meaning of the data. Having collaborated on an examination of the data, together we can change the analysis conditions and methods in order to arrive at a solution.

## Advanced Analytical Techniques Yield Contributions to Tokuyama and Society

**Q** So, I guess we could say that your objectives are the same as those of R&D?

That's exactly right. By further enhancing our analysis and evaluation techniques, we make ourselves indispensable to the R&D and manufacturing departments. And in doing so, we contribute to the company and to society.

### A development partner that is useful for its unique perspective



**Hiroyuki Mori**

Researcher, Fine Chemicals Development Dept.

The Fine Chemicals Development Department at Tsukuba Research Laboratory develops bulk pharmaceuticals for generic drugs. To make bulk pharmaceuticals that perform even better than those used in the original drug, we have to achieve a purity level of one part per billion. When working to explore synthetic routes or reduce impurities, analysis and evaluation are indispensable at each step of the development process. Our Analysis and Evaluation Team comes up with analytical methods that reflect a totally different perspective from ours in the Development Department. That's very helpful.

## Practice of Environmental Management

For Tokuyama, the pursuit of proactive initiatives to protect the earth's environment is an important part of its corporate social responsibilities. Accordingly, the Company practices environmental management that takes into account the natural environment in all business activities.

## Environmental Management at Tokuyama

### Performance in Fiscal 2014

#### » Flow of Materials in Business Activities

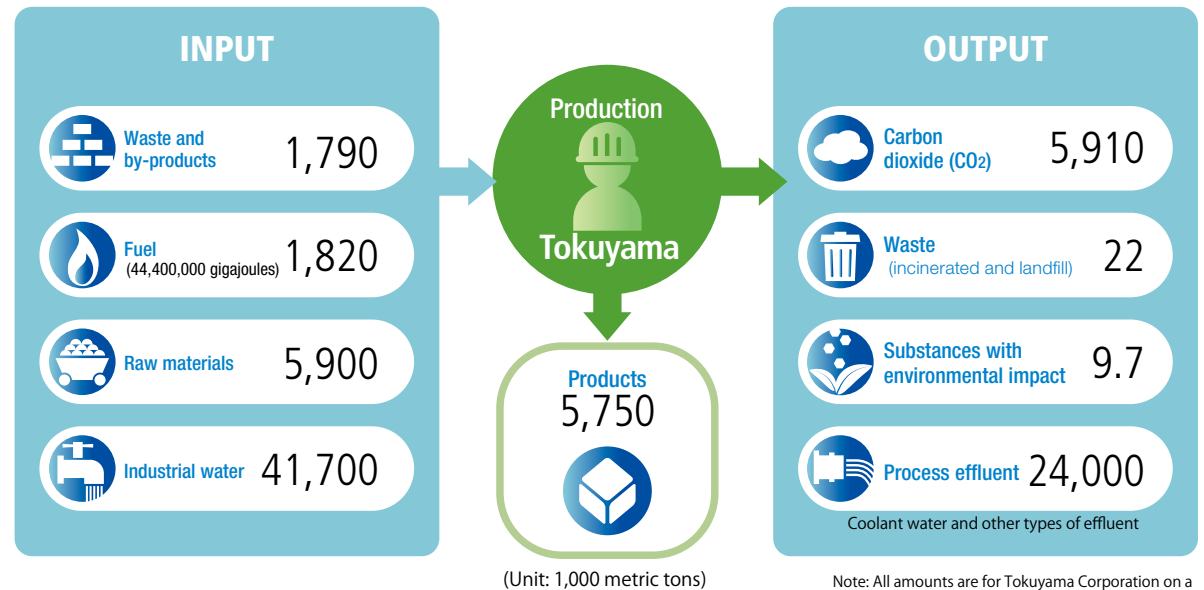
Tokuyama works to accurately determine the input and output of materials for production, and regularly sets new targets aimed at reducing environmental impact.

#### » Results of Environmental Protection Initiatives in Fiscal 2014

Among its targets for reducing environmental impact in fiscal 2014, Tokuyama met targets for soot emissions, water quality (chemical oxygen demand, nitrogen, and phosphorus), PRTR-listed substances, recycling, and near-zero waste. The Company also made progress in reducing per-unit energy consumption in fiscal 2020 by 3.0% compared to the fiscal 2005 level.

Regarding performance data for fiscal 2015 and beyond, Tokuyama has set a separate numerical management target for each department to maintain the current low-impact situation.

#### Flow of Materials in Business Activities



#### Results of Environmental Protection Initiatives by the Tokuyama Factory in Fiscal 2014

Symbols: ○ Goal achieved, × Goal not achieved

Category	Items	FY2014 Target	FY2014 Result	Rating	FY2015 Target	
Environmental Impact Reduction	Atmosphere	Soot	Emission target reset to 200 metric tons per year to reflect operating forecasts and characteristics of facilities	-33%	○	Maintain the current low-impact situation
		COD	Same level as the fiscal 2010 result	-12%	○	
	Water Quality	N	Same level as the fiscal 2010 result	-19%	○	
		P	Same level as the average result for the previous three years	-13%	○	
	PRTR	PRTR	Same level as the average target values for the previous three years	-27%	○	
Global Environment Conservation	Energy Conservation	Energy consumption on a per-unit basis	3% reduction of per-unit energy consumption by fiscal 2020 compared to fiscal 2005	-2.1%	○	Improve per-unit energy consumption of products
Waste Reduction	Recycling	Effective utilization rate	Maintain at 94%	94.0%	○	Maintain at 94%
	Zero emissions	"Zero emissions" rate	Maintain at 99.9%	99.9%	○	Maintain at 99.9%

## Environmental Accounting

Tokuyama has been carrying out environmental accounting since fiscal 2000 in order to accurately determine and analyze the investment amounts and costs associated with its environmental conservation activities, thereby providing a sound basis for making environmental investments.

### » Environmental Costs

Of Tokuyama's total environmental investment in fiscal 2014, 60% was intended for resource recycling, followed by 21% for pollution control, and 10% for management activities. Meanwhile, among environmental costs in fiscal 2014, 69% of the

total was generated by pollution control, 17% by resource recycling, and 7% by global environmental conservation.

In fiscal 2014, Tokuyama made principal environmental investments for upgrading equipment at electrostatic precipitator and wastewater treatment facilities.

### » Economic Benefits of Environmental Management

Economic benefits are determined by calculating only monetary gains on the reduction of energy consumption, the sale of valuable waste, the reduction in waste disposal costs through waste recycling, and the reduction in raw material and fuel costs through waste recycling. In fiscal 2014, these economic benefits totaled almost ¥1.46 billion, a slight decrease of ¥230 million compared to the previous fiscal year.

## Measures to Help Combat Global Warming

Tokuyama participates in Keidanren's Voluntary Action Plan on the Environment, as a member of one of the industries covered by the Action Plan. It is via this Action Plan that Tokuyama is working to achieve its 2020 emissions reduction target.

Tokuyama is making steady progress in conserving energy throughout its business activities, and supporting efforts by employees to save energy at home.

### » Promoting Energy Conservation

Tokuyama consumes a vast amount of energy to manufacture its core products such as caustic soda, cement, and

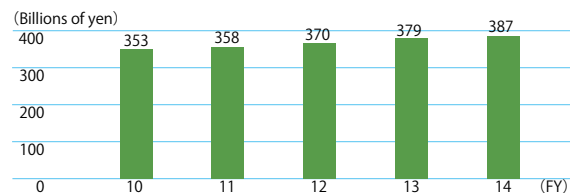
Environmental Preservation Costs

Category	Major Activities	Amount Invested (¥ million)	Costs (¥ million)
Costs in Business Areas	Pollution Control	Installation of electrostatic precipitators and drainage conduits, replacement of tanks	163 4,526
	Global Environmental Conservation	Optimization of freezer equipment, upgrade of refrigeration equipment for low-temperature warehouses	66 493
	Resource Recycling	Upgrade of desalination equipment, PCB waste treatment expenditures, etc.	463 1,117
Upstream and Downstream Costs		0 1	
Management Activity Costs	Installation of environmental analysis equipment	81 250	
Research and Development Costs		0 0	
Social Activity Costs	Greenification and beautification measures Production of CSR report	0 76	
Costs for Environmental Damage	Imposition, management of a former mining site	0 111	
<b>Total</b>		<b>774 6,575</b>	

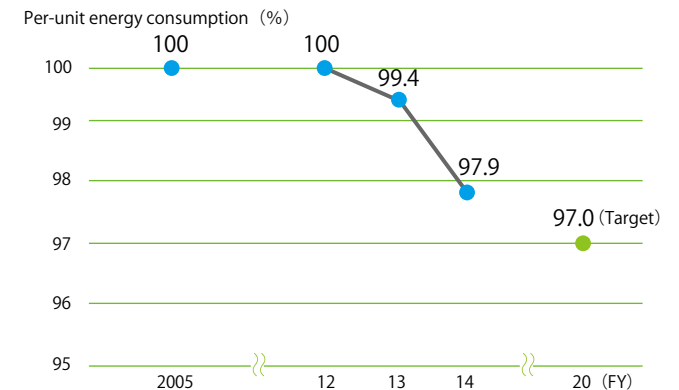
Economic Benefits in Fiscal 2014

Category	Material Benefit (1,000 metric tons)	Economic Benefit (¥ million)
Gains on Reduction in Energy Consumption	-	190
Gains on Sale of Valuable Waste	72	170
Gains on Reduction in Waste Disposal Costs through Waste Recycling	251	649
Gains on Reduction in Raw Material and Fuel Costs through Waste Recycling	251	453
<b>Total</b>	-	<b>1,462</b>

Cumulative Total of Environmental Investment  
(Calculated from Fiscal 1990)



Unit Energy Consumption Index\* (Tokuyama Factory)



\* The unit energy consumption index is calculated using a method recommended by the Japan Chemical Industry Association (JCIA).

polycrystalline silicon. It also emits carbon dioxide (CO<sub>2</sub>), one of the greenhouse gases, primarily in its burning of fossil fuels and decarboxylation of limestone, which is used as a raw material for cement production.

The Company is working to reduce CO<sub>2</sub> emissions by implementing energy conservation measures, including upgrading to more energy-efficient equipment. The Tokuyama Factory, which accounts for more than 99% of the Company's total energy consumption, reduced per-unit energy consumption in fiscal 2014 by 2.1% compared to the fiscal 2005 level, advancing the Company's goal of reducing per-unit energy consumption in fiscal 2020 by 3.0% compared to the fiscal 2005 level.

#### » Initiatives at Offices

In fiscal 2014, the Company's Tokyo Head Office made energy-saving settings to computers, removed some lights, and strictly regulated air conditioning. It also continued to participate in the government-led Cool Biz campaign, which encourages

cooler, casual clothing in offices in the summer to reduce the need for air conditioning.

#### » Contributing to Efforts to Combat Global Warming in the Consumer Sector

The Tokuyama Group is working to help reduce household CO<sub>2</sub> emissions by providing its Shanon brand of plastic window sashes, which are highly effective for saving energy in residences.

The Group is also making advances in the development of other technologies that can help combat global warming, such as polycrystalline silicon for solar cells and electrolyte membranes for fuel cells.

#### » Global Warming Prevention Support Program

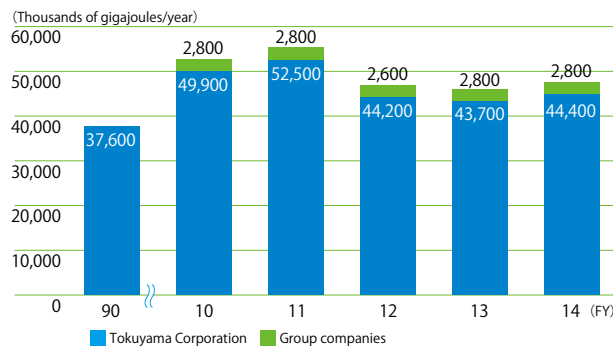
As part of its CSR-based environmental, energy-conservation and social-contribution initiatives, Tokuyama launched its Global Warming Prevention Support Program for all Tokuyama Group employees in April 2008.

The objectives of the program are to raise awareness of global warming among Group employees, encourage them to save energy, and help them reduce CO<sub>2</sub> emissions from their households. The Company covers part of the costs incurred by employees for purchasing and installing environmentally friendly products closely connected to the Group's business, namely residential-use plastic window sashes and solar power generation systems. Tokuyama continued to offer the program for the seventh year in fiscal 2014, a year when it implemented measures to improve profitability. The usage of the program by employees is described below.

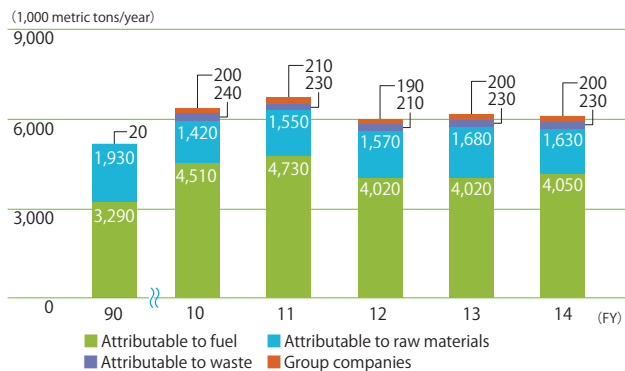
In fiscal 2014, the number of subsidies for such product units was lower than in fiscal 2013. This was due to the lag following the rush in demand in fiscal 2013 before the consumption tax went up in Japan in April 2014.

In addition, Tokuyama has set up a new groupware-based portal site for the program. The site is regularly updated with product usage reports and helpful information, such as recommended websites about global warming.

#### Energy Consumption



#### CO<sub>2</sub> Emissions



#### Adoption of Environmentally Friendly Products

	Plastic Window Sashes		Solar Power Generation Systems	
	Number of cases of subsidization	Units	Number of cases of subsidization	kW
FY2010	7	91	30	129
FY2011	13	174	22	87
FY2012	6	61	23	108
FY2013	8	113	34	180
FY2014	8	80	11	58
Total	61	837	134	620



## Reducing Atmospheric Emissions and Water Pollution

Tokuyama has been actively working to help protect the natural environment from early on in its history, implementing a wide range of measures designed to reduce pollutants into the atmosphere and water systems.

### » Amounts of Atmospheric Emissions

In order to reduce emissions of sulfur oxides (SOx), nitrogen oxides (NOx), and soot into the atmosphere, Tokuyama equips its boilers, cement kilns, and other facilities that generate these substances with emission control systems, including flue gas desulfurizers, denitration equipment, low-NOx burners, and high-performance dust collectors. In fiscal 2014, the Company reduced emissions of NOx, SOx and soot compared to the previous fiscal year, as a result of lower operating rates at manufacturing facilities.

### » Amounts of PRTR-Designated Substances

Among all of the substances Tokuyama handled in fiscal 2014, 24 were subject to registration under the Pollutant Release

and Transfer Register (PRTR)\* system. Every workplace handling these substances undertook measures to reduce emissions in fiscal 2014. As a result, the Company reduced its emissions to 27 metric tons compared to the previous fiscal year.

\* The PRTR system collects and publishes data on the sources of designated harmful chemical substances and the amounts of these substances discharged in the environment or transported from production sites as part of waste matter.

### » Amounts of Hazardous Air Pollutant Emissions

Tokuyama generates chloroethylene and three other substances that are among the 12 substances subject to voluntary controls in Japan's Air Pollution Control Law. Accordingly, the Company has formulated a voluntary action plan and carries out ongoing measures for reducing the emissions of these substances.

### » Measures to Reduce Dioxins

Tokuyama's waste oil incinerators and certain equipment in its vinyl chloride monomer manufacturing facilities are subject to regulations under Japan's Special Measures Law for Countermeasures against Dioxins. Accordingly, the Company measures the concentrations of dioxins in exhaust gases and wastewater

emitted from these facilities to ensure that amounts are below regulatory limits.

### » Amounts of Industrial Effluent and Wastewater

The Tokuyama Factory follows a stringent system for monitoring industrial effluent and purifying wastewater using treatment equipment in order to comply with regulatory standards and limits set by the local government, as well as the Company's own standards, which are even stricter. The factory also employs activated sludge treatment facilities for reducing the discharge of nitrogen and phosphorous and meeting chemical oxygen demand (COD)\* regulations for overall water quality.

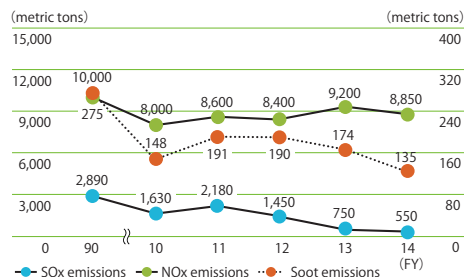
Phosphorus emissions in 2014 were down from the year before, as was COD. Nitrogen emissions rose from 2013, however, due to an increase in the overall operating rate of related equipment.

\* Chemical oxygen demand is an indicator used to measure water quality, and refers to the amount of oxygen required to oxidize organic compounds in water.

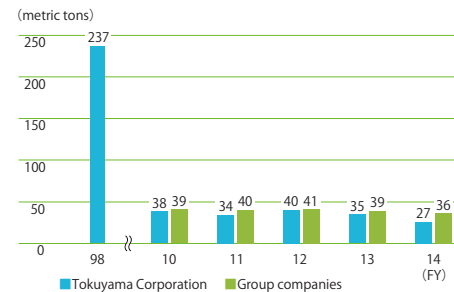
Nitrogen and Phosphorus Emissions (metric tons)

	FY2010	FY2011	FY2012	FY2013	FY2014
Nitrogen	110	108	94	70	90
Phosphorus	2.3	2.8	2.7	2.4	2.6

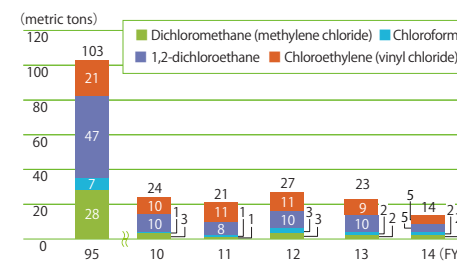
SOx, NOx and Soot Emissions



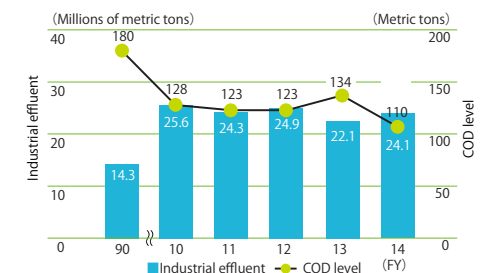
PRTR Substance Emissions



Hazardous Air Pollutant Emissions



Industrial Effluent Amounts and COD Levels



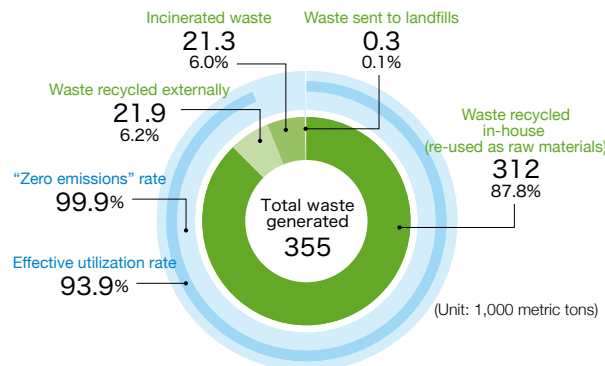
## Recycling and Reducing Waste

Tokuyama makes exhaustive efforts to reduce and recycle the waste it generates. As a result, the Company maintained a 94.0% effective utilization rate of waste and again hit its "zero emissions" target of 99.9% in fiscal 2014.

### » Waste Management

Tokuyama generated a total of 355,000 metric tons of waste in fiscal 2014. It actively worked to recycle this waste both in and outside the Company, mainly by re-using waste matter as raw materials and fuel for cement at the Tokuyama Factory. In addition, packing materials, pallets and other wood waste were crushed and then used as fuel for power plants. Through its diligent efforts to recycle waste as raw material for cement, Tokuyama achieved an effective utilization rate of 94.0%, on par with the previous fiscal year. Moreover, owing to progress

### Breakdown of Industrial Waste Treatment in Fiscal 2014



$$\text{Effective utilization rate (\%)} = \frac{\text{Amount of waste recycled (in-house and externally)}}{\text{Total waste generated}} \times 100$$

$$\text{"Zero emissions" rate (\%)} = \left[ 1 - \frac{\text{Amount of landfilled waste (onsite and offsite)}}{\text{Total waste generated}} \right] \times 100$$

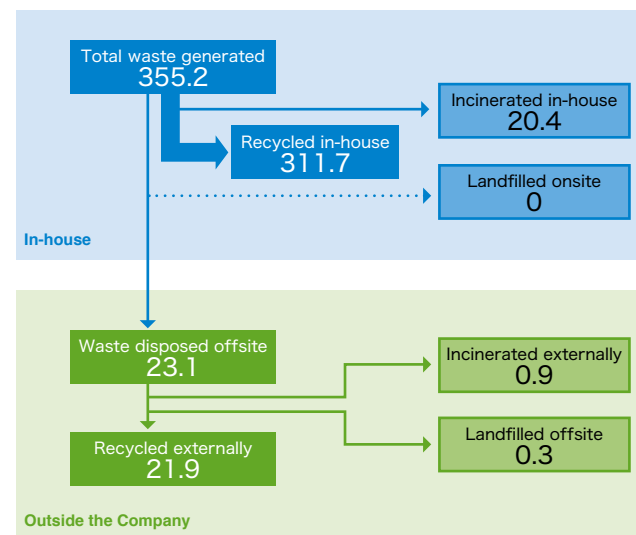
made in reusing waste and reducing the amount generated, the Company again achieved its "zero emissions" target of 99.9% in fiscal 2014.

### » Management and Treatment of PCB Waste

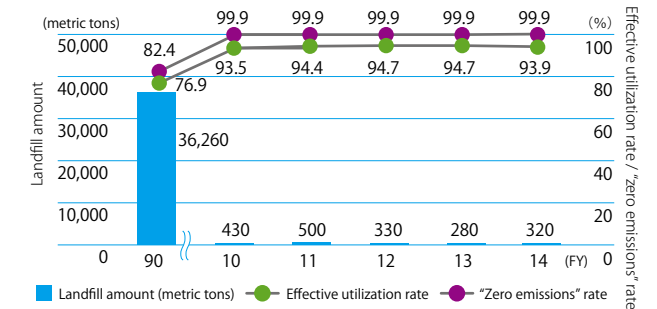
The Tokuyama Group has stopped using all of its remaining 30 transformers and capacitors containing high concentrations of polychlorinated biphenyl (PCB).<sup>\*</sup> Of these, 26 were disposed of in fiscal 2014. Other high-level and low-level PCB waste is stored and managed in compliance with Japan's Law concerning Special Measures for Promotion of Proper Treatment of PCB Wastes.

<sup>\*</sup> PCB is an organic chlorinated compound that emits dioxins when burned at a low temperature. It was formerly used in transformers, capacitors, and many other electric products because of its excellent electrical properties, including chemical stability, thermal resistance, chemical resistance, and insulation. Because of its danger to the human body, however, it was banned from production and usage in 1972. Owners of transformers, capacitors, or other products containing PCB are responsible for their storage at suitable facilities.

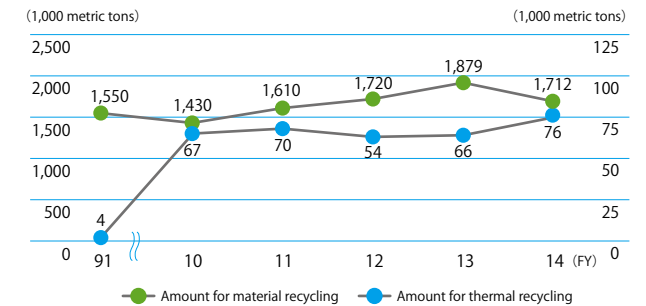
### Flow of Industrial Waste Treatment



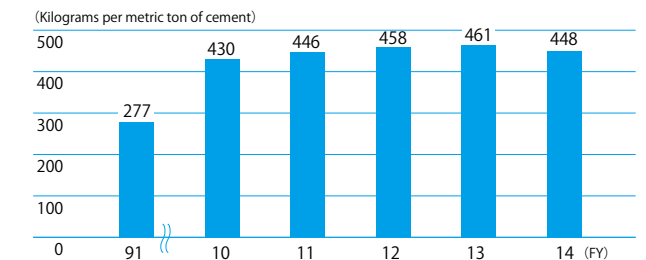
### Amount of Waste Sent to Landfills and Rate of Effective Utilization

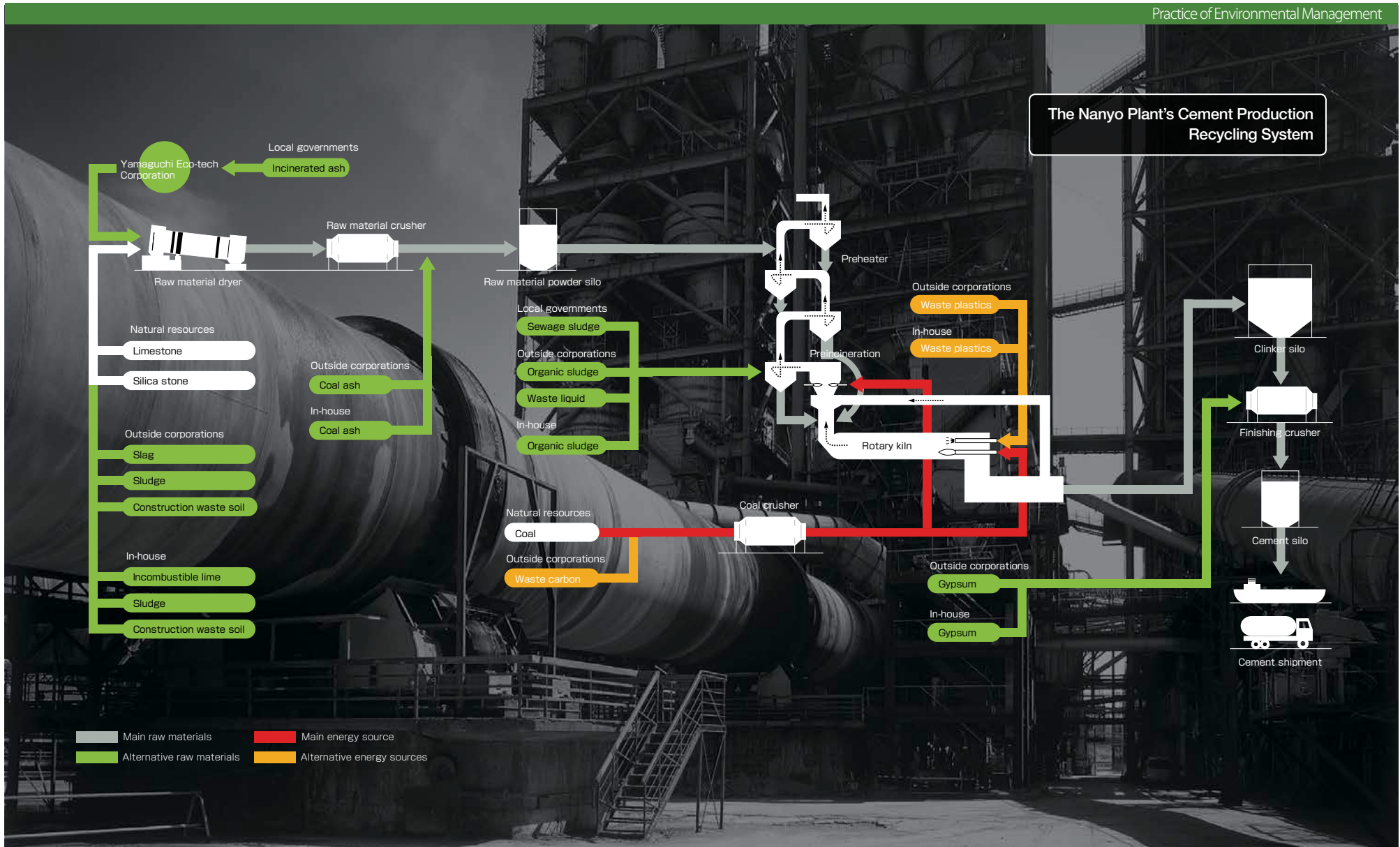


### Amount of Recycled Waste



### Amount of Waste Byproducts Used in Cement





# Tokuyama Factory

Location: 1-1, Mikage-cho, Shunan City, Yamaguchi 745-8648, Japan  
 Number of employees: 1,561  
 Total site area: 1.91 million m<sup>2</sup>  
 Main products: Cement, inorganic chemical products, organic chemical products, polycrystalline silicon, fumed silica, polyvinyl chloride, and other products

Hideki Adachi  
 Tokuyama Factory  
 General Manager



Still situated at the Company's first business site, the Tokuyama Factory is the Group's main manufacturing facility, and its products account for about 90% of non-consolidated sales. The factory operates with the motto, "Go to work healthy and return home happy." Aiming to achieve 12.4 million accident-free hours at the factory and 9 million accident-free hours at its contractors, the factory is working hard to keep everyone on site happy and safe at work. In fiscal 2015, the factory's top priorities include: (1) raising risk awareness by expanding "risk simulation" education and training programs to all employees; (2) discussing accident case studies to identify their causes and find ways to prevent them; and (3) dialoguing on safety with contractors, and providing feedback on the results.

## Performance Data

	Unit	FY2010	FY2011	FY2012	FY2013	FY2014
S0x emissions	Metric tons	1,630	2,180	1,450	750	550
NOx emissions	Metric tons	8,000	8,600	8,400	9,200	8,850
Soot emissions	Metric tons	148	191	190	174	135
Industrial water consumption	Million metric tons	40.5	43.8	41.3	42.2	41.7
Effluent discharged	Million metric tons	25.5	24.2	24.8	22.1	23.9
COD level	Metric tons	124	119	119	132	110
Total nitrogen discharged	Metric tons	110	108	94	70	89
Total phosphorous discharged	Metric tons	2.3	2.8	2.7	2.4	2.6
PRTR-designated substance emissions	Metric tons	37	32	39	33	34
Waste generated	Thousand metric tons	312	379	381	395	354
Waste sent to landfills	Metric tons	417	490	320	277	313
Energy consumption*	Thousand gigajoules	49,800	52,400	44,100	43,700	44,200
CO <sub>2</sub> emissions* (originating from fossil fuel)	Thousand metric tons	4,510	4,730	4,020	4,020	4,040
Complaints	Cases	5	3	0	1	0

\* In accordance with a revision of Japan's Act on the Rational Use of Energy, figures based on calorific values and other factors have been recalculated retrospectively to 1990.

## Emissions and Transfer of Specific PRTR-Designated Substances in Fiscal 2014

Unit: metric tons (mg-TEQ equivalency for dioxins)

Substance Name	Regulatory Number	Amount of Emissions				Amount Transferred
		Atmospheric	Water	Soil	Subtotal	
Chloroethylene (vinyl chloride)	94	5.0	0.0	0.0	5.0	0.0
1,2-Dichloroethane	157	4.9	0.0	0.0	4.9	0.5
Toluene	300	3.9	0.0	0.0	3.9	36.6
Chloromethane (methyl chloride)	128	3.0	0.0	0.0	3.0	0.0
Cresol	86	0.0	2.8	0.0	2.8	0.0
Water-soluble compounds of zinc	1	0.0	1.7	0.0	1.7	0.0
Dichloromethane (methylene chloride)	186	1.5	0.0	0.0	1.5	0.0
Chloroform	127	0.9	0.0	0.0	0.9	0.0
1,2-Epoxypropane (propylene oxide)	68	0.6	0.0	0.0	0.6	2.3
1,2-Dichloropropane	178	0.4	0.0	0.0	0.4	183.7
Carbon tetrachloride	149	0.1	0.0	0.0	0.1	0.0
2,2-Azobisisobutyronitrile	16	0.0	0.0	0.0	0.0	0.0
Water-soluble copper salt	272	0.0	0.0	0.0	0.0	5.4
Hydrazine	333	0.0	0.0	0.0	0.0	0.0
Hydrogen fluoride and its water-soluble form	374	0.0	0.0	0.0	0.0	0.0
Benzene	400	0.0	0.0	0.0	0.0	0.0
Boron compounds	405	0.0	0.0	0.0	0.0	0.1
Dioxins	243	8.0	1.4	0.0	9.4	0.0
Total (excluding dioxins)		20.2	4.5	0.0	24.7	228.5

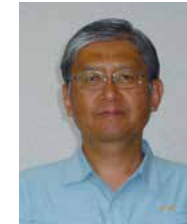
Substances are listed in descending order of emissions levels; substances with no emissions are listed in order of the regulatory number. Water refers to public waters.

Amount transferred indicates the sum of the quantity transferred to sewage systems and the quantity subject to intermediate treatment. Total figures have been rounded to the first decimal place.

## Kashima Factory

Location: 26 Sunayama, Kamisu City, Ibaraki 314-0255, Japan  
 Number of employees: 78  
 Total site area: 101,000m<sup>2</sup>  
 Main products: *Produced by Tokuyama Corporation*  
 Bulk pharmaceuticals for X-ray contrast agents, stomach and duodenal ulcer treatment drugs, and diabetes drugs; optical materials (plastic lens monomer, light modulating materials, and hard coating solutions); raw materials for electronic materials; metal cleaning solvents  
*Produced by Tokuyama Dental Corporation*  
 Dental materials (restorative materials, adhesives, relining materials, impression materials and investment materials)

Fumiaki Iwasaki  
 Kashima Factory  
 General Manager



The Kashima Factory strives to recycle waste matter while placing the utmost importance on the proper management and handling of chemical substances.

As a result of this approach, the factory achieved an 80% effective utilization rate of waste in fiscal 2014, maintaining the high recycling rate achieved in the previous fiscal year.

Looking ahead, the Kashima Factory is examining the feasibility of material and thermal recycling as it works to increase its effective utilization rate for all types of waste matter.

Waste sent to landfills for final disposal amounted to 11 metric tons, and the Company achieved its “zero emissions” target of 99%.

Meanwhile, Tokuyama Dental Corporation modified the operating conditions of treatment equipment to eliminate handling in certain processes in an effort to reduce its atmospheric emissions of exhaust gases. Consequently, the company maintained the same level of share of total atmospheric emissions from the factory with fiscal 2014.

### Performance Data

	Unit	FY2010	FY2011	FY2012	FY2013	FY2014
Industrial water consumption	Thousand metric tons	77	71	76	51	48
Effluent discharged	Thousand metric tons	93	90	96	66	63
COD level	metric tons	4	4	4	3	3
PRTR-designated substance emissions	metric tons	2	2	1	2	2
Waste generated	metric tons	857	909	930	919	1,020
Waste sent to landfills	metric tons	12	7	7	7	11
Energy consumption*	Thousand gigajoules	60	57	59	36	36
CO <sub>2</sub> emissions* (originating from fossil fuel)	metric tons	2,340	2,324	2,399	2,476	2,465
Complaints	Cases	0	0	0	0	0

\* In accordance with a revision of Japan's Act on the Rational Use of Energy, figures based on calorific values and other factors have been recalculated retrospectively to 1990.

### Emissions and Transfer of Specific PRTR-Designated Substances in Fiscal 2014

Unit: metric tons (mg-TEQ equivalency for dioxins)

Substance Name	Regulatory Number	Amount of Emissions				Amount Transferred
		Atmospheric	Water	Soil	Subtotal	
Chloroform	127	1.1	0.3	0.0	1.5	36.2
Toluene	300	0.4	0.0	0.0	0.4	15.4
Dichloromethane	186	0.4	0.0	0.0	0.4	2.3
Acetonitrile	13	0.0	0.0	0.0	0.0	1.3
o-Methylstyrene	149	0.0	0.0	0.0	0.0	0.0
1,4-Dioxane	150	0.0	0.0	0.0	0.0	0.1
N,N-Dimethylacetamide	213	0.0	0.0	0.0	0.0	4.2
N,N-Dimethylformamide	232	0.0	0.0	0.0	0.0	13.1
Triethylamine	277	0.0	0.0	0.0	0.0	0.0
2-Vinylpyridine	338	0.0	0.0	0.0	0.0	0.2
Methacrylic acid 2,3-Epoxypropyl	417	0.0	0.0	0.0	0.0	0.0
Total		2.0	0.3	0.0	2.3	72.7

Notes: All figures are the numerical sum for Tokuyama Corporation and Tokuyama Dental Corporation.

Substances are listed in descending order of emissions levels; substances with no emissions are listed in order of the regulatory number Water refers to public waters.

Amount transferred indicates the sum of the quantity transferred to sewage systems and the quantity subject to intermediate treatment.

Total figures have been rounded to the first decimal place.

Tokuyama recognizes that its group companies must be fully engaged with the issues addressed by its Responsible Care activities. The Company has concluded a CSR Management Agreement with its manufacturing subsidiaries in and outside of Japan and is providing them with assistance to carry out these activities. The Company collects data from group companies on their environmental impact, safety management, and other indicators, and conducts safety, environmental, and quality audits at several subsidiaries each year. In this way, Tokuyama is closely following the Responsible Care activities at each company and ensuring that they are complete. Tokuyama also shares news on regulatory trends and other relevant information with its group companies, and helps them acquire ISO 9001 and ISO 14001 certification.

**11 Group Companies with ISO 9001 and/or ISO 14001 Certification**

Group Company	ISO9001	ISO14001	Group Company	ISO9001	ISO14001
Sun-Tox Co., Ltd.	●	●	Tokuyama Siltech Co., Ltd.	●	●
Excel Shanon Corporation	●	—	Sun Arrow Kasei Co., Ltd.	—	●
Tohoku Shanon Corporation	●	●	ASTOM Corporation	●	●
A&T Corporation	●*	●	Shin Dai-ichi Vinyl Corporation	—	●
Figaro Engineering Inc.	●	—	Tokuyama Polypropylene Co., Ltd.	●	●
Tokuyama Dental Corporation	—*	●			

● = Acquired certification  
 ● = Certification acquired by a worksite of the group company  
 \* = Acquired ISO 13485 certification

**Sun·Tox Co., Ltd.**

Established: February 14, 1992  
 Shareholder: Tokuyama Corporation (100%)

Head office: Akasaka Enoki-zaka Mori Building, 1-7-1 Akasaka, Minato-ku, Tokyo, Japan  
 Business activities: Manufacture and sale of biaxial-oriented polypropylene films and cast polypropylene films

**Kanto Plant**



**Kazunori Shimada**  
Plant Manager



Location: 3075-18 Shimasu, Itako City, Ibaraki, Japan  
 Number of employees: 185  
 Total site area: 55,800 m<sup>2</sup>

Sun-Tox's Kanto Plant manufactures biaxial-oriented polypropylene films and cast polypropylene films, which are used for food packaging and other applications, totaling about 28,000 metric tons annually. As a Type 1 Designated Energy Management Factory under the Japan's Act on the Rational Use of Energy, the Kanto Plant strives to cut down on its overall energy consumption on a per-unit basis.

The plant also conducts initiatives to improve productivity and reduce waste, and actively interacts with its local community by participating in cleanup activities within the industrial park where it is located. As it continues to implement three management systems, namely Japan's Occupational Safety and Health Management System (OSHMS), ISO 14001, and ISO 9001, the Kanto Plant is building on its achievements with the aim to be a community-based factory.

**Performance Data**

	Unit	FY2010	FY2011	FY2012	FY2013	FY2014
Waste generated	metric tons	56	57	26	15	20
Waste sent to landfills	metric tons	38	43	7	4	10
Energy consumption	Thousand gigajoules	344	341	340	360	351
CO <sub>2</sub> emissions	Thousand metric tons	19	19	19	20	20
SO <sub>x</sub> emissions	metric tons	0.3	0.4	0.3	0.2	0.3
NO <sub>x</sub> emissions	metric tons	0.6	0.7	0.6	0.7	0.6
Soot emissions	metric tons	0.04	0.04	0.03	0.06	0.05

**Tokuyama Plant**



**Naoki Ueda**  
Plant Manager



Location: 7-7, Harumi-cho, Shunan City, Yamaguchi, Japan  
 Number of employees: 154  
 Total site area: 24,100 m<sup>2</sup>

Sun-Tox's Tokuyama Plant manufactures environmentally friendly biaxial-oriented polypropylene films, which are mainly used for food and beverage packaging, amounting to about 23,000 metric tons annually.

As part of its environmental initiatives, the plant is actively working to reduce per-unit energy consumption and increase recycling rates. With respect to safety, it acquired OSHMS certification in 2013 for all of its departments including R&D departments. Under the slogan, "Strictly following safety procedures, making manufacturing enjoyable, and never compromising quality," the plant aims to keep its facilities operating safely so it can be depended upon by the community, customers and employees.

**Performance Data**

	Unit	FY2010	FY2011	FY2012	FY2013	FY2014
Waste generated	metric tons	80	70	67	66	76
Waste sent to landfills	metric tons	9	1	2	2	1
Energy consumption	Thousand gigajoules	434	448	445	463	458
CO <sub>2</sub> emissions	Thousand metric tons	26	26	26	27	27
PRTR-designated substance emissions	metric tons	0.1	0.0	0.0	0.0	0.0
Complaints	Cases	0	0	0	0	0

## Sun·Arrow Kasei Co., Ltd.

Established: February 1, 1999  
 Shareholder: Tokuyama Corporation (100%)  
 Head office: Nakanoshima Central Tower, 2-2-7 Nakanoshima, Kita-ku, Osaka, Japan  
 Business activities: Manufacture and sale of polyvinyl chloride compounds

### Tokuyama Plant



Yasuto Yasuzawa  
Plant Manager

Sun Arrow Kasei's Tokuyama Plant manufactures and sells polyvinyl chloride compounds used for pipes, joints, and other items essential for upgrading infrastructure, as well as resin window frames, which are highly effective for saving energy.

The plant practices ISO 14001 environmental management, and ensures safety and prevents accidents by having all employees participate in activities designed to eliminate problems, identify near-miss situations, and practice the 5S principles. Owing to this approach, the plant has maintained an accident- and disaster-free record for 15 years since its establishment.

In fiscal 2015, the plant intends to strictly enforce internal controls while carrying out Responsible Care activities based on a safety-first policy for all operations.

Location: 1-2 Harumi-cho, Shunan City, Yamaguchi, Japan  
 Number of employees: 24  
 Total site area: 3,280 m<sup>2</sup>



### Performance Data

	Unit	FY2010	FY2011	FY2012	FY2013	FY2014
Power consumption	Thousand kilowatt hours	2,735	2,763	2,455	2,562	2,473
Waste plastic produced	metric tons	124	110	107	125	108
Waste plastic effectively used	metric tons	124	110	107	124	105
Waste sent to landfills offsite for disposal	metric tons	12.5	10	15	7	8
Steam usage	metric tons	240	240	240	240	240
Industrial water consumption	Thousand metric tons	65	65	65	65	65

## Tokuyama Polypropylene Co., Ltd.

Established: April 2, 2001  
 Shareholder: Tokuyama (50%), Prime Polymer Co., Ltd. (50%)  
 Head office: 1-1 Harumi-cho, Shunan City, Yamaguchi, Japan  
 Business activities: Manufacture and sale of polypropylene resin and flexible polypropylene resin

### Tokuyama Plant



Hiroaki Endo  
Plant Manager

Tokuyama Polypropylene's Tokuyama Plant conducts risk assessments of processes, facilities, and operations, and takes measures to identify near-miss situations and points of concern, in order to enhance the plant's safety culture. The result has been a perfect accident- and disaster-free record since the time it was first established as Tokuyama's polypropylene film business 39 years ago.

The plant is scheduled to obtain recertification in 2015 under the High Pressure Gas Safety Act and the Ordinance on Safety of Boilers and Pressure Vessels, and is pursuing Responsible Care activities with the goals of extending its accident- and disaster-free record, reducing its environmental impact, and eliminating customer complaints related to quality.

Location: 1-1, Harumi-cho, Shunan City, Yamaguchi, Japan  
 Number of employees: 62  
 Total site area: 70,997 m<sup>2</sup>



### Performance Data

	Unit	FY2010	FY2011	FY2012	FY2013	FY2014
Industrial water consumption	Thousand metric tons	329	366	343	411	308
Waste generated	metric tons	180	123	160	116	89
Waste sent to landfills	metric tons	3.8*	0	1.9*	15	2.4*
Unit Energy Consumption Index (Fiscal 2002=100)	%	86	88	88	84	76

\* Year with periodic maintenance

## Tokuyama Malaysia Sdn. Bhd.

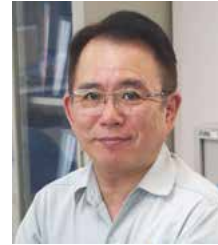
Established: August 18, 2009  
 Shareholder: Tokuyama Corporation (100%)  
 Head office: Lot 600, 6th Floor, Wisma Bukit Mata Kuching, Jalan Tunku Abdul Rahman, 93100 Kuching, Sarawak, Malaysia  
 Business activities: Manufacturing and sale of polycrystalline silicon  
 Location: Lot 89, Block 1, Kemena Land District, Samalaju Industrial Park, 97300 Bintulu, Sarawak, Malaysia



Takeo Suzuki  
President

## Tokuyama Chemicals (Zhejiang) Co., Ltd.

Established: September 13, 2005  
 Shareholder: Tokuyama Corporation (100%)  
 Head office: No 555 Yashan West Road, Economic Development Zone Zhapu Port, Jiaxing, Zhejiang China 314201  
 Business activities: Manufacturing and sale of fumed silica, Trichlorosilane, Tetrachlorosilane, and 31% hydrochloric acid



Masaki Yoshinaga  
President





## Environmental Data for Tokuyama

Input (Unit: 1,000 metric tons)	FY2010	FY2011	FY2012	FY2013	FY2014	Comparison with the previous fiscal year (%)
Waste and by-products	1,500	1,680	1,780	1,945	1,790	-8.0
Fuel	2,020	2,270	2,150	1,760	1,820	3.4
Raw materials	5,390	5,880	5,650	6,080	5,900	-3.0
Industrial water	40,500	43,900	41,300	42,200	41,700	-1.2
Output (Unit: 1,000 metric tons)	FY2010	FY2011	FY2012	FY2013	FY2014	Comparison with the previous fiscal year (%)
Carbon dioxide	6,170	6,510	5,800	5,930	5,910	-0.5
Waste (incinerated and landfill)	20	21	20	21	22	4.8
Substances with environmental impact	10	11	10	10	10	0.0
Process effluent	25,600	24,300	24,900	22,100	24,000	8.6

## Emissions of SOx, NOx, and Soot

Unit: Metric tons	FY2010	FY2011	FY2012	FY2013	FY2014	Comparison with the previous fiscal year (%)
SOx	1,630	2,180	1,450	750	550	-26.7
NOx	8,000	8,600	8,400	9,200	8,850	-2.8
Soot	148	191	190	174	135	-22.4

## Discharge of Nitrogen and Phosphorous

Unit: Metric tons	FY2010	FY2011	FY2012	FY2013	FY2014	Comparison with the previous fiscal year (%)
Nitrogen	110	108	94	70	89	27.1
Phosphorous	2.3	2.8	2.7	2.4	2.6	8.3

## Waste Management

Unit: 1,000 metric tons	FY2010	FY2011	FY2012	FY2013	FY2014	Comparison with the previous fiscal year (%)
Waste recycled in-house	271	331	337	350	312	-10.9
Waste recycled externally	21.1	27.3	25.0	24.5	21.9	-10.6
Incinerated waste	20	21	19.7	20.5	21.3	3.9
Waste sent to landfills	0.4	0.5	0.3	0.3	0.3	0.0

### Energy Consumed on a Per-Unit Basis\* at the Tokuyama Factory

Unit: %	Base year (FY2005)	FY2012	FY2013	FY2014	Target (FY2020)
Per-unit energy consumption	100.0	100.0	99.4	97.9	97.0

※ The factory has been working since 2014 to reduce per-unit energy consumption in fiscal 2020 by 3.0% compared to the fiscal 2005 level.

### Amount of Waste Matter and By-Products Used to Produce Cement

Unit: Kg per metric ton of cement	Base year (1991)	FY2010	FY2011	FY2012	FY2013	FY2014
Amount used	227	430	446	458	461	448

### Material and Thermal Recycling Amounts in Cement Production

Unit: 1,000 metric tons	Base year (1991)	FY2010	FY2011	FY2012	FY2013	FY2014
Material recycling	1,550	1,430	1,610	1,730	1,879	1,712
Thermal recycling	4	67	70	54	66	76

### Energy Consumption

Unit: 1,000 gigajoules	Base year (1990)	FY2010	FY2011	FY2012	FY2013	FY2014
Tokuyama Corporation	37,600	49,900	52,500	44,200	43,700	44,400
Group companies	—	2,800	2,800	2,600	2,800	2,800

### Emissions of CO<sub>2</sub>

Unit: 1,000 metric tons	Base year (1990)	FY2010	FY2011	FY2012	FY2013	FY2014
Originating from fuel	3,290	4,510	4,730	4,020	4,020	4,050
Originating from raw materials	1,930	1,420	1,550	1,570	1,680	1,630
Originating from waste matter	20	240	230	210	230	230
Group companies	—	200	210	190	200	200

## Emissions of PRTR-Designated Substances

Unit: Metric tons	Base year (1998)	FY2010	FY2011	FY2012	FY2013	FY2014
Tokuyama Corporation	237	38	34	40	35	27
Group companies		39	40	41	39	36

## Emissions of Hazardous Air Pollutants

Unit: Metric tons	Base year (1995)	FY2010	FY2011	FY2012	FY2013	FY2014
Dichloromethane (methylene chloride)	28	3	1	3	2	1.5
Chloroform	7	1	1	3	2	2.1
1,2-Dichloroethane	47	10	8	10	10	4.9
Chloroethylene (vinyl chloride)	21	10	11	11	9	5

## Discharge of Industrial Effluent and Levels of COD

	Base year (1990)	FY2010	FY2011	FY2012	FY2013	FY2014
Industrial effluent (million metric tons)	14.3	25.6	24.3	24.9	22.1	24.1
COD (metric tons)	180	128	123	123	134	112

## Breakdown of Waste Treatment Methods

Unit: 1,000 metric tons	FY2009	FY2010	FY2011	FY2012	FY2013	FY2014
Waste recycled in-house	260	271	331	337	350	312
Waste recycled externally	20.8	21.1	27.3	25	24.5	21.9
Incinerated waste	18.9	20	21	19.7	20.5	21.3
Waste sent to landfills	0.4	0.4	0.5	0.5	0.3	0.3
Total waste generated	300	313	380	382	396	355

## Landfilled and Recycled Waste

	Base year (1990)	FY2010	FY2011	FY2012	FY2013	FY2014
Landfilled waste (1,000 metric tons)	36,260	430	500	330	280	320
Effective utilization rate (%)	77	93.5	94.4	94.7	94.7	93.9
"Zero emissions" rate (%)	82	99.9	99.9	99.9	99.9	99.9

## A Review of Tokuyama's CSR Report and Corporate Profile 2015

### Eriko Nashioka

Representative Director, Institute for Environmental Management Accounting, Certified Public Accountant and Certified Tax Accountant, and part-time lecturer in environmental accounting and environmental auditing for the Faculty of Commerce, Doshisha University



### » Still Rock-Solid after Nearly a Century

The Tokuyama Group formulated a Centennial Vision a few years ago in preparation for 2018, the 100th anniversary of its founding, and has been busy with related activities since then. In fiscal 2014, however, the Group recorded a major loss as the result of an impairment loss at Tokuyama Malaysia. Considering how careful companies are about their financial position, I think only a very safe company can take decisive action like this. The Tokuyama Group deeply values safety, and this will be evident to readers. I see several reasons that Tokuyama has been able to stay in business for almost a century, not least of which are its emphasis on safety and the trust it has earned from employees and the public by consistently responding to society's expectations. Tokuyama's efforts to reduce CO<sub>2</sub> emissions and waste, described in this report, have also played an important role.

### » Creation of Value

A company's social role depends on what sort of value it creates, and how it contributes to society. The Tokuyama Group, acting in line with its philosophy of being "responsive to society," has always had a clear picture of what society expects of it, and leverages the power of chemistry to make a unique contribution. One indicator of how important the Tokuyama Group is to society is the fact that it has many products for which it is the only producer in Japan, or for which it enjoys No.1 global market share. This means that Tokuyama bears a responsibility to provide its products without fail—and it makes socially responsible management all the more important.

The Integrated Reporting framework encourages companies to show how their business models create value over the medium and long terms based on six kinds of capital. The Tokuyama Group regards CSR as the foundation of its business, so I hope that the Group would enhance clarity by doing three things: put forward a business model that contributes to the resolution of social issues; clearly state the importance and priority of its initiatives; and disclose benchmarks to indicate the progress of its initiatives.

I suggest that the Group consider disclosing benchmarks on CSR initiatives, just like financial benchmarks, to make it easier for people to understand the Tokuyama Group.

## In Response to Third-party Review

### Toshihiko Annaka

Executive Officer, and General Manager, Corporate Social Responsibility Division



The Tokuyama Group now presents its CSR Report and Corporate Profile as a single document to help stakeholders gain a more accurate understanding of its direction and the foundation that supports its progress. With the appointment of a new president in March 2015, the report presents his views on the Group's management, describes our focus on the customer's perspective and our top technologies, and features our ongoing efforts for safety and socially responsible management. The special features provide information on the safety initiatives at our cement plants, and the RC Research Department which supports the Group's environmental analysis and R&D.

As for Integrated Reporting and the medium- to long-term business model that makes use of six kinds of capital, we have been focusing on providing information on how our systems and initiatives are built. In the future we will consider the possibility of disclosing benchmarks on CSR initiatives to help stakeholders get a clear picture of exactly what we have achieved.