

NSK Ltd.  
**ENVIRONMENTAL  
REPORT**  
2002

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## Message from the Chairman and President

NSK recognizes that our contribution to building a sustainable, recycle-oriented society is an important corporate mission.

Our bearings and other products facilitate the smooth operation of various kinds of machinery, such as automobiles, industrial machinery, household appliances, and information devices. Moreover, NSK products contribute to the conservation of the environment through our tribology technology, which reduces energy loss from friction and is critical to the development of all of our products. We give utmost consideration to environmental protection in all phases of the product life cycle, from research and development, to manufacturing and finally, waste disposal.

For the past year, “promotion of environmental management” has been one of our highest business management priorities. We have expanded this management philosophy from our factories, where it was initially implemented, to encompass all NSK operations, including logistics and green procurement. This approach has also been extended to our affiliated companies. The entire NSK Group is striving to incorporate environmental preservation programs in its corporate activities as part of its social responsibility.

We will continue to work towards our goal of developing environmentally friendly products that will more effectively contribute to society and global environment protection efforts. Corporate management is committed to allocating resources in order for us to achieve this goal.

This is our second environmental report. In this report, we have set out to accurately and clearly explain our policy towards activities in each business division, our concept of voluntary action plans, and the current status of measures initiated by NSK Ltd. on a company-wide basis, as well as the environmental protection activities at each site. We are disciplining ourselves to work harder to pursue environmental conservation activities in many areas. We are confident that we will be able to present new achievements in this area by our next report. In addition to presenting an informative publication, our goal is to encourage candid criticism and suggestions on environmental issues from all stakeholders, such as our investors, stockholders and customers as well as NGOs and people in the communities where we have operations. These opinions will be of great value as we plan our future environmental protection initiatives.



Tetsuo Sekiya  
Chairman of the Board



Seiichi Asaka  
President & CEO

# Corporate Profile

## Company Name

NSK Ltd.

## Establishment

November 8, 1916

## Capital

Approximately 67.2 billion yen (as of March 31, 2002)

## Head Office

Nissei Bldg., 1-6-3 Ohsaki, Shinagawa-Ku,  
Tokyo 141-8560, Japan

## Telephone

+81-3-3779-7111

## President and CEO

Seichi Asaka

## Major Business

Manufacturing and sales of bearings, automotive products, precision machinery and parts, mechatronics products

## Number of Employees

Consolidated: 22,337 (as of March 31, 2002)

Unconsolidated: 7,231 (as of March 31, 2002)

## Annual Sales (consolidated)

480.9 billion yen (fiscal year ended March 31, 2002)

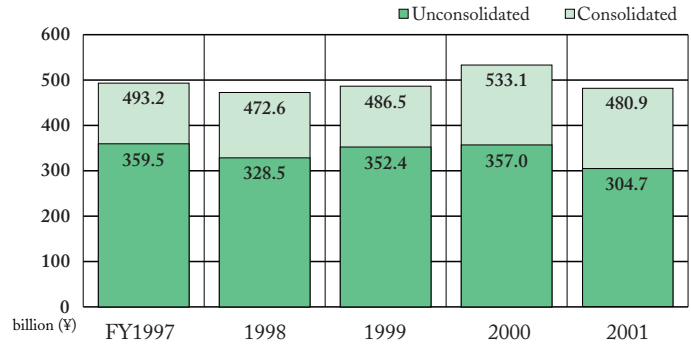
## Affiliates & Subsidiaries

94 companies (as of March 31, 2002)

Domestic companies including NSK: 35

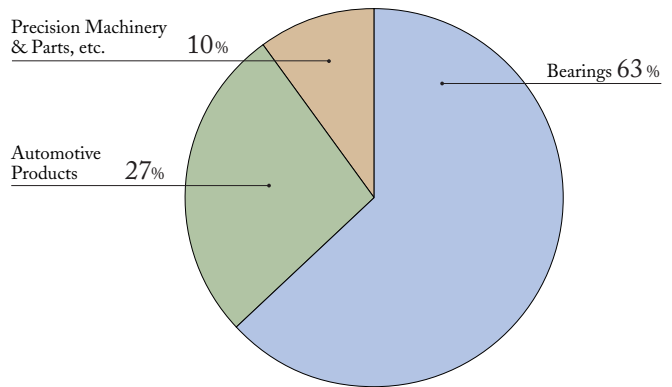
Overseas companies: 59

## Sales Transition

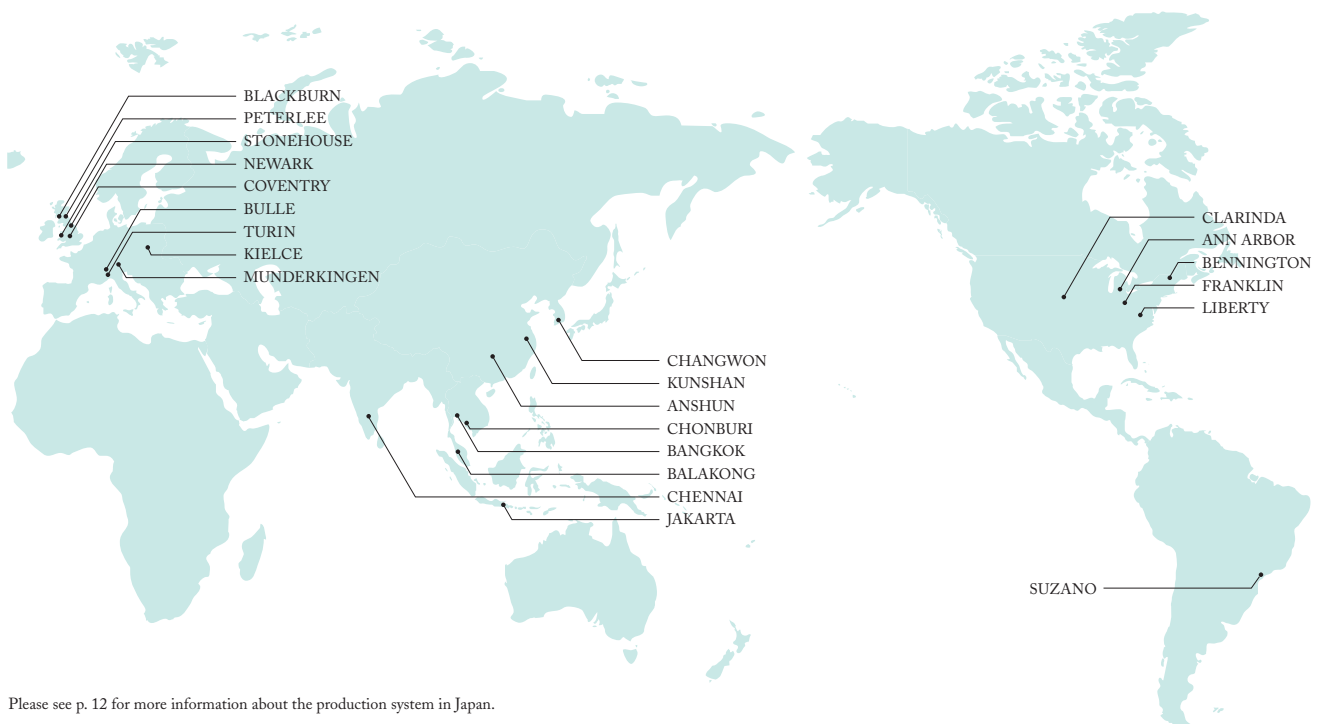


## Sales by Product in FY2001

Consolidated Sales: ¥480.9 billion



## Global Production Network



Please see p. 12 for more information about the production system in Japan.

# NSK's Environmentally Aware Business Management

NSK considers the environmental protection effort as the cornerstone for contributing to a sustainable recycle-oriented society.



# NSK's Approaches to Environmental Protection

People in today's modern society demand more comfort and convenience in their everyday lives. NSK believes that it is our responsibility as a manufacturer to commit to a policy of a sustainable "Recycle-oriented Society," instead of engaging in mass production, mass consumption, and massive waste.

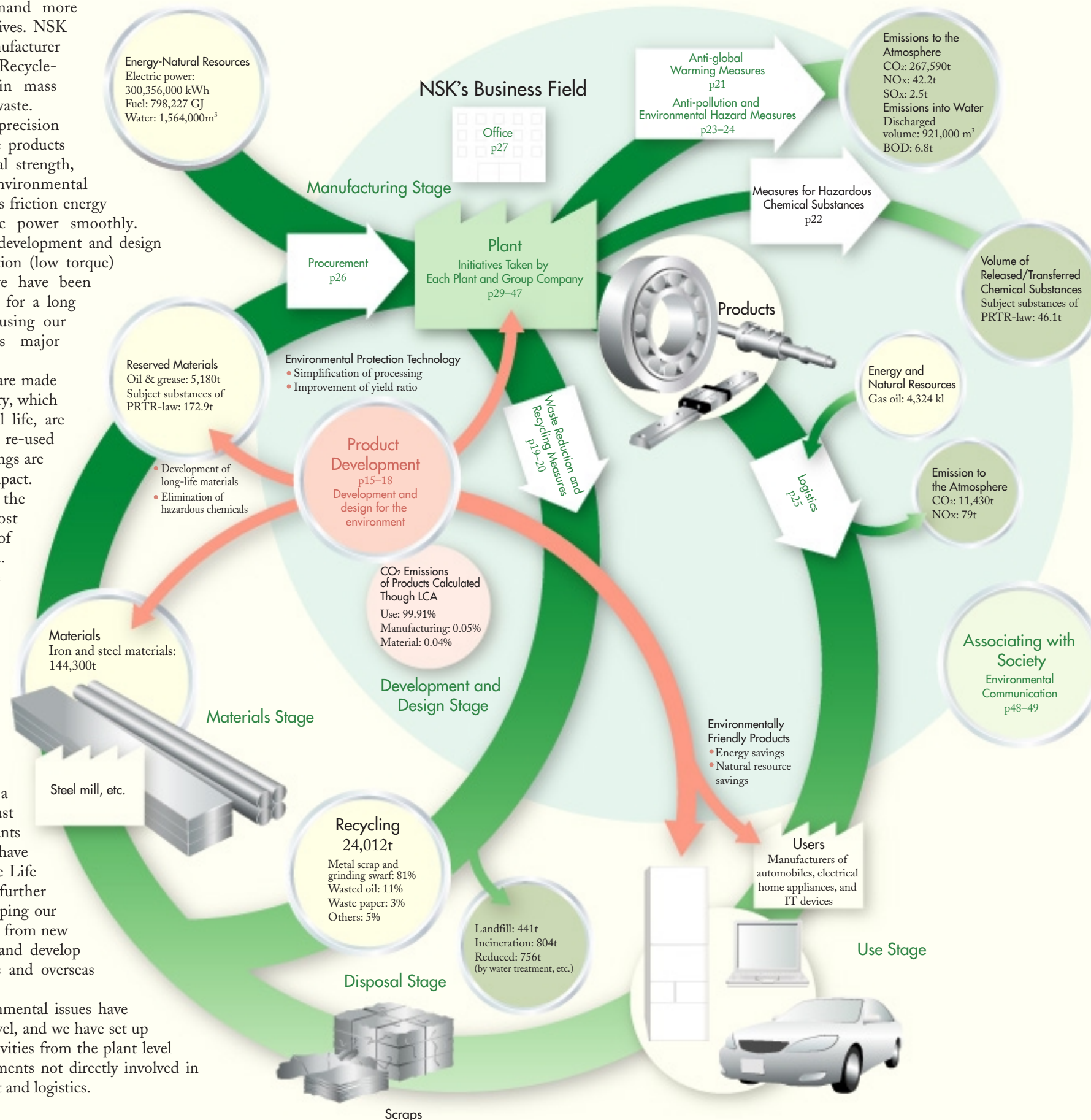
Our principal products are bearings, precision machine parts, and automotive parts. These products utilize NSK Group's cultivated technological strength, further allowing it to contribute to environmental conservation by developing products with less friction energy loss, and the ability to convey dynamic power smoothly. Therefore, as part of basic projects for our development and design divisions, such as reduced energy consumption (low torque) and reduced use of natural resources, we have been designing environmentally friendly products for a long time. Our involvement can be examined using our environmental accounting, which places major emphasis on design and development costs.

As for raw materials, most NSK bearings are made of steel that is recycled from scraps. Machinery, which use bearings and no longer have any useful life, are recycled, and the recycled steel products are re-used as raw materials. This means that NSK bearings are products with relatively low environmental impact.

Among our business operations, the manufacturing processes have the most environmental impact as generous volumes of oil and other energy resources are consumed. To tackle this problem, NSK established the Global Environmental Protection Committee in 1993. Since then we have engaged in the development of environmentally friendly products as well as the reduction of energy consumption, waste management, and the reduction of hazardous substances at each manufacturing site. We have also promoted environmental management, with an emphasis on manufacturing operations at each site.

However, from the viewpoint of building a recycle-oriented society, the Company must recognize that not only the manufacturing plants but also our products and business activities have an impact upon the global environment. The Life Cycle Assessment (LCA) is intended to further facilitate the process of designing and developing our products. By constantly considering this issue from new perspectives, we are attempting to expand and develop environmental management in our affiliates and overseas plants, as well as in our related divisions.

As of last year, our approaches to environmental issues have been focused on the business management level, and we have set up a structure that enables us to expand our activities from the plant level to the entire NSK Group, including departments not directly involved in manufacturing, along with green procurement and logistics.



## Approaches to the Environment in FY2001



**Isamu Terao**  
Executive Vice President  
(Chairman of Global Environmental Protection Committee)

Since March 2001, one of the goals of our business innovation initiatives has been to promote new environmental programs. These programs have as their focal point—environmental stewardship as part of the Management Innovation Project. This report will provide in some detail a few of these projects and their results for FY2001.

As for the environmental management systems, continuous commitment has been undertaken to bolster and expand our activities as a group by acquiring environmental ISO certification for affiliates, which manufacture NSK bearing parts. NSK has also worked to acquire ISO 14001 for each product design created by our research and development divisions. This has led to newly obtained certifications for regions of Maebashi (precision machinery parts) and Soja (automotive parts) in addition to Fujisawa regions. Since the establishment of a new working group, which deals principally with the development and design of all NSK products, we have sought to further implement LCA and develop environmentally friendly products.

NSK's manufacturing divisions are doing everything they can to counter global warming. It was unfortunate that the ratio of CO<sub>2</sub> emissions per unit increased in FY2001. This was due to an unforeseen decline in manufacturing output due to the weakness in the IT industry. We are proceeding with our efforts to restructure and rationalize our manufacturing lines in order to further increase efficiency. In addition, the portion of fixed energy consumption will be reduced continuously by linking the amount of energy used to production volume as well as introducing the co-generation systems. We have accomplished many of our waste reduction and recycling objectives and have achieved zero-emissions at four plants. Achieving zero-emissions at all plants is our next goal and gradual progress is being made. We have also achieved our goal of reducing CFC use in refrigeration as part of our attempt to reduce the use of hazardous chemical substances.

In our continuing effort to help build a "recycle-oriented society," NSK has developed the following measures, namely, measures to "increase development of environmentally friendly products," measures to "help fight global warming," measures to "simultaneously reduce waste and increase recycling," and measures to "better utilize, manage and control hazardous chemical substances."

## Corporate Philosophy

NSK aims to contribute to the well-being and safety of societies and to protect the global environment through its innovative technology integrating Motion and Control. We were guided by our vision of NSK as a truly international enterprise, and working across national boundaries to improve relationships between people throughout the world.

### NSK Environmental Policy

Our commitment to environmental management forms the basis of our existence and our pursuits.  
We are determined to take independent and assertive actions.

#### 1. Overall Goals

To create a harmony between people and the Earth by developing environmentally friendly manufacturing processes and technology, such as our tribology friction control technology, using the full efforts of all employees and all departments in our company.

#### 2. Reduction of Negative Environmental Impact

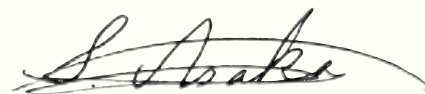
To establish and continually improve the environmental management system, comply with regulations, prevent pollution and reduce environmental impact.

#### 3. Contribution to Societies

To be a good global corporate citizen, contributing to the social development of countries and communities where we operate, and also to advance the realization of affluent societies that are in harmony with the environment.

### Environmental Code of Conduct

1. To reform environmental management organizations, by improving operational systems and clarifying chains of responsibility.
2. To develop products and technology that will decrease environmental impact.
3. To tackle environmental protection more aggressively by setting and adhering to high internal standards in addition to complying with laws, ordinances and agreements.
4. To ensure energy and resource conservation, waste reduction, and recycling in all spheres of our business operations.
5. To convert from ozone-depleting and hazardous chemical substances to environmentally friendly alternative substances, and where possible switch to alternative processes and technologies.
6. To communicate with environmental authorities and local communities in order to receive insightful and constructive opinions.
7. To contribute to local communities through participation in social environmental activities.
8. To encourage employees to understand our environmental policies and to ensure an environmental mindset in the company through education and internal communications.
9. To disclose the ongoing status of our environmental management activities to the public when necessary.



Seiichi Asaka  
President and CEO, NSK Ltd.  
Originally compiled: December 12, 1997  
Last revised: June 27, 2002

# NSK's Environmental Management

NSK is actively developing an environmental management system that includes the entire Group with the goal of implementing more effective environmental measures.





## Voluntary Action Plans

In view of growing environmental concerns, a comprehensive mid-term goal was outlined in FY2000, to responsibly enact, achieve and reinforce environmental protection activities throughout the entire company, including the development, supply and logistics divisions. Moreover, having identified the necessity for an effective group-wide approach, we have established midterm goals for our affiliates, such as the parts manufacturing companies.

Especially in our development division, we have clarified the standards for our environmentally friendly products, introduced LCA activities, and successfully managed to

reduce negative impact on the environment. Although the goals associated with anti-global warming measures in our production division has not yet been reached, we have achieved our waste management goals and achieved zero-emission at four plants. In our logistics division, all of our goals were not accomplished. However, we intend to continuously improve the conditions.

Our overseas manufacturing sites are scheduled to acquire ISO 14001 certification, the international standard for environment management systems, by FY2003.

### ©NSK Voluntary Action Plans

Category	Midterm Goal	Performance in FY2001	Evaluation	Reference Page(s)	
Development	Product Development	<ul style="list-style-type: none"> <li>To practically use guidelines for environmentally-oriented design and development</li> <li>To create environmentally friendly products</li> </ul>	<ul style="list-style-type: none"> <li>Established guidelines for environmental research and development</li> <li>Registered environmentally friendly products: 65</li> <li>Certified two types of grease to bear the EcoMark</li> </ul>	○	15-18
		<ul style="list-style-type: none"> <li>To implement LCA (Life Cycle Assessment) on representative products from each product line: bearings, precision machinery and parts, and automotive products</li> <li>To reduce environmental impact causing substances</li> </ul>	<ul style="list-style-type: none"> <li>Implemented LCA for conventional types and newly-developed types of 6 representative products</li> <li>Reformed management standards for environmentally hazardous substances contained in products</li> </ul>	○	
		<ul style="list-style-type: none"> <li>To reduce unit energy consumption per value added output and CO<sub>2</sub> emissions: 23% by FY2010 (Base year: FY1990)</li> </ul>	<ul style="list-style-type: none"> <li>Reduced CO<sub>2</sub> emissions by 10.3% (Base year: FY1990), yet realized a shortfall in the targeted performance of a 16.0% reduction. Similarly, under performed to reach the target for unit energy consumption</li> </ul>	×	21
Manufacturing	Anti-global Warming Measures	<ul style="list-style-type: none"> <li>To achieve a recycling rate of at least 98% by FY2010</li> <li>To achieve zero emissions at three plants by FY2003</li> </ul>	<ul style="list-style-type: none"> <li>Improved the recycling ration by 3% compared to the previous year</li> <li>Achieved zero emissions at four plants</li> </ul>	○	19-20
	Waste Reduction and Recycling Measures	<ul style="list-style-type: none"> <li>To eliminate ozone-depleting substances (CFC for refrigeration and halon-based extinguishers) by FY2005</li> <li>To reduce the use of machining oils with chlorine-related additives: 50% by FY2005 (Base year: FY2000)</li> <li>To reduce the use of PRTR-law related products*: 50% by FY2005 (Base year: FY2000)</li> </ul>	<ul style="list-style-type: none"> <li>Decreased the use of CFC for refrigeration by 33% (Base year: FY2000)</li> <li>Established a reduction plan and reduced emissions in the production of 6 products</li> <li>Established a reduction plan and reduced emissions in the production of 15 products</li> </ul>	○	22
	Measures for Hazardous Chemical Substances	<ul style="list-style-type: none"> <li>To reduce negative environmental impact (CO<sub>2</sub> and NO<sub>x</sub>) emitted during transportation</li> <li>To promote eco-friendly packing (Reduction of packaging materials)</li> </ul>	<ul style="list-style-type: none"> <li>Reduced unit CO<sub>2</sub> and NO<sub>x</sub> emissions by 4.8% per sale made, through improved product distribution compared to the previous year</li> <li>Introduced returnable packaging materials for HUB unit bearings exported to Australia</li> </ul>	○	25
Measures for Logistics		<ul style="list-style-type: none"> <li>To adopt green-procurement standards</li> <li>To adopt guidelines for green purchasing</li> </ul>	<ul style="list-style-type: none"> <li>Compiled standards and adopted them for 93% (in terms of total volume of purchases made) of vendor companies</li> <li>Established guidelines for papers, office equipment, stationary, office equipment and vehicles</li> </ul>	○	26
		<ul style="list-style-type: none"> <li>To promote environmental conservation awareness</li> <li>To reduce the volume of paper used, sorting of waste material, and energy saving</li> </ul>	<ul style="list-style-type: none"> <li>Published ECO news and implemented environmental education</li> <li>Reduced electric power consumption by 6% compared to the previous year</li> <li>Reduced the consumption of paper for electric calculators by 16% compared to the previous year</li> </ul>	○	27
Green Procurement				○	
Green Office Activities				○	

\*PRTR-law related products: Products that contain subject substances of PRTR-law, which exceeds the specified content ratio.

○ Good △ Fair × Not good

### ©NSK Group Voluntary Action Plans

Separate environmental activities are undertaken at each level of the organization. In addition, last year, group-wide activity targets were set at the Affiliates Environmental Meeting. In order to improve our environmental impact while maintaining corporate performance throughout our group, we will monitor ourselves to ensure that these goals are met.

Category	Midterm Goal
Environmental Management	To acquire ISO 14001 certification by FY2003
Anti-global Warming Measures	To reduce unit CO <sub>2</sub> emissions by 1% yearly per value-added output
Waste and Recycling Measures	To achieve a recycling rate of at least 98% by FY2010
Measures for Hazardous Chemical Substances	<ul style="list-style-type: none"> <li>To eliminate ozone-depleting substances (CFC for refrigeration and halon-based extinguishers) by FY2010</li> <li>To reduce the use of machining oils with chlorine-related additives: 50% by FY2005 (Base year: FY2000)</li> <li>To eliminate dichloromethane by FY2003</li> </ul>

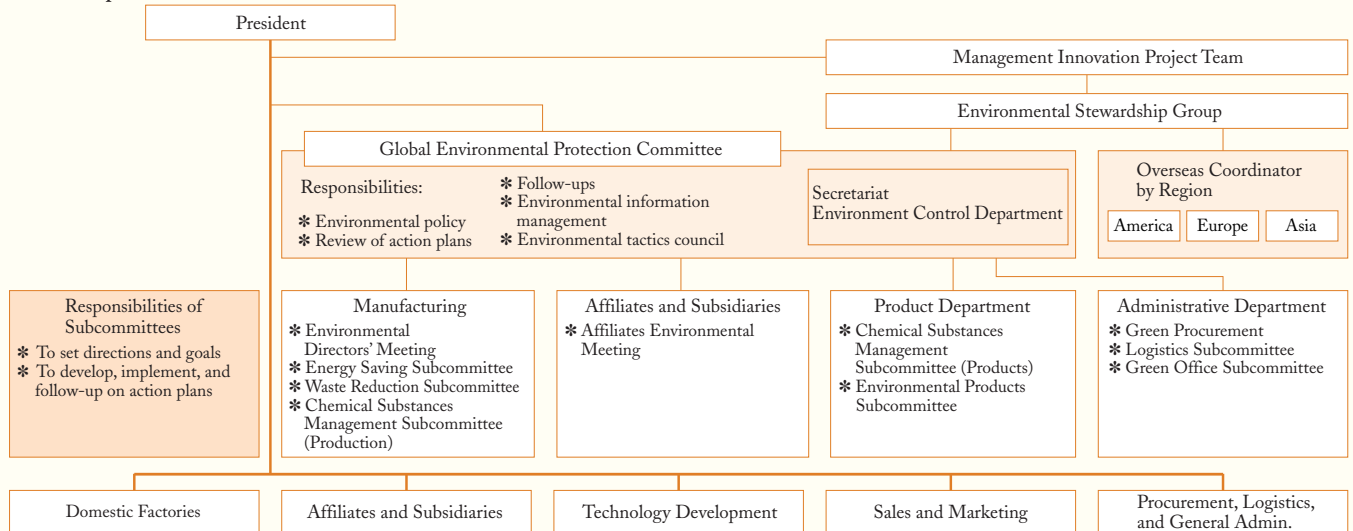


# Environmental Management Organization

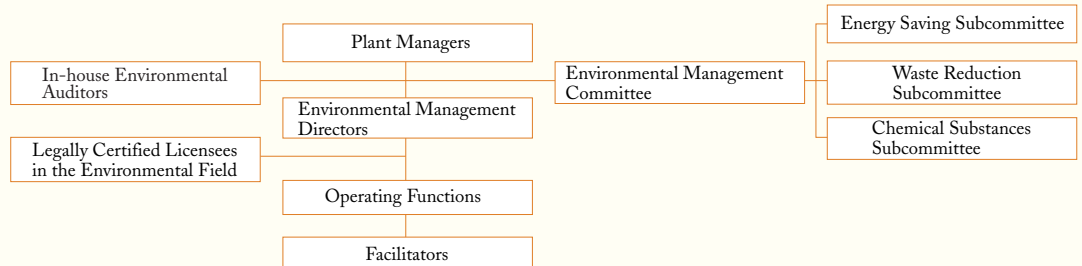
The Environmental Stewardship Group, as part of the Management Innovation Project, was formed towards the end of FY2000 to increase management awareness of global environment issues. All environmental activities on a corporate-wide basis are directed and coordinated by this new group. The emphasis is not only on the manufacturing divisions, but extends

to the R&D, logistics and procurement areas. This newly formed group is an extension of the Global Environmental Protection Committee, formed in 1993. The committee's initial focus was to implement environmental activities principally in the manufacturing divisions. However, in FY2001, this focus was extended to include all corporate functions.

NSK Group



Plants



## Global Environmental Protection Committee—Activity History

Category	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Voluntary Action Plans	1st voluntary action plan								2nd voluntary action plan	
Global Warming Measures	1st plan				2nd plan				3rd plan	
Waste and Recycling Measures	1st plan		2nd plan			3rd plan			4th plan	
Measures for Hazardous Chemical Substances	Chemical Substances Management	Establishment of chemical substances management system for products containing substances with high-environmental impact						Establishment of a manufacturing processes management system		
	Ozone-depleting Substances	Elimination of cleaning chemicals from all sites		Reduction of CFC for refrigeration						
	Chlorinated Solvents	Elimination of trichloroethylene from all sites		Elimination of dichloromethane from all sites						
	Dioxins	Elimination of incinerators from all sites						Alternation of machining oils with chlorine-related additives		
PRTR Management	Participation in pilot project						Reduction plan			
Pollution/Environment Hazards Management	Legal compliance				Environmental hazards management/environmental impact					
Logistics Management	Elimination of PVC/foamed PS packaging		Introduction of returnable packing materials			Automotive committee		Logistics subcommittee		
Product Management									LCA introduced by products subcommittee	
Procurement Management									Implementation of green procurement and green purchasing	
Office Management									Green office subcommittee	
Establishment of Environmental Management System	NSK Environment Policy Statement	Establishment								
	ISO 14001	NSK domestic site				Affiliates and subsidiaries/overseas operation				
	Environmental Accounting	Start-up of environmental accounting								
	Environmental Audit	Audit of legal compliance		Audit of performance		Audit of system and support			Audit of affiliates and subsidiaries	
Environmental Disclosure	Measures by Affiliates							Environmental meetings		Action plans
	Launch of website						Status report on annual report		Environmental report	

NSK has developed an environment management system as a means of supporting the continuous efforts involved in reducing the negative environmental impact that results from NSK's corporate activities. Each plant has an individual environmental policy that corresponds to different site conditions and products.

In order to more efficiently carry out these activities, NSK

introduced and implemented ISO 14001, an international standard for environmental management. It is one of our voluntary action plans and is promoted throughout the entire group. Our environmental management system is reviewed through environmental auditing and formulated to improve and firmly establish a system for our environmental performance.

◎ Environmental Auditing Methods

● System Audit

Auditing is conducted annually by in-house auditors, certified by third party auditor to confirm that the PDCA (plan, do, check, action) cycle has been accurately and diligently performed. With perfection as the key motivation to our environmental activities, we have instigated an ISO 14001 audit by a third-party auditor.

● Performance Audit

Results realized from improvements set out in NSK's Voluntary Action Plan, and full legal compliance are periodically managed by the Energy Saving, Waste Reduction and Chemical Substances Management Subcommittees organized under the Global Environmental Protection Committee.

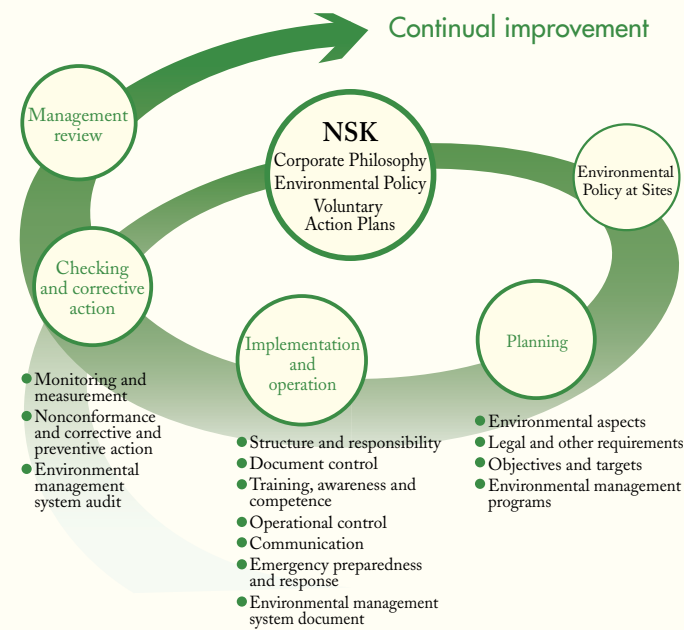
● Audit by Statutory Auditor

Annual audit of management activities by the statutory auditor.

◎ Audit Result in the Year 2001

Upon the completion of the periodic ISO 14001 audit, the following details, outlined in the chart below, were disclosed. The improprieties reported by both in-house and third party auditors were immediately remedied.

PDCA Cycle for Environment Management System



Status of ISO 14001 Certification

Audited Location	In-house Audit			Third-party Audit for ISO 14001 Certification				
	C1	C2	OB	C1	C2	OB	SP	
NSK	Maebashi Plant/Technology Department	0	3	45	0	0	16	0
	Soja Plant/Technology Department	0	1	23	0	0	7	1
	Saitama Plant/Saitama Precision Machinery and Parts Plant	0	13	35	0	0	10	2
	Fujisawa Plant/Technology Department	0	5	35	0	0	9	1
	Kirihara Precision Machinery and Parts Plant/ NSK Autoliv Co., Ltd.	0	3	12	0	0	9	0
	Shiga Manufacturing Division (Otsu Plant and Ishibe Plant)	0	37	81	0	0	8	1
	NSK Fukushima Co., Ltd.	0	2	4	0	1	19	0
Affiliates and Subsidiaries								
NSK Torrington Co., Ltd. (Haruna Plant)	0	0	5	0	0	7	3	
NSK-Warner Kabushiki Kaisha	0	21	47	0	0	4	3	
NSK Micro Precision Co., Ltd.	0	9	2	0	2	10	0	
NSK Kyushu Ltd.	0	3	19	0	0	5	0	
Inoue Jikuu Kogyo Co., Ltd.	0	31	23	0	0	11	5	
Shinnippon Koukyu Co., Ltd.	0	5	39	0	0	8	0	

Note: The result of the qualification audit (2nd audit) for NSK Micro Precision Co., Ltd. and Shinnippon Kohkyu Co., Ltd.  
 C1: Serious disqualification (including total lack of procedures for system requirements)    OB: Not disqualified, but the system effectiveness is expected to be improved  
 C2: Slight disqualification (partial disqualification for important items)    SP: Special advantages in activities

◎ Acquisition of ISO 14001 Certification

● Domestic Facilities

Beginning with NSK Fukushima Co., Ltd. in July 1998, all domestic plants acquired ISO 14001 certification by December 1999. Last year, NSK Fukushima Co., Ltd. and the Saitama Plant/Saitama Precision Machinery and Parts Plant renewed their certifications.

As for the Maebashi and Soja Plants, ISO 14001 certification had already been acquired by technology departments at the manufacturing activity level. Subsequent to last year's periodic audit, the scope of certification was expanded to incorporate the development and research departments. With Fujisawa Technology Department's certification, all of NSK's development and research divisions are certified.

● Domestic Affiliates and Subsidiaries

Regarding affiliated companies engaged in manufacturing using the NSK brand, all five of the companies obtained

certification by June 2001.

Moreover, another five affiliates that manufacture parts and machinery are scheduled to acquire ISO 14001 certification by FY2003. In addition, Shinnippon Kohkyu Co., Ltd. successfully acquired certification, in September 2001.

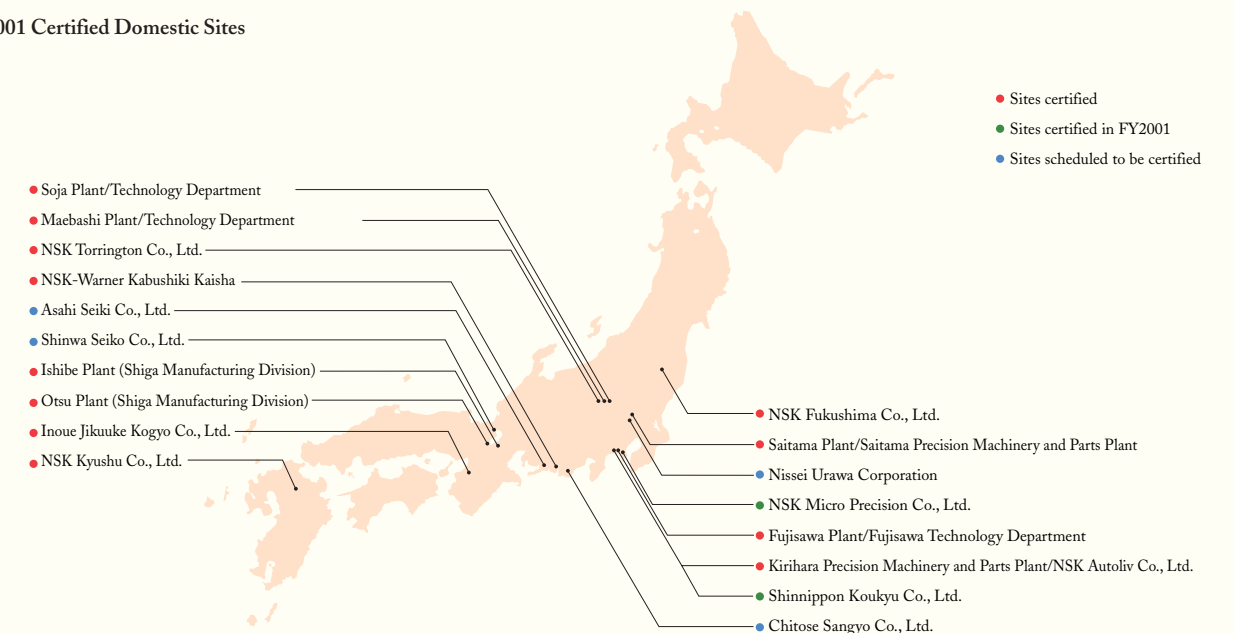
● Overseas Facilities

Each site is tackling environmental issues aggressively, guided by a common policy under the supervision of environmental coordinators assigned to the regions of America, Europe, and Asia in which NSK Ltd. has developed a four-pole global production system in addition to Japan. Also, an environmental management supervisor is based at each plant. Our target is to acquire ISO 14001 certification at all of our overseas plants by FY2003. At the present time, three plants have acquired certification in FY2001, and 15 out of 24 plants have completed the certification process.

Status of ISO 14001 Certification

Fiscal Year	Domestic Facilities	Domestic Affiliates and Subsidiaries	Overseas Affiliates and Subsidiaries
FY1997 (Apr. 1997 to Mar. 1998)			NSK Korea Co., Ltd., Changwon (Korea) Dec. 1997 NSK Bearings Europe Ltd., Blackburn (U.K.) Feb. 1998
FY1998 (Apr. 1998 to Mar. 1999)	NSK Fukushima Co., Ltd. July 1998 Saitama Plant/Saitama Precision Machinery and Parts Plant Sept. 1998 Ishibe Plant (Shiga Manufacturing Division) Oct. 1998		NSK Bearings Europe Ltd., Peterlee (U.K.) Feb. 1999
FY1999 (Apr. 1999 to Mar. 2000)	Fujisawa Plant/Technology Department Sept. 1999 Otsu Plant (Shiga Manufacturing Division) Nov. 1999 Kirihara Precision Machinery and Parts Plant Nov. 1999 Maebashi Plant/Technology Department Dec. 1999 Soja Plant/Technology Department Dec. 1999	NSK Autoliv Co., Ltd. Nov. 1999	NSK Steering Systems Europe Ltd., Coventry (U.K.) Oct. 1999 Waelzlager Industriewerke Bulle AG (Switzerland) Dec. 1999 ISC Micro Precision Sdn. Bhd., Malaysia (Malaysia) Dec. 1999 NSK Brasil Ltda., Suzano (Brazil) Jan. 2000 P.T. NSK Bearings Manufacturing Indonesia Ltd., Jakarta (Indonesia) Mar. 2000
FY2000 (Apr. 2000 to Mar. 2001)		NSK Kyushu Co., Ltd. Oct. 2000 NSK Torrington Co., Ltd. Jan. 2001 Inoue Jikuu Kogyo Co., Ltd. Feb. 2001 NSK-Warner Kabushiki Kaisha Mar. 2001 NSK Micro Precision Co., Ltd. Jun. 2001	NSK Bearings Europe Ltd., Newark-Linear (U.K.) May 2000 Siam Nastech Co., Ltd. (Thailand) Nov. 2000 Neueweg Fertigung GmbH (Germany) Jan. 2001 NSK Steering Systems Europe Ltd., Peterlee (U.K.) Feb. 2001 NSK Steering Systems Europe Ltd., Peterlee (EPS) (U.K.) Sept. 2001
FY2001 (Apr. 2001 to Mar. 2002)		Shinnippon Koukyu Co., Ltd. Sept. 2001	NSK Corporation, Ann Arbor Plant (U.S.) Nov. 2001 NSK Micro Precision Sdn. Bhd., Malaysia (Malaysia) Jan. 2002

ISO 14001 Certified Domestic Sites





# Environmental Accounting

NSK actively employs environmental accounting, recognizing it as an important management tool to understand and evaluate environmental protection activities in a quantitative manner. In FY2001, we revised our guidelines, corresponding to an amendment in the

guidelines made by the Ministry of the Environment in March 2002. NSK has broadened its scope by completing environmental accounting for logistics and green purchasing, in addition to NSK-owned plants and technology division.

## Resultant Compiled Data

The costs incurred in FY2001 were ¥0.85 billion in total investments and ¥3.1 billion in total expenditures. Of these totals, R&D accounted for significant expenditures, amounting to as much as 43.0% of total investment or ¥0.37 billion, and 52.3% of total expenditure or ¥1.62 billion. This figure for R&D is attributed to environmentally friendly

products and environmental protection technology development. Economic benefits of environmental conservation were ¥1.8 million. As for the quantitative effect achieved by waste reduction measures, the recycling ratio improved by 3.3% from the previous fiscal year while four plants accomplished zero emissions.

## Environmental Conservation Cost

Category	Investment		Expenditure	
	Amount (Millions of yen)	Main Purpose	Amount (Millions of yen)	Main Purpose
1. Business area costs				
(1) Pollution prevention costs	135.1	<ul style="list-style-type: none"> <li>Introduction of evaporating concentrators</li> <li>Repair of subterranean tanks and buried pipes and making them above ground</li> </ul>	382.3	<ul style="list-style-type: none"> <li>Repair, inspection, and maintenance of environmental facilities</li> <li>Repair, inspection, and maintenance of drainage facilities</li> </ul>
(2) Global environmental costs	251.8	<ul style="list-style-type: none"> <li>Introduction of energy-efficient equipment</li> <li>Introduction of new equipment to enable the use of non-ozone depleting substances</li> </ul>	137.8	<ul style="list-style-type: none"> <li>Energy saving measures</li> <li>Reduction measures of ozone-depleting substances</li> </ul>
(3) Resource circulation costs	35.9	<ul style="list-style-type: none"> <li>Introduction of briquetting machines for grinding swarf</li> <li>Introduction of perishable garbage treatment machines</li> </ul>	326.8	<ul style="list-style-type: none"> <li>Recycling/reduction of waste</li> <li>Disposal of general/industrial waste</li> </ul>
Subtotal	422.8		846.9	
2. Upstream/downstream costs	2.5	Introduction of repair machines for plastic boxes	135.1	Green purchasing of low-emission vehicles, office equipment, paper and stationery
3. Management activity costs	48.3	Landscaping and forestation	433.4	<ul style="list-style-type: none"> <li>Personnel costs for environmental protection organization</li> <li>Maintenance and operation of ISO 14001</li> <li>Measurement and analysis of environmental impacts</li> </ul>
4. Research and development costs	367.8	Introduction of R&D facilities for new eco-friendly products	1,623.0	R&D personnel and administrative costs of new eco-friendly product development
5. Social activities costs	0.0		43.4	<ul style="list-style-type: none"> <li>Donations and membership fees to the World Wildlife Fund Japan, and to Keidanren Nature Conservation Fund</li> <li>Donations to Electro-Mechanic Technology Advancing Foundation and welfare organizations</li> </ul>
6. Environmental damage costs	13.5	Introduction of remediation facilities	22.9	Maintenance of remediation facilities
Total	854.9		3,104.7	

## Effects of Environmental Activity

### Economic Effects (Monetary unit)

Category	Amount (Millions of yen)
Cost saving by energy conservation*1	89.1
Cost saving by waste reduction*1	31.2
Income of valued materials obtained by waste recycling*2	64.4
Total	184.7

\*1 Including five-year investment from FY1997 through FY2001

\*2 Salvaged value from sales to affiliates and subsidiaries

### Material Effects

Category	Compared to Previous Fiscal Year	
Plants	Unit CO <sub>2</sub> emissions	11.0% increased
	Water consumption	12.9% improved
	Landfill waste ratio	0.8% improved
	Waste recycling ratio	3.3% improved
Logistics	Unit CO <sub>2</sub> emissions	4.8% improved

### Data Compilation Methodology

- Accounting term: April 2001–March 2002
- Scope of activity and organization: NSK plants, technology division, logistics and headquarters
- Quantification criteria for environmental conservation costs:
  - Expenditures and investments that correspond to the Ministry of the Environment's guidelines
  - Five-year straight-line depreciation (Depreciation for the past five years should be booked in FY2001)

- Booking of composite costs by prorating each environmental activity
- Expenditures made by green purchasing are accounted in full amount rather than balance amount
- Standards for accounting for environmental conservation effects:
  - Account economic effects (expressed in monetary units) supported with evidence, and material effects associated with the environmental conservation measures
  - Deemed effects (estimated effect by avoiding risks and profit contributed by assumed effects)

## The Next Step

The efficiency of accounting will be improved with the compilation of more informative data for use in environmental management decisions. In addition, the scope of environmental accounting will be expanded in order to enhance the company's environmental performance.



# Dealing with the Life Cycle of Our Products

This chapter will introduce recent activities NSK has implemented in its continuing effort to reduce the negative environmental impact of its products. This effort encompasses the entire product life cycle, from development to disposal.

NSK products contribute to the conservation of energy and resources by facilitating smooth rotary and linear motion in a variety of machinery. In FY2001, we expanded the scope of our Environmental Products Subcommittee's Activities. The Environmental Products Subcommittee became actively involved in product development, namely environmentally friendly products. Measures for dealing with hazardous chemical substances were also increased. The subcommittee also vigorously promoted LCA as well as EcoMark certification.

### Basic Policies and Guidelines for the Environment—Conservation Research and Development

The goal of our environmental policy is “to design and develop the technology to produce products that reduce negative environmental impacts.”

In order to achieve our goals, we formulated the “Basic Policy for Development of Environmentally Friendly Products” in FY2001, which is common to all technology divisions, and compiled action plans specific to each division. By considering the entire product cycle including the planning stages, we hope to develop products that will contribute to environmental conservation.

### Development of Environmentally Friendly Products and Environmental Protection Technologies

NSK product lines, including roller bearings and linear guides, are environmentally friendly, contributing to energy and resource savings by their function, performance, and quality.

### Basic Policy for Development of Environmentally Friendly Products

For the purpose of supplying products friendly to the environment, we will endeavor to develop products that may cause the least environmental impact throughout their life cycle from research and development, through designing, production and use, until final scrapping. Specifically, we will manufacture products that meet the following standards:

1. Products will contribute to saving energy and reduce impact on natural resources when used by customers.
2. Products will have minimal energy requirements, and minimal impact on natural resources in the process of being manufactured.
3. Products will be manufactured using processes that are free of any harmful or toxic substances, or at least use the safest substances available.
4. Products will contribute to the health and safety of end users with low noise, low vibration, and low dust.

The majority of steel used for our products is recycled steel scrap. Used products are then recycled into steel materials, thus contributing to the environment throughout their life cycle, from manufacture to waste processes. NSK's environmental approach from a technological aspect consists of creating environmentally friendly products that

effectively reduces consumption of energy and other resources when used and eliminates any emissions of hazardous substances. In addition, we will encourage further development of manufacturing technology to reduce the environmental impact during the material and parts selection, manufacturing, shipping and disposal.

Matrix for environmental conservation in terms of technology

Process	Product planning Features and functions (Outcome for customers)	Considerations for: Material selection Part selection Lubricant selection	Environmentally friendly products	Environmental protection technologies
			Considerations for manufacturing and shipping processes	Considerations for disposal
Energy saving (Electric, gas & fuel consumption)	High speed with reductions in weight, size, and torque  CVT, EPS, Hub Units Low-torque Ball Bearings (GR™ Series) Roller clutches with resin cage	Selection of materials and parts having low environmental impact  Fast-carburized medium carbon carburizing steel	Simplified working; reduction of stock removal for working; shortening of heat treatment time  Technology for correcting heat treatment distortion	Recycling of materials
Natural-resource saving (Long life; smaller consumption of natural resources; recycling)	Longer life; integrated into units; smaller size; higher resistance to corrosion and heat  HTF; STF Bearings; Linear guides with NSK K1™; ROBUST Series Bearings	Easily recyclable and light-weight materials  Use of hollow shafts	Increase in yield rate; utilization of both main and odds; near net shape working  Cold rolling, roll forming, and segment facing technologies	Recycling of materials
Cleanliness; health & safety (No emission of hazardous substances; maintenance; environmental pollution prevention; noise and vibration minimization)	Improved cleanliness; tighter sealed state; lower noise; lower vibration; no dust; no need of lubricant replenishment  Molded Oil™ Bearings Squeak-free Bearings; NSK S1™ Series Ball Screws	Use of materials and parts free of hazardous substances; use of biodegradable lubricants  Biodegradable greases; parts of chrome-free material	Use of non-hazardous substances, detoxification of cleaning solvents, and promotion of dry processes working	No toxic leaking even after disposal (by burial or incineration)
Minimization of wastes (Target setup for minimal wastes)	Reusable; easier disassembly design	Selection of reusable or recyclable materials	Minimization and reuse of scraps; simpler packing; use of returnable materials  Use of regenerated plastics	Recyclable

### Registration of Environmentally Friendly Products and Environmental Protection Technologies

Based on the viewpoint stated earlier, and in order to provide customers with products of the highest quality, since FY2001 we have formulated our own standards for registering environmentally friendly products and environmental protection technologies. Our registration standards allow us to quantitatively show the effects existing products have on the environment. They also provide us with user's evaluations of certain products and allows us to differentiate according to patents. Registered products and technologies affect sales and profits. Therefore, registration of products and how many products have been registered are indices that management must monitor. Currently registered products and technologies amount to 65 items, approximately 35% of our sales ratio.

### Elimination of Hazardous Substances

We established “Management Regulations for Substances Contained in Products which have Environmental Impacts” in March 1997. Under this management system, every product manufactured and sold by NSK is checked for hazardous chemical substances. Since the establishment of the management regulations 5 years ago, legal regulations in other countries and users' self regulations have been enforced, thus requiring a review.

Based on the results of our research regarding approximately 1600 kinds of chemicals contained in supplied raw materials, parts, and lubricant oils, our management regulations have been amended to be consistent with the other regulations. The revised regulations consist of standards for 28 kinds of prohibited substances, five kinds of substances to be reduced, and 12 kinds of controlled substances. When using such substances, it is mandatory to make abolition plans or select substitute materials. Lead compounds and hexavalent-chrome compounds that are designated by EU ELV (EU's End-of-Life Vehicle directive) Directive were registered in the new version. Regarding a slight volume of hexavalent-chrome in the surface treated area of the seal and shield of our bearings; we are actively working on eliminating it by the end of 2002.

### Promotion of LCA

LCA (Life Cycle Assessment) is a method that measures quantitatively how much each process in the life cycle of a product—“from cradle to grave”—from the extracting of raw materials to manufacturing, processing, logistics, sales, consumption, use, recycling and waste disposal—affects the environment.

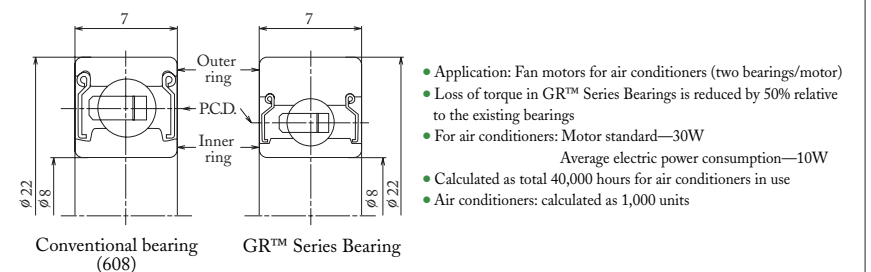
NSK is actively promoting the adoption of LCA for representative products from our lineup (bearings, precision machinery parts, and automotive parts). For example, an experimental measurement with vehicles was undertaken comparing the performance of a vehicle in which the Half-Toroidal CVT POWERTOROS UNIT developed by NSK was installed, and a vehicle with a four-speed AT. Using LCA, we measured the hypothetical impacts of those two vehicles when each traveled a total of 160,000 km. Although the environmental impact from vehicle with the POWERTROS installed would be greater from a material extraction and manufacturing stage point of view, due to the doubling of the weight of the transmission, the unit CO<sub>2</sub> emissions

would be reduced by 5 tons per vehicle, resulting from improved fuel consumption by CVT.

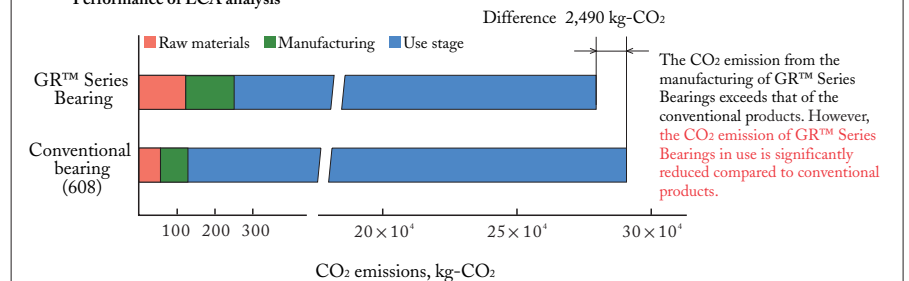
In addition, we have learned that, when applying our low noise and low torque GR™ Series Bearings, CO<sub>2</sub> emissions were reduced by approximately 2.5 tons per 1,000 air conditioners compared to air conditioners without these bearings. Thus, LCA shows quantitatively how minor reformulations and improvements of machinery elements can contribute to mitigating environmental impact. Although the LCA method is still being developed, we intend to integrate the method with our own techniques so that it is reflected in product planning and users' requests in the future.

### LCA for GR™ Series Bearings

Results of LCA when existing NSK bearings for air conditioner motors are replaced with the low-torque GR™ Series Bearings



### Performance of LCA analysis



## Conservation of Resources

### ©EW/EM Series Cylindrical Roller Bearings

Compared to ball bearings, cylindrical roller bearings have a high capacity and are able to run at high speeds. They are widely used for general industrial machinery such as steel-making and construction machinery, large-scale electric motors, and compressors. However, a difficult balance exists between bearing life, bearing tolerances and bearing noise. NSK, with its R&D expertise and production technique, offers a full lineup of cylindrical roller



EM Series Cylindrical Roller Bearings

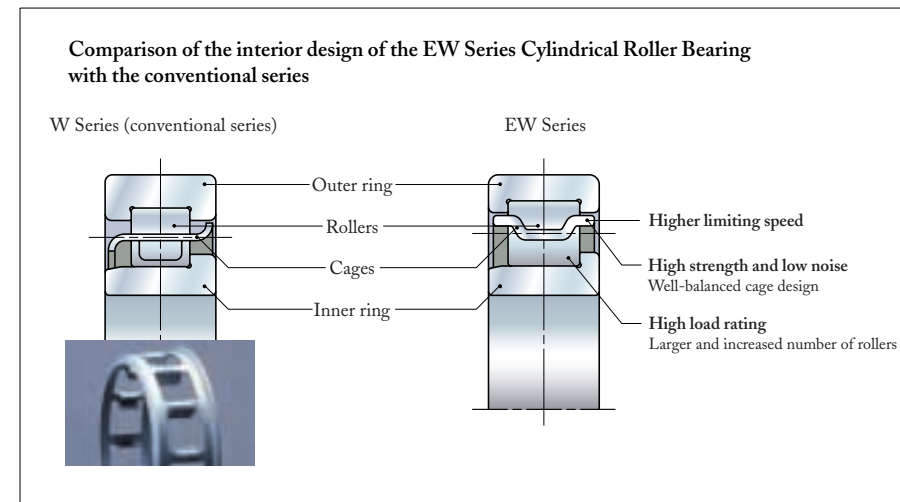
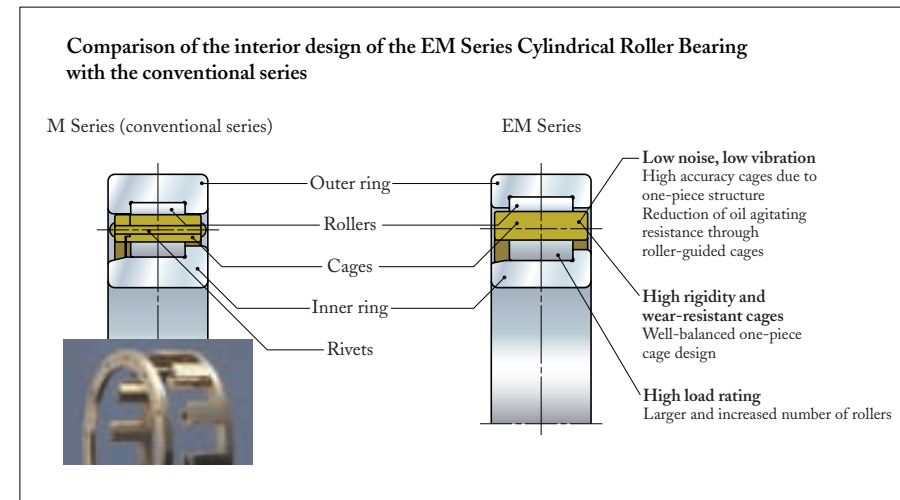


EW Series Cylindrical Roller Bearings

bearings for different applications. NSK has come to dominate this opposing position by providing a variety of kinds of cylindrical roller bearings to meet the needs of different applications. Recent improvements to our computer analysis and manufacturing technologies have made it possible to design more functional standard bearings optimal for every application.

The EM (with copper alloy machined cage) and EW (with steel plate cage) Series

are designed with high-capacity reinforced cage guiding rollers, and improved mechanical fatigue strength, thereby doubling their working lives compared to conventional designs. Also, the high-precision cages cut vibration resulting in a 50% noise reduction when compared to conventional cages. All these products have been designed to further enhance our environmental performance.



## Energy Conservation

### ©HTF Series Ball Screws for High Load Drive

From an energy saving standpoint, the motorization of heavy load linear motion in machinery for various kinds of equipment is essential. Motorization, which is rapidly taking place, is a process in which conventional hydraulic-driven linear motion is replaced with a design using ball screws and servo motors. In particular, the hydraulic drive type was the major thrust in injection molding machines, yet electric injection molding machines were conceived to reduce energy and resources. Currently, more motorized machines than hydraulic models are in use in domestic production. In order to implement electric drives instead of hydraulic drives, ball screws must be able to tolerate of the severe conditions in electric drives, which demand long service lives and high load drive applications under small strokes.

The HTF Series ball screws for high load drive meets these requirements. Their design distributes load evenly and utilizes our exclusive internal design customized for heavy loads. The HTF Series ball screws successfully contribute to energy conservation (electric power consumption is cut by 1/3 to 1/4 of that used by previous equipment), providing a maintenance-free and clean working environment as well as high efficiency.



"HTF Series" Ball Screw for High Load Drive

### Cleanness, Noise and Vibration Minimization

#### ©Biodegradable grease EXCELLA GREEN™ NS7 Grease EXCELLA GREEN™ ENS Grease

Our biodegradable EXCELLA GREEN™ NS7 grease and EXCELLA GREEN™ ENS grease are eco-friendly, and have been certified as an environmental protection product by the EcoMark Office



EXCELLA GREEN™ NS7 Grease



EXCELLA GREEN™ ENS Grease

of the Japan Environmental Association (JEA). Products that are EcoMark certificated have met demanding criteria and have passed strict biodegradability tests and acute fish toxicity tests.

EXCELLA GREEN™ NS7 Grease is sealed into approximately 350 million NSK bearings a year. This low torque and long life grease is primarily sealed in bearings for small- to medium-sized general purpose motors and air conditioner fan motors, and assembled into household appliances and IT devices.

EXCELLA GREEN™ ENS Grease is recommended for high-temperature/high-speed rotation and is consistently used for bearings in automotive electrical accessories. It is a clean lubricant that effectively contributes to energy and resource conservation, while participating in the reduction of environmental pollution, resulting in sustainable benefits to the ecosystem.

#### ©NSK S1™ Series Precision Ball Screws and Precision Linear Guides

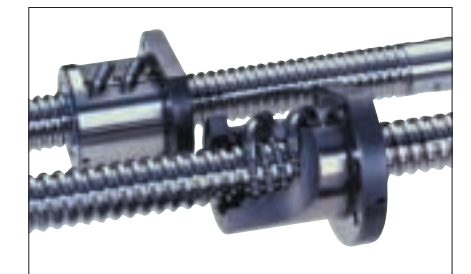
In recent years, advancements in speed and capabilities have enhanced the performance of machinery and equipment. At the same time, users have expressed increasing concerns about environmental issues. Their demands focus on increasing smoothness of machine operation, further reduction of noise and vibration, and continued reduction of negative environmental impact. The NSK S1™

Series Precision Ball Screws and Precision Linear Guides set a new benchmark in creating environmentally friendly products. Achievements were made to lower noise emissions and increase smoothness of operation. These achievements resulted from improved designs, designs that incorporate resin retaining pieces between the steel balls to avoid ball-to-ball contact.

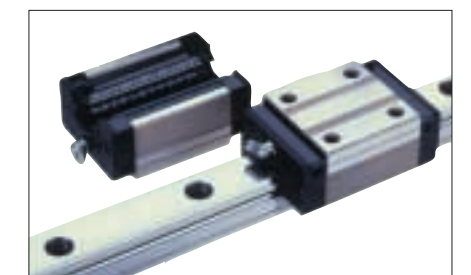
By inserting the resin retaining pieces, noise caused by the contact and collision of steel balls is prevented. The improved internal design provides low noise and low torque in all speed ranges compared to existing products. In contrast to spacer ball type screws, the S1 Series Ball Screws are compact in design even with the increased number of balls, and retain equivalent functionality.

The S1 Series Ball Screws are used for noise- and vibration-sensitive applications, such as measuring instruments, plotting devices, medical equipment, and office equipment. They are also used for applications that require smooth operations, such as wire discharge machines, scanners, and steppers.

The NSK S1™ Series, is one of NSK's environmentally friendly precision products, developed from the viewpoint of the conservation of energy and resources.



NSK S1™ Series Precision Ball Screws



NSK S1™ Series Precision Linear Guides



# Waste Reduction and Recycling Measures

Measured and deliberate actions were taken to focus on recycling wastes that were previously used for landfill. The goal was to achieve “zero emissions at three plants before the targeted date of FY2003.” As a result, zero emissions were achieved in FY2001 at four plants, successfully surpassing our expectations.

## Measures and Policies

NSK hopes to attain a recycle-oriented society by promoting the 3R's—Reduce, Reuse and Recycle. The goal will be to reduce the volume of wastes for landfill to zero and to further improve the recycling rate.

- Reduce  
Improve yield ratio by reviewing the processing conditions for products and by improving the production process.
- Reuse  
Reuse for similar purposes.
- Recycle  
Improve ability to recycle wastes and develop additional potential uses for recycled material.

## Result of Major Actions Taken in FY2001

### ◎ Achieving zero emissions at four plants

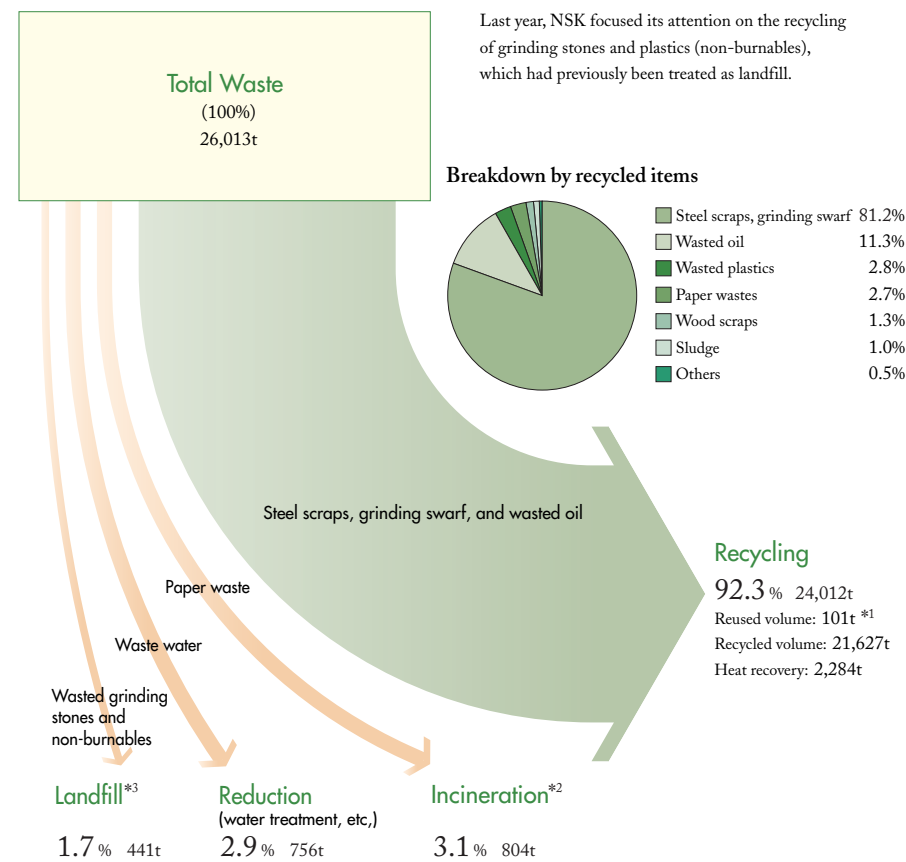
NSK's targets for FY2003 were to achieve zero-emissions at NSK Fukushima Plant, Saitama Plant, and Otsu Plant (Shiga Manufacturing Division). Not only were zero-emissions achieved before the end of FY2001 at all three plants, Fujisawa Plant, which had not been incorporated into the zero-emission plan, also manage to attain zero-emissions. In other words, we managed to stay ahead of schedule.

In addition, the recycling rate increased by 3% compared to the figure in the previous year, reaching a 92% recycling rate. In response to these results, NSK redefined its objectives; the new objective will be to “achieve zero emissions at all sites” by FY2002.

### ◎ Recycling of used grinding stones

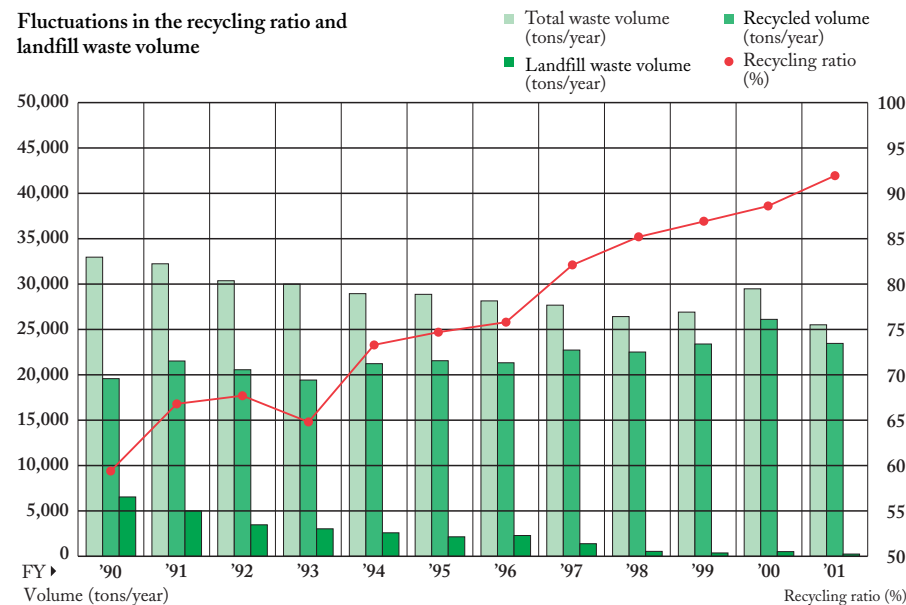
NSK has advocated the reuse of small grinding stones from the grinding process for other processing activities. When the stones are reduce to an unworkable size, they are ultimately sent for landfill. The Otsu and Ishibe Plants (Shiga Manufacturing Division) have promoted the recycling of these grinding stones into reusable grains, and approximately 24 tons were successfully recycled in FY2001.

## Waste flow diagram



\*1 Reuse of returnable containers, but not including in-house reuse.  
\*2 Wastes incinerated by communities are included regardless of heat recovery.  
\*3 Landfill of residual materials after treatment is not included.  
However, “dehydrated” and “crushed” residuals for landfill purposes are included.

## Fluctuations in the recycling ratio and landfill waste volume



## ◎ Recycling of plastic waste

In the past, the majority of used soft plastics, which were stained with oil, such as plastic bags used during product transportation, were disposed of by incineration. The Fujisawa Plant recycled all plastic waste, according to its waste disposal policy, as regenerated raw materials, blast furnace reducers, and cement calcination fuels. Approximately 160 tons were recycled last year.

## ◎ In-house solidification of grinding swarf into briquettes

During the manufacturing of bearings, swarfs are produced in the grinding process. Our plants have been recycling the grinding swarf into steel and cement raw materials for more than ten years, and have already accomplished the goal of recycling the entire volume of grinding swarf. For the purpose of additional reduction in the quantity of waste and outsourcing costs, we have adopted a technique to partially convert the swarf into briquettes (solidification) in-house.

## Future Activities

The measures that were found to be effective at plants where zero emissions were achieved in FY2001 have been unilaterally applied to the plants that have yet to achieve zero emissions, thus attempting as part of an effort by all NSK plants to accomplish zero emissions by FY2002. Regarding the four plants where zero emissions were achieved, issues remain unresolved, namely, the separation of disposals. In the future, we will engage in reinforcing and improving our management by increasing the recycling rates.

### NSK's definition of zero emissions

Zero emissions are defined as equal to, or less than 1% of the total of landfill waste volume. This includes reclamation after intermediate processing (such as dehydrating, crushing and compressing) is completed in order to satisfy the reclamation standards defined in the act on waste treatment methods. By-products including metal scraps, industrial waste such as waste oil and sludge, and general office waste such as paper trash and wood chips are considered as targets for emissions reduction.

## Achievement of Zero Emissions

Otsu Plant (Shiga Manufacturing Division) continues to implement advanced measures, and has already achieved a reduced reclamation ratio relative to the total volume of waste realized in FY2000, to a level slightly over 1%, as defined in the zero emission standards.



Separated waste collection area



Separation of gloves at manufacturing plants



Work gloves made from work uniforms



Garbage disposal unit

### ◎ Ensuring the classification of wastes

The complete classification of wastes is a basic concept in recycling. Attempting to raise awareness, NSK staff at Otsu Plant (Shiga Manufacturing Division) ensured the classification of approximately 30 kinds of waste. Work uniforms, plastic gloves, and safety shoes that were disposed of as miscellaneous items last year were newly added as target wastes to be recycled.

Subsequently work uniforms, plastic gloves, and safety shoes were sorted, disposed of separately, and successfully recycled into work gloves and shock-absorbing mats.

### ◎ Converting perishable garbage from the cafeteria into organic compost

The option of a smaller meal serving was added to the daily menu as a means of reducing leftover and perishable garbage. Nonetheless, perishable garbage was still being incinerated. We have since installed garbage disposal units to produce compost. Organic fertilizer produced from compost is provided to plant employees and the neighborhood farming communities for practical use.



CO<sub>2</sub> emissions were reduced by 12% compared to the previous year. However, the unit CO<sub>2</sub> emissions per value-added output increased by 6.7%. While a targeted reduction of 16% was sought, relative to the base year in FY1990, the actual achievement was a 10.3% reduction. The reason lies in the fact that the effect from our energy conservation measures could not cover the significant depreciation in the equipment's operational efficiency due to diminished production, which was affected by the depression in the IT industry.

## Measures and Policies

By improving energy efficiency and promoting the use of clean energy, the NSK plants have reduced CO<sub>2</sub> emissions, as an anti-global warming measure. The goals of our activities are as follows:

- Reduce fixed energy and modify energy consumption/productivity structure
- Replace existing equipment with high energy-efficient models
- Enhance management standards for energy equipment and compliance
- Meticulous control of energy consumption
- Convert fuel usage to natural gas

We have made considerable efforts toward mitigating our water consumption by preventing water leakage and installing automatic blowing controller systems in cooling towers for the cooling of equipment.

## Major Actions Taken During FY2001

NSK has been actively restructuring production throughout the entire company and improving manufacturing efficiency in order to achieve more efficient energy usage.

Each NSK plant has made tremendous progress in the company's environmental activities. Energy use has become more efficient. However, in FY2001, NSK experienced a decrease in production volume due to the weak economy that adversely

affected our energy conservation measures. The following measures were taken at each of the following sites.

- NSK Fukushima: Ejection pressure in air compressor was decreased gradually, which significantly reduced power consumed by air compressors.
- Maebashi and Saitama Plants: Reviewed heat treatment conditions and integrated heat treatment furnaces by improving throughput efficiency.
- All NSK Plants: Inverters and higher-efficiency motors have been installed for various instruments.
- Ishibe Plant (Shiga Manufacturing Division): City gas (natural gas) has been used for heat treatments and air-conditioners since FY2000. Similarly, city gas is used for air conditioners at the newly constructed buildings of Kiriara Precision Machinery and Parts Plant. The constituent ratio of energy consumption improved from 1.1% to 4.1%.
- Fujisawa Plant: The "Energy Conservation Diagnosis for Large Scale Factories"—a method of discerning energy conservation issues published by the Energy Conservation Center was used to determine what further improvements NSK can make in its ecological efforts. Based on the results of this diagnosis, NSK plans to further improve energy conservation by lowering the ejection

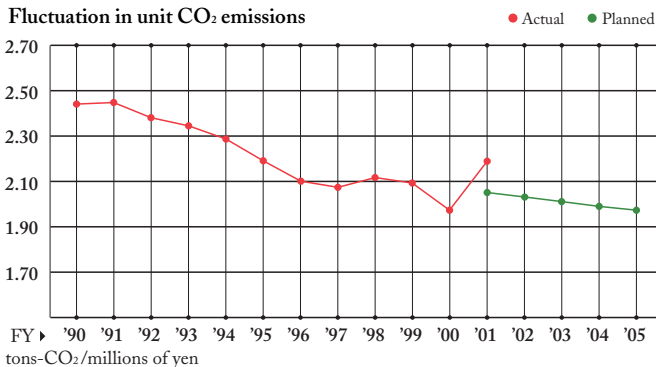
pressure of air compressors.

- All NSK Plants: Until the conclusion of the second project in FY2002, major environmental measures take in the last five years at various NSK sites were published on the in-house Intranet. This was done to increase information-sharing activities and thereby encourage horizontal development among NSK Group companies.
- In order to ensure compliance with the "Criteria for Business Owners' Decisions on Modernization of Energy Consumption at Factories," as stated in the Energy Conservation Act, the energy management staff at various sites conducted mutual inspections between pairs of plants. As a result, weak points were discovered and discussed. We intend to improve on these weaknesses in FY2002.

## Future Activities

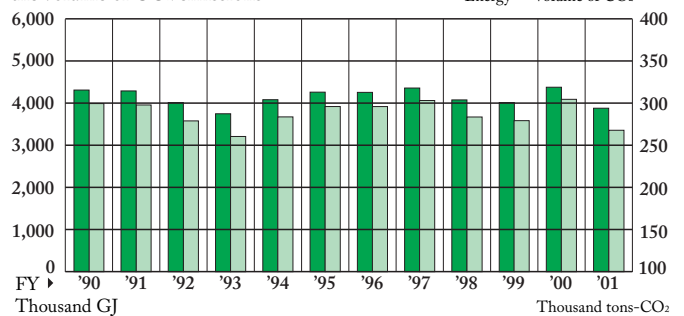
Preparations aiming at the introduction of a co-generation system in FY2003 are in progress at the Maebashi Plant. The goal is to employ energy more efficiently by exploiting the exhaust heat discharged as a by-product of power generation. In addition, we will focus on creating an energy consumption structure capable of adjusting to changes in production volume, resulting in greater energy savings.

### Fluctuation in unit CO<sub>2</sub> emissions



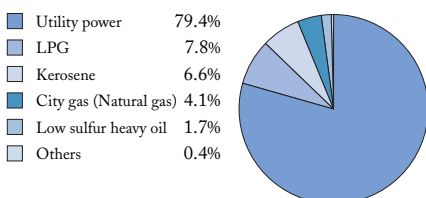
Note: Unit CO<sub>2</sub> emissions is the volume of CO<sub>2</sub> emissions per million yen of added value output (Added value output = Output - Expenses)

### Fluctuations in energy consumption and the volume of CO<sub>2</sub> emissions

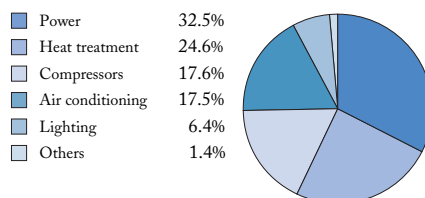


Note: The volume of CO<sub>2</sub> emissions for electricity is calculated in accordance with the conversion value of thermal power generation. The converted energy value is derived from at-market value.

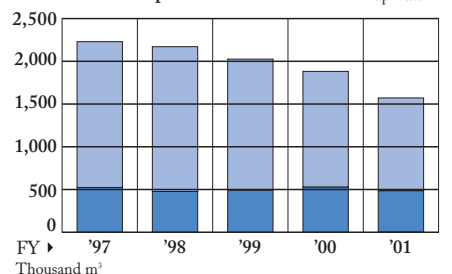
### Breakdown of energy consumption



### Breakdown of energy consumption by use



### Fluctuations in the volume of water consumption



NSK has been enthusiastically advocating curtailed use of hazardous chemical substances during the manufacturing process, as well as the elimination of hazardous substances from products. We have already achieved total abolition of ozone-depleting substances in detergents and chlorinated organic solvents. Furthermore, our goals will extend to reducing subject substances of PRTR-law; machining oils, which contain chlorine-related additives; and CFCs for refrigeration that are generally not emitted to the environment. As planned, the use of CFCs for refrigeration were reduced by 33% in FY2001, compared to the previous year.

### Measures and Policies

NSK's objective is to take concrete action to reduce or replace the use of hazardous chemical substances in its operation by establishing a control system used in production at each plant. The planned action and the chemical substances being focused on, are as follows:

- Total abolition of ozone-depleting substances by FY2005 (CFCs and halon-based extinguishers).
- Reduction of subject substances of PRTR-law: 50% by FY2005, relative to the base year in FY2000.
- Reduction of machining oils with chlorine-related additives: 50% by FY2005, relative to the base year in FY2000.

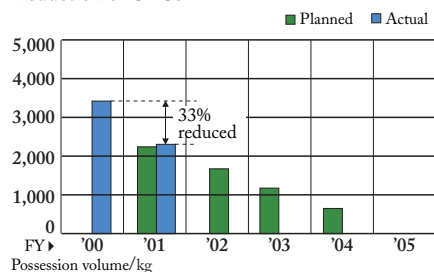
### Major Measures for FY2001

#### ◎ Ozone-depleting substances

The use of ozone-depleting substances in the cleaning processes was totally abolished in 1994. NSK has been actively attenuating CFCs for refrigeration, and the quantities were successfully decreased by 33% in FY2001 compared to the previous year. The elimination of halon-based extinguishers is in progress as intended.

- The two turbo chillers at Saitama Plant, using the CFC-11, were replaced with gas absorption type chiller/heater units, and the volume of CFC-11 was reduced by 1,100 kg.

#### Reduction of CFCs



#### Survey results for subject substances of PRTR-law (FY2001)

Substance code	Substance name	Handled volume	Released to the atmosphere	Released into water	Transferred to sewage	Transferred as wastes	Consumed	Recycled	Number of sites using substances
16	2-aminoethanol	5,326	58	28	7	3,365	0	1,868	3
24	n-alkylbenzene sulfonic acid and its salts	1,179	0	41	0	0	1,138	0	1
40	ethylbenzene	3,481	1,346	0	0	390	1,745	0	2
63	xylene	117,861	19,643	0	0	3,537	90,164	4,517	8
224	1,3,5-trimethylbenzene	6,041	2,715	0	0	95	2,512	719	4
227	toluene	37,335	10,355	0	0	3,447	23,533	0	5
243	barium and its water-soluble compounds	1,123	0	0	0	1,123	0	0	1
299	benzene	583	2	0	0	0	581	0	1

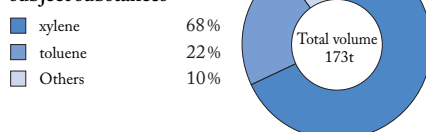
Notes: Annual volume of Class 1 designated chemical substances being handled exceeding 1 ton, and of specified Class 1 designated substances exceeding 0.5 tons, are listed.

- The CFC-12, is used in machines' oil coolers. Since many units have to be regulated, specific schedules have been established for the abridgement of CFC-12. The combined reduction of CFC-12 at the Saitama Plant and Ishibe Plant (Shiga Manufacturing Division) amounted to 16 kg.
- A project aimed towards the gradual replacement of halon-based extinguishers with carbon dioxide gas was proposed. The project also expects to address and deliver a manageable solution to the large number of halon-based extinguishers. The combined reduction of halon at the Ishibe Plant (Shiga Manufacturing Division) and Maebashi Plant amounted to 161 kg.

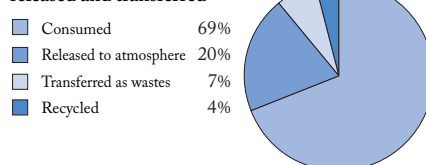
#### ◎ Subject substances of PRTR-law\*1

Although the volume of substances to be reported to the government was 5 tons or more in FY2001, as part of our voluntary management, NSK has set 1 ton or more of the subject substances as the goal to be reported. We have reported volumes of eight subject substances, and the total volume used was 173 tons. Upon examination of "the breakdown of the PRTR subject substances," xylene and toluene used mainly for air conditioning systems and forklift fuels, volume to approximately 90% of the total. "The breakdown of the volume of substances

#### Breakdown of PRTR subject substances



#### Breakdown of the volume of substances released and transferred



Released to public water and transferred to sewage are minimal, constituting almost 0% on the graph.

released and transferred" shows that substances released to the atmosphere occupy 20%, consisting of cleaning solvents, paints, and diluting solvents. The release into the water system was almost 0%. 69% of the consumed volume\*2 was produced by combustion.

- At each plant, a total of 15 products, which contain subject substances of PRTR-law, such as grinding coolant containing (2-aminoethanol), and cleaning solvents (containing toluene), were replaced.

#### ◎ Dioxins

We have abolished the use of waste incineration furnaces, and are currently making efforts to reduce the use of machining oils with chlorine-related additives.

- At the Shiga Manufacturing Division and Saitama Plant, six kinds of grinding coolant that are non-chlorine-related additives were considered as possible replacements.

### Future Activities

CFCs will be decreased according to the schedule. Regarding the subject substances of PRTR-law and chlorine-related additives containing machining oils, not only will we advance plans to diminish subject substances, but additionally consider establishing targets for the reduction of the total volume of substances handled and their emissions. Although the abatement of emissions of PRTR subject substances into the atmosphere and in chlorine-related additives containing machining oils is technologically difficult, the NSK Group will try to accomplish its goal by developing methods for total abolition at each site.

\*1 PRTR-law: The Law Concerning Reporting, etc. of Releases to the Environment of Specific Chemical Substances and Promoting Improvements in Their Management.

\*2 Consumed volume: Quantity of the subject substances of PRTR-law that are converted to other substances by reactions or that is transferred to the outside along with the products.

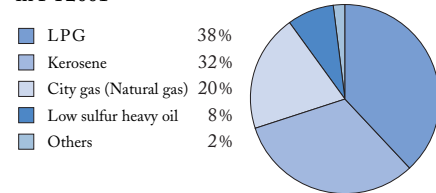


NSK and all its plants will contribute to make every effort to comply with laws and regulations related to the environment, to comply with environmental conservation agreements, and to reduce environmental risks by setting voluntary standards for important issues. In order to minimize impact on the atmosphere, water quality, and soils, we have established guidelines for chemical substance control, promoting preferential procurement of environmentally friendly materials and introducing more effective facilities for waste elimination.

## Air Conservation

Air conditioning and heat treatment are the primary NSK activities that affect atmospheric conditions. Our plants switched to LPG, kerosene, and city gas (natural gas) as well as low sulfur heavy oil as fuels in an attempt to diminish environmental impacts. According to measurements of soot and smoke emissions examined in FY2001, the quantity of sulfur dioxide discharges, concentrations of soot and dust, and volume of nitrogen oxides at all sites meet the legal requirements of release standards regulated by the Clear Air Act.

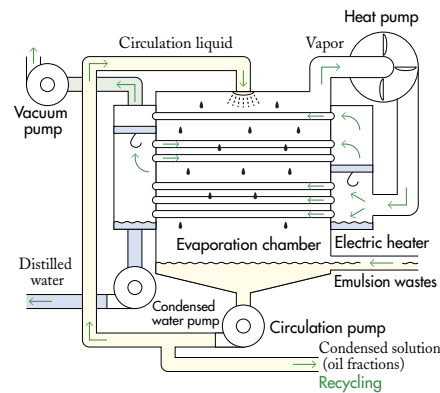
### Breakdown of the volume of fuels used in FY2001



## Water Conservation

The quality of wastewater is affected by runoff including emulsion wastes that are used in grinding and heat treatment processes, and detergent from barrel processes. Due to the difficulty in processing wastes containing surfactants, NSK Fukushima, Fujisawa, and Saitama Plants have systematically been installed with highly-efficient evaporating concentrators. In FY2001, another evaporating concentrator was installed at the Maebashi Plant, allowing the plant to further reduce the average quantity of COD (Chemical Oxygen Demand) released to the water from 20% to 10%, as well as to recycle concentrated fluids (oils) as backup fuels. In addition, our voluntary management activities will be applied in the future to affiliate companies whose facilities are not designated to manage emissions control, in an attempt to improve the water quality of our factory wastewater and to reduce the volume of chemical releases. According to public analysis as well as our additional voluntary analysis in FY2001, all plants met the water release standards required by laws and regulations related to water quality.

### Structure of an evaporating concentrator



The evaporating concentrator separates emulsion wastes into water and oil through an effective methodology of circulating it through a reduced-pressure evaporation chamber with an electric heater and a heat pump as the heating source.

## Soil and Groundwater Conservation

### Measures for purifying pollution

No chlorinated organic solvents are used at any of our plants. According to the guidelines proposed by the Ministry of Environment in 1997, research studies of soil and groundwater have been performed. These studies have isolated contamination by chlorinated organic solvents that exceeded the volume stipulated in the environmental standards in limited areas at three plants. NSK has accordingly initiated remediation procedures of these areas. The procedures were completed at one plant by the end of FY2000, and the other two plants continued remediation in FY2001. We have also conducted investigations at plants who have a record of using chlorinated organic solvents at our affiliated companies, and found no contamination.

## Response to Environmental Hazards

### Prevention measures for oil leakage accidents

Since large volume of oils are used at each plant, "Voluntary Standards Regarding Underground Storage Tanks and Subterranean Pipes Used for Hazardous Substances" were established to prevent oil leakage accidents. Subsequently, periodic inspections are performed to check the air-tightness of the underground tanks and subterranean pipes, resulting in no malfunctions or accidents being reported in FY2001. In addition to a prohibition on new installations of underground tanks and subterranean pipes, underground tanks

buried in soft foundations were removed, and leakage-preventing wall facilities and pipes were maintained above the ground. In FY2001, underground fuel tanks at two locations were replaced by above-ground tanks at the Saitama plant, in an attempt to prevent environmental risks.



Unearthened fuel tank reinstalled above ground

### Train for emergency situations

As a preventive measure against oil leakage, which has the potential for causing severe environmental disruptions, we have installed a discharge pond at the mouth of drainage outlets at each plant and an oil/water separation apparatus in order to prevent diffusion of contaminants. In response to accidents, ISO 14001 procedures are immediately deployed in the form of emergency tools, training courses and an emergency reporting systems standard at each site.

An emergency toolbox containing soil- and oil-absorbent mats is properly stowed at each plant in the event of accidents and disasters. At the Ishibe Plant (Shiga Manufacturing Division), a training session simulating a leakage accident from the plant was conducted with the cooperation of the local communities. After analyzing the training results, another emergency toolbox was installed outside the plant in an attempt to strengthen our prevention system against risk of environmental pollution.



An emergency toolbox installed outside the plant

Emergency drills are periodically performed at each plant. An environmental disaster training exercise was conducted at NSK Fukushima. Assuming that "a waste oil drum was turned over during transportation and waste oil was spilled over to the side ditches," we would lay bags of soil along



Emergency response training



Training to install oil fences to prevent spills from spreading

the side ditches and spread an oil fence from the site of the spill to the final discharge pond.

In an unrelated leakage accident near NSK's Saitama Plant, NSK plant personnel were requested by the local government to construct an oil fence to prevent an oil spread; a vacuum pump car was subsequently used to collect the oil. The NSK staff was able to mobilize swiftly and minimize damage due to their routine training. We realize the importance of training in responding to emergencies and accidents, and we will continue to make every effort to prepare for emergency situations.

### Equipment using PCB (polychlorobiphenyl)

Waste instruments using PCB are stored and managed according to the Waste Management Law. The waste instruments using PCB stored in our office buildings are transferred to facilities where they are controlled under strict regulations.

Regarding the treatments for the waste instruments using PCB, we will treat them as soon as the authorities install treatment facilities.

## Complaints from Local Residents and Regulatory Requirements Violations

NSK's plants are generally located in industrial areas, but due to recent urban development near plants, more complaints from nearby residents were reported. In FY2001, six complaints concerning noise were received from local residents. The complaints were primarily caused by machinery malfunctions or factory chime noises, such as the noise of sliding belts, motor malfunctions, and grinding disk spindle malfunctions of the cooling tower. It is the intention of NSK to continuously improve and resolve each individual difficulty. In FY2001, NSK paid no penalties and performed no illegal activities; acting completely within environmental laws and regulations.

### Preventative measures for pollution and environmental risks at NSK plants

Field	1970	1980	1990	1992	1994	1996	1998	2000	2002
General		Reinforcement of survey systems through internal evaluation			Compliance audit	Performance audit	System audit		Inspection of affiliated companies
Air conservation		Conversion of fuel for air conditioning facilities: Heavy oil→kerosene, low sulfur heavy oil			Actions taken to reduce exhaust gas generated in heat treatment processes (actions taken to reduce oil mist)				Kerosene, low sulfur heavy oil→LPG, natural gas
							All company incinerators ceased operation		
Water conservation		Legal compliance: Established total water treatment plants (including the treatment of nitrogen and phosphorus)			Actions taken to reduce the environmental impact of emulsion waste (expansion of in-house treatment capability): Introduced evaporating concentrators				
					Installation and monitoring of oil-water separation tanks and retarding basin at discharge points				
							Improvement of examination and monitoring systems including oil film detector		
Soil and groundwater conservation		Removal of trichloroethylene/1,1,1-trichloroethane			Removal of dichloromethane				
		Reduced solvent emissions: Installation of recovery facilities			Actions to prevent leakage from underground tanks and buried pipes and to improve monitoring systems				
					Heavy metal: Completion of soil inspection				
					Chlorinated organic solvents: Completion of soil inspection, remediation measures				

A newly established Environmental Logistics Subcommittee took initiatives to increase measures towards a comprehensive reduction of environmental impact resulting from the use of logistics and vehicles throughout the entire company. In FY2001, due to improvements in product logistics efficiency, the volume of CO<sub>2</sub> and NO<sub>x</sub> emissions per sales were reduced by 4.8% compared to FY2000.

## Measures and Policies

### Reduce environmental impact of transportation (CO<sub>2</sub> and NO<sub>x</sub> emissions)

- Enhance the efficiency of loading capacities by combining product logistics with procurement logistics.
- Reduce mileage and the number of vehicles used by introducing joint deliveries and “milk run” regular routes.
- Promote eco-driving

### Reduce environmental impact of packing and packaging

- Promote 3Rs for packing and packaging materials (Reduce, Reuse and Recycle).
- Promote recycling of plastic containers and expansion of the target for recycling.

## Reducing Environmental Impact of Transportation

### More efficient product logistics

We promoted greater efficiency by integrating and reviewing the major principle routes on a group-wide basis, as a means of decreasing mileage. As a result of these measures, the CO<sub>2</sub> and NO<sub>x</sub> emissions per sales were reduced by 4.8% by product logistics compared to FY2000.

### Measures for procurement logistics

Conventional logistic systems consider vehicle capacity for the transportation of products to customers and the transportation of parts to factories to be different. The Shiga Manufacturing Division, by identifying the need to enhance loading efficiency, introduced a superior logistics system for products and procurement, commencing with bearing seals. The vehicles used for transporting products are also used effectively for transporting parts. As a result, the number of total vehicles used for the entire distribution system was reduced. Therefore, more numbers of items are delivered without interfering with loading efficiency, while achieving lower costs of delivery.

### Promote eco-driving

Stepping up our initiatives on reducing environmental impact, a “Stop Idling” signboard has been posted at various logistic bases and plants to boost awareness of eco-driving among our vendors and

employees. In addition, constant reminders are made to increase employee awareness.



Signboard for “Stop Idling”

## Packaging and Packing Measures

### Promote the 3R concept for packaging and packing materials

Damaged wooden pallets in the past have been disposed of as fuel chips. We are currently promoting their reuse after repairing them, depending on the condition.

### Encourage the production of returnable materials

Tri-walls (large-sized cardboard containers with wooden frames), which are used for exporting crates were previously disposed of at export destinations after being used once. NSK has since replaced the electric power steering containers used for exporting from the Soja Plant to Europe

with plastic boxes in order to achieve full return of materials. Shiga Manufacturing Division has also been promoting the replacement of containers used for HUB Units exported to Australia with returnable materials.

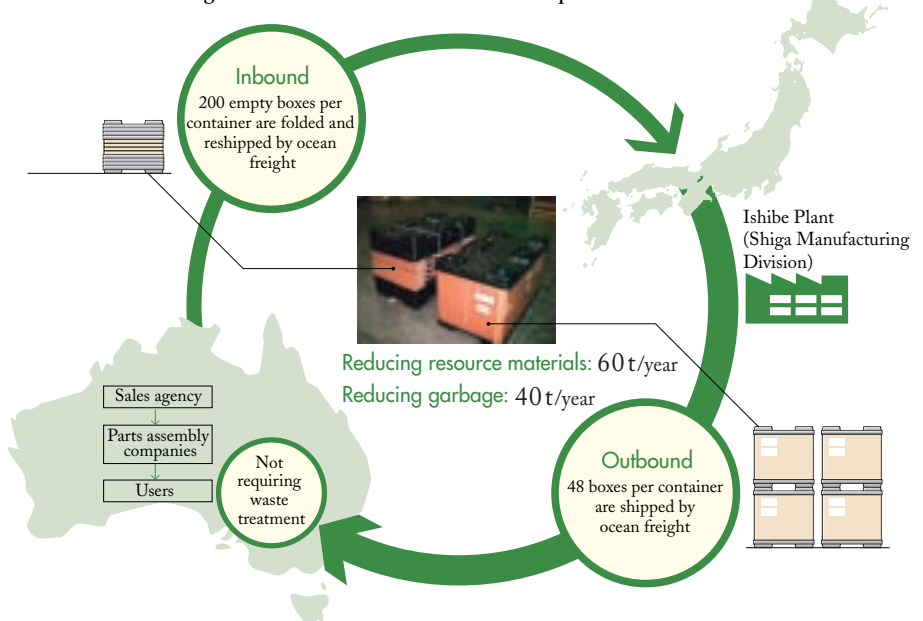
### Reuse by repairing plastic boxes and recycling

Plastic boxes were used as returnable containers for transporting products, however, due to use over an extended period of time, the bottoms of the boxes were caused to swell. Previously, the deformed plastic boxes were crushed and recycled as raw materials for new plastic boxes. To secure longer reuse life, a machine was introduced to repair deformations caused by the swelling. As a result, plastic boxes showing relatively minor deterioration were repaired before processing them to a raw material, making the reuse period longer.



Plastic box repairing machine

## Procedures for creating returnable containers for HUB units exported to Australia





NSK has also taken actions to protect the environment beyond its corporate operations by encouraging our suppliers to take environmentally friendly actions. To this end, we published the Green Procurement Standards and NSK Chemical Substance Control List, and distributed them to our 181 suppliers (93% of our total purchases). In order to promote green purchasing of general goods such as paper and office supplies, we published the Green Purchasing Guidelines and started to apply these guidelines internally.

### Policies and Activities

#### ◎ Green procurement (raw materials, parts, material resources, etc.)

- Reduce the environmental impact of our use of raw materials, parts, and material resources
- Promote controls for hazardous chemical substances
- Encourage suppliers to implement voluntary environmental measures

#### ◎ Green purchasing (general goods)

- Reduce the environmental impact of general purchases
- Raise employees' awareness of environmental issues

### Green Procurement of Raw Materials, Parts, and Material Resources

Our approach to the conservation of the environment has been recorded in the NSK's Green Procurement Standards and NSK Chemical Substance Control List, and distributed to 181 suppliers (93% of our total purchases). In the Green Procurement Standards manual, our suppliers are advised to evaluate their activities for the environment using three point scale. This approach encourages voluntary activities for building an environmental management system by grading activities in terms of improvement needed. For procurement, we have published requirements regarding energy and resource conservation, recyclability, and the management of hazardous chemical substances, as well as concerns related to packing and packaging. These requirements efficiently reduce the environmental impact of materials supplied to our company.

### Green Purchasing of General Goods

In order to promote green purchasing of paper, office supplies, OA equipment, and vehicles throughout the entire company, we published our Green Purchasing Guidelines. The document has been posted on our intranet, and all staff are encouraged to switch to products that meet the standards proposed in these guidelines. By advertising through a medium, such as internal newsletters and ECO news, NSK management has endeavored to raise the environmental awareness of its employees. As a result, 1,113 computers that were scheduled to be upgraded were replaced with energy-saving computers in accordance with the standards, further reducing electric power consumption. In addition, the sales and manufacturing divisions purchased 7 low-pollution vehicles. At the headquarters division, paper for photocopying and printing as well as for bookkeeping were replaced with 100% recycled paper with 70% degree of

brightness. Furthermore, 62,120 NSK diaries distributed to our employees and customers, were made from 100% recycled paper. Other printed items, such as the Green Procurement Standards and NSK Chemical Substance Control List as well as a periodical technology newsletter, the "NSK Technical Journal," were printed using recycled paper made of 100% used paper, and soy ink.

### Future Activities

NSK will proactively seek to expand its range of target suppliers for green procurement and widely promote environmental conservation activities. Regarding green purchasing of general goods, we will further increase our activities, and foster measures such as educating our employees and implementing green purchasing to procure office supplies that use less electrical power, in an attempt to improve on current performances.



Green Procurement Standards Manual

### Results of the green procurement assessment

Items	Number of suppliers investigated	Amount of procurement cost / Total procurement cost (%)
Suppliers subject to the investigation	181	93%
Suppliers responding	138	79%
Suppliers with priority trading	103	71%
Suppliers requiring improvements	35	8%
Suppliers to whom new business was terminated	0	0%

Logos indicating "Using 100% recycled paper," and "Printed with soy ink," as well as the NSK environmental logo signifying NSK's concerns with the environment.



As part of the Head Office's environmental conservation activities, we have engaged in the fractional recovery of paper, classification of wastes, and energy conservation. In order to integrate our management system and promote efficiency of our activities, the Green Office Subcommittee was established in 2001. This subcommittee is composed of the Management Division and Sales Division employees from the Head Office building, as well as members from our affiliated companies.

## Measures and Policies

The objective of this subcommittee is to promote various activities for environmental conservation at our headquarters division, such as:

- Raise awareness of environmental conservation: promoting education and support activities
- Encourage efficient use of material resources: promote reduction of paper consumption, classification of wastes, and conservation of energy
- Promote green purchasing

## Achievements during FY2001

### Environmental education and awareness activities

- An "Environmental Education Seminar" was conducted at varying levels of management, including 88 new employees and 43 newly-assigned managers.
- A bimonthly "ECO News" newsletter was published and other information distributed via our Intranet to raise employee awareness of environmental issues.
- The "Green Patrol," members of the Green Office Subcommittee, conducted bimonthly checks on the classification of paper and wastes at the Head Office building.



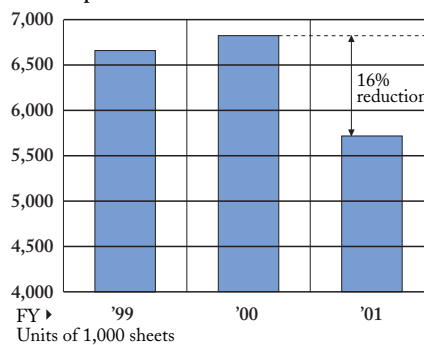
Bi-monthly issue of "ECO News"

### Reduce paper consumption

Enormous volumes of paper are consumed daily. However the volume of used paper is being abridged by strategies, such as making double-sided photocopies, using the backs of already-printed paper, and reviewing paper distribution at meetings. Moreover, we are actively promoting a paperless office operation by internal information sharing methods, such as internal electronic notification and procedures, and the introduction of electronic bookkeeping.

- The introduction of electronic bookkeeping systems contributed to the reduction of purchases of computer paper by 16% compared to the figure in FY2001.

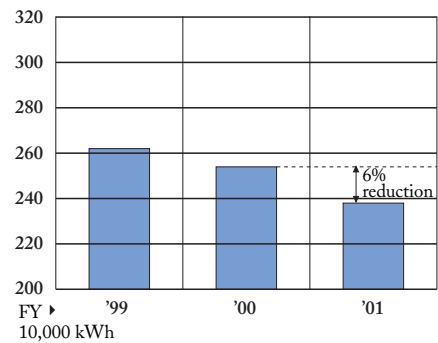
### Volume purchased



### Reduce electric power consumption

For more effective utilization of energy and the conservation of resources, we are encouraging the reduction of electric power consumption for lighting and office equipment (PCs, copiers, etc.). When purchasing fluorescent lights and office equipment, efforts are made to procure energy-conserving products. Other efforts include turning off lights during lunch breaks and time off, as well as small personal actions such as turning off PCs. Electric power consumption was steadily reduced from 2,540,000 kWh in FY2000 to approximately 2,380,000 kWh in FY2001, leading to significant power conservation. In particular, the replacement of desktop PCs with laptop PCs (420 units/year) made a great contribution to these positive results.

### Power consumption



### Promote green purchasing

NSK makes every effort to purchase environmentally friendly products and whenever possible procures office supplies made from recycled materials.

Recycled copy paper with a higher degree of whiteness has a heavy environmental impact due to its manufacturing processes, which use chemical bleaching treatments. As a result, we use 100% recycled paper with 70% degree of brightness. Recycled paper is also used for computer printers.

## Future Activities

Our goal is to make these activities for environmental conservation part of standard company procedure, and to expand the activities throughout the company to include other buildings, such as our branch offices.

# Initiatives Taken by Each Plant and Group Company

NSK has taken an “All NSK” approach. All manufacturing sites, group companies and affiliates are making collective as well as individual efforts to successfully promote an environmentally friendly perspective.

# Shiga Manufacturing Division (Otsu Plant, Ishibe Plant)



## Outline

	Otsu Plant
Location	1-16-1 Seiran, Otsu-shi, Shiga
Site Area	53,279 m <sup>2</sup>
Number of Employees	553 (as of March 31, 2002)
Products	Ball bearings
Acquisition of ISO 14001 Certification	November 1999

## Outline

	Ishibe Plant
Location	1-1-1 Ishibegaoka, Ishibe-cho, Kouga-gun, Shiga
Site Area	185,330 m <sup>2</sup>
Number of Employees	803 (as of March 31, 2002)
Products	Automotive bearings; Ball bearings
Acquisition of ISO 14001 Certification	October 1998

## Status of Environmental Actions

An environmental management system was integrated into the Shiga Manufacturing Division. Based on the mid-term results, environmental conservation plans for Otsu and Ishibe Plants were developed and implemented. The plants are surrounded by abundant nature, rich in water resources and greenery. To increase harmony with the local communities, clean-up activities around the plant are conducted regularly, and community meetings with the local residents' association and plant tours are organized. Shiga Manufacturing Division also publishes annual site reports, such as the Shiga Manufacturing Division's Environmental Report, to inform concerned government agencies and local community members of continuing environmental conservation activities.



Shiga Manufacturing Division's Environmental Report

### ©Anti-global Warming

Despite the plant's best efforts to reduce energy consumption by utilizing high-efficiency motors and lighting instruments, and reducing compressed air loss, the plant was unable to achieve the desired results with regards to the unit CO<sub>2</sub> emissions in FY2001, due to the decline in production volume.

### ©Waste

The Otsu Plant was designated as a model plant for NSK's zero-emission measures. The plant's main objective was to achieve zero emissions and this was accomplished. The measures taken to achieve this objective were the recycling of waste grinding stones, used uniforms, safety shoes and plastic gloves.

At the Ishibe Plant, devices were installed for solidifying grinding swarf into briquettes, which demonstrated great results at the Otsu Plant in FY2000. The Ishibe Plant was already recycling the entire volume of grinding swarf, and achieved further positive results in reducing the volume of swarf by recovering the grinding coolant and reducing the processing costs.

### ©Hazardous Chemical Substances

The unremitting challenge toward accomplishing a complete eco-friendly production process, as led the Shiga Manufacturing Division to identifying and sought to eliminate chlorine-related additives from machining oils, to which encouraging results have been achieved. In FY2001, 6 PRTR-law related products were reduced by replacing the cleaning agents, which contain no PRTR subject substances. As part of measures related to ozone-depleting substances, we intend to systematically promote the replacement of halon based extinguishers and CFC for refrigeration.

### ©Environmental Risks

Large quantities of oils are used at our factories. A general environmental training exercise is performed annually in June, simulating an emergency situation such as an outflow of oils into the rivers. Based on the results of the exercise, nighttime lighting and emergency tools have been installed at the downstream and at the mouths of adjoining rivers.

Hisataka Takau, Representative—Environmental Management

## Otsu Plant

### Water quality

Item	Regulatory requirements	NSK requirements	Actual value
pH	6.0-8.5	6.3-8.0	7.1
BOD (mg/l)	70	25	8.3
COD (mg/l)	70	25	5.0
Suspended solids (mg/l)	90	30	2.5
Oils (mg/l)	5	4	1.0
Nitrogen (mg/l)	40	20	4.6
Phosphorus (mg/l)	2	1.8	0.2

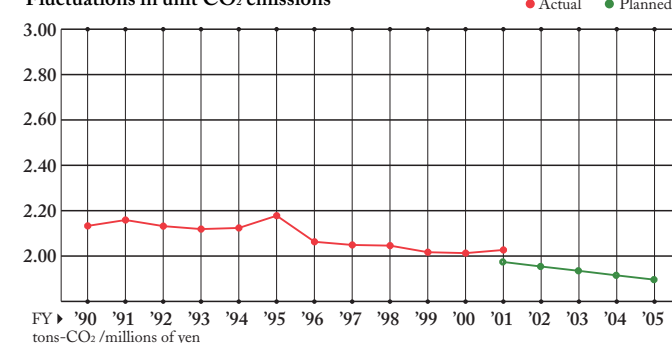
● Discharge point: River (Morikoshi River)

### Air quality

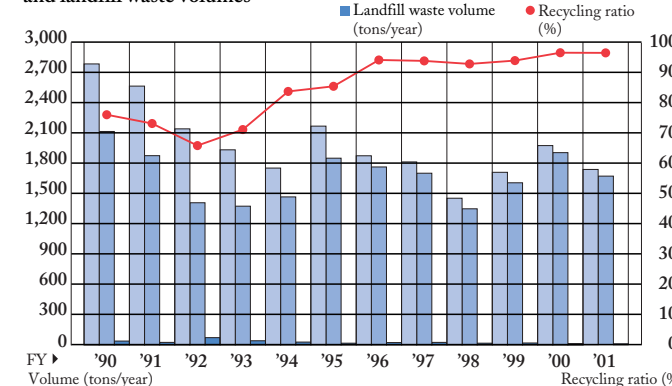
Item	Machinery	Regulatory requirements	NSK requirements	Actual value
NOx (ppm)	Boiler	150	120	90
Soot and dust (g/m <sup>3</sup> N)	Boiler	0.3	0.05	0.007
SOx (K value)	Boiler	8.76	5	0.02

\*Actual value indicates the maximum volume at the relevant facilities.

### Fluctuations in unit CO<sub>2</sub> emissions



### Fluctuations in the recycling ratio and landfill waste volumes



### Released and transferred volume of subject substances of PRTR-law

Substance code	Substance name	Handled volume	Released and transferred volume (Unit: kg/year)		
			Released to the atmosphere	Transferred to sewage	Consumed
63	xylene	14,094	2,958	0	9,890
			0	0	1,246

## Ishibe Plant

### Water quality

Item	Regulatory requirements	NSK requirements	Actual value
pH	6.0-8.5	6.3-8.0	7.2
BOD (mg/l)	70	50	4.9
COD (mg/l)	70	50	7.4
Suspended solids (mg/l)	90	70	5.5
Oils (mg/l)	5	4	1.0
Nitrogen (mg/l)	40	30	2.1
Phosphorus (mg/l)	2	1.6	0.1

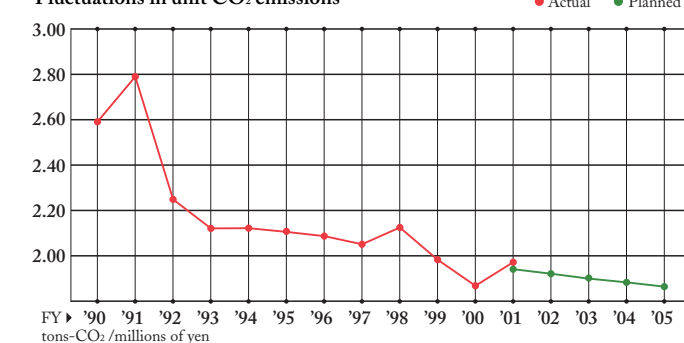
● Discharge point: River (Yasu River)

### Air quality

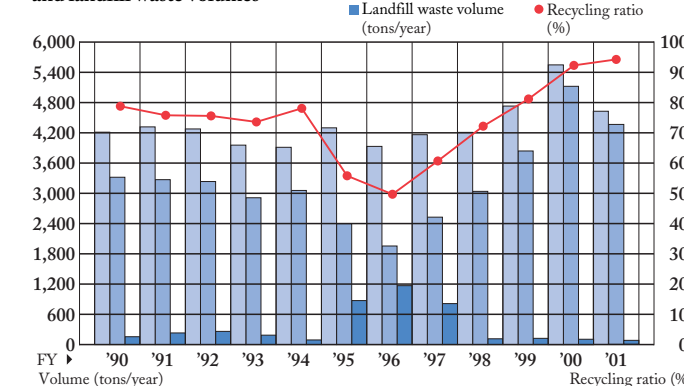
Item	Machinery	Regulatory requirements	NSK requirements	Actual value
NOx (ppm)	Boiler	150	120	78.6
Soot and dust (g/m <sup>3</sup> N)	Boiler	0.1	0.05	Less than 0.02
SOx (K value)	Boiler	8.76	5	Less than 0.1

\*Actual value indicates the maximum volume at the relevant facilities.

### Fluctuations in unit CO<sub>2</sub> emissions



### Fluctuations in the recycling ratio and landfill waste volumes



Note: The increase in final disposal volume between 1995 and 1997 was caused at our consignees, where it was not possible to recycle a portion of the grinding swarf.

### Released and transferred volume of subject substances of PRTR-law

Substance code	Substance name	Handled volume	Released and transferred volume (Unit: kg/year)		
			Released to the atmosphere	Transferred to sewage	Consumed
16	2-aminoethanol	1,164	58	0	0
			0	990	116
63	xylene	10,196	3,284	0	5,953
			0	0	959
224	1,3,5-trimethylbenzen	1,687	1,180	0	49
			0	0	458



# Fujisawa Plant/Technology Department



## Outline

<b>Location</b>	1-5-50 Kugenuma Shinmei, Fujisawa-shi, Kanagawa
<b>Site Area</b>	163,851 m <sup>2</sup>
<b>Number of Employees</b>	1,542 (as of March 31, 2002)
<b>Products</b>	Large-sized ball bearings; Roller bearings
<b>Acquisition of ISO 14001 Certification</b>	September 1999

## Status of Environmental Actions

Fujisawa Plant is the longest serving plant in NSK, manufacturing large ball bearings and roller bearings. The manufacturing processes include heat treatments and grinding processes; large volumes of energy and machining oils are subsequently consumed. Recently, the rapid urban development has taken place in the area, with condominiums and residential houses being built around the plant.

### ◎ Anti-global Warming

Despite the plant's best efforts to reduce energy consumption by employing high-efficiency motors and lighting instruments, and employing adiabatic coatings on the building roofs, the plant was unable to achieve the desired results of unit CO<sub>2</sub> emissions in FY2001. However, the plant arranged to use cleaner fuels by installing heat pumps powered by city gas (natural gas) in the air-conditioning units when the research buildings were expanded to accommodate research and development divisions.

### ◎ Waste

The Fujisawa Plant, engages in thorough fractional recovery of waste plastics, paper, and oils, and accomplished zero emissions by improving the landfill ratio to 0.1%. The plant intends to further reduce and recycle waste by using returnable packing materials and expand in-house treatments for emulsion waste.

### ◎ Environmental Risks

Since more urbanization is occurring near the plant, various techniques are employed in order to minimize the impact of noise and odors on the community. These measures include sound-proofing, strengthening of routine inspections of surrounding facilities, measures to limit soot and smoke in exhaust gases, and whenever possible, encourage the use of less odorous oil agents. The status of these environmental measures is reported to the local government periodically.

Toshiji Abe, Representative—Environmental Management

## Water quality

Item	Regulatory requirements	NSK requirements	Actual value
pH	5-9	5.3-8.8	7.4
BOD (mg/l)	600	540	16.6

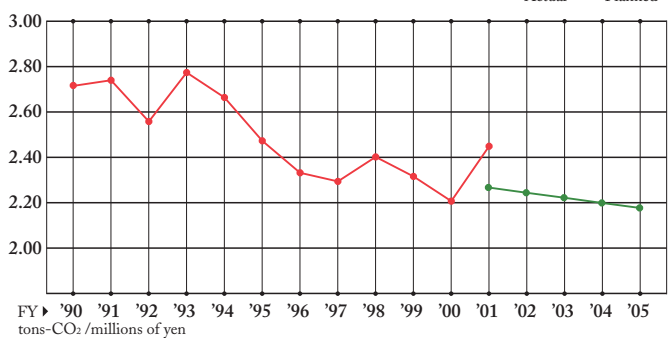
● Discharge point: Sewage treatment plant (no discharge to rivers)

## Air quality

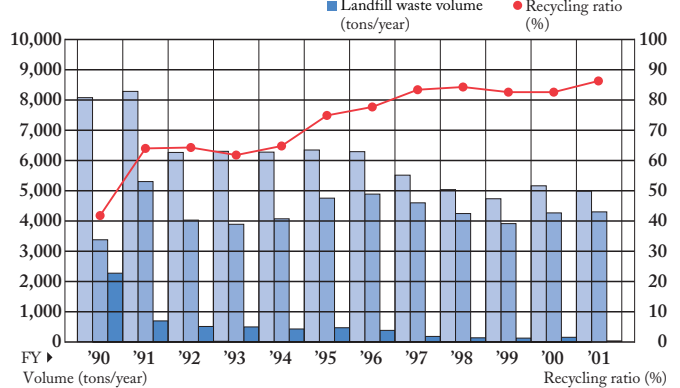
Item	Machinery	Regulatory requirements	NSK requirements	Actual value
NO <sub>x</sub> (ppm)	Boiler	180	135	80
	Heating furnace	200	180	108
Soot and dust (g/m <sup>3</sup> N)	Boiler	0.3	0.27	0.001
	Heating furnace	0.25	0.18	0.05
SO <sub>x</sub> (m <sup>3</sup> N/hr)	Boiler	3.2	2.9	Less than 0.01
	Heating furnace	1.03	0.93	Less than 0.01

\*Actual value indicates the maximum volume at the relevant facilities.

## Fluctuations in unit CO<sub>2</sub> emissions



## Fluctuations in the recycling ratio and landfill waste volumes



## Released and transferred volume of subject substances of PRTR-law

Substance code	Substance name	Handled volume	Released to the atmosphere	Transferred to sewage	Consumed
			Released into water	Transferred as wastes	Recycled
63	xylene	36,417	2,797	0	32,554
			0	0	1,066
224	1,3,5-trimethylbenzen	1,041	729	0	51
			0	0	261
227	toluene	3,630	60	0	3,570
			0	0	0
243	barium and its water-soluble compounds	1,123	0	0	0
			0	1,123	0

# Maebashi Plant/Technology Department



## Outline

<b>Location</b>	78 Toriba-machi, Maebashi-shi, Gunma
<b>Site Area</b>	94,500 m <sup>2</sup>
<b>Number of Employees</b>	967 (as of March 31, 2002)
<b>Products</b>	Precision machinery and parts
<b>Acquisition of ISO 14001 Certification</b>	December 1999

## Status of Environmental Actions

LCA activities have been implemented in the research and development division of the Maebashi Plant and they additionally acquired ISO 14001 certifications in November 2001. The plant manufactures precision linear guide components, such as ball screws for machine tools in the IT industry. In the manufacturing processes, heat treatment facilities and thermostatic chambers are utilized, and large quantities of energy are consumed. Also, machining oils are used.

### © Anti-global Warming

In spite of the development of energy conservation activities, such as integrating facilities by rationalizing heat treatments, unit CO<sub>2</sub> emissions did not reach FY2001 target levels due to reduced production caused by the sluggish IT business environment. The plant intends to introduce in the near future, plans to reduce unit CO<sub>2</sub> emissions by exploiting heat generated from the co-generation facilities. The discharged heat will be primarily used in the thermostatic chambers.

### © Waste

An 8% recycling rate improvement was achieved by upgrading the plant's treatment facilities for emulsion waste by using evaporating concentrators, reducing the volume of sewage released, and recycling condensed oils. Maebashi Plant is targeting zero emissions in FY2002 by increasing the separation of plastic waste and recycling used grinding stones.

### © Hazardous Chemical Substances

Chlorine-related additives containing machining oils are used due to the strict technical requirements of the machining process. However, with highest priority placed on environmental protection, the plant is determined to solve technical issues so that machining oils with chlorine-related additives can be used.

Toshio Yaguchi, Representative—Environmental Management

## Water quality

Item	Regulatory requirements	NSK requirements	Actual value
pH	5.8–8.6	5.9–8.5	7.6/7.8
BOD (mg/l)	25	24	13.7/2.0
COD (mg/l)	25	24	18.0/2.0
Suspended solids (mg/l)	50	45	4.0/2.0
Oils (mg/l)	5	4	1.0/1.0
Nitrogen (mg/l)	120	100	2.7/0.75
Phosphorus (mg/l)	16	14	0.2/0.14

● Discharge point: River (Someya River)

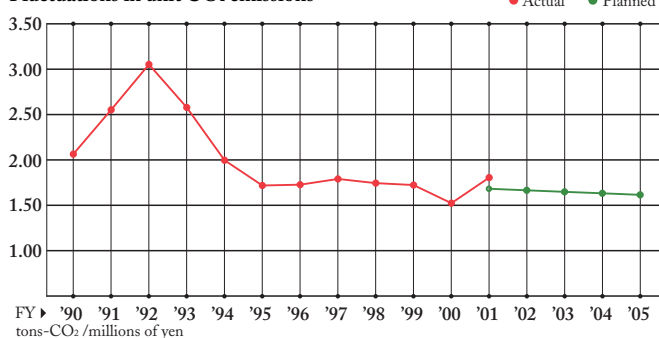
\*Actual value indicates water qualities before/after the installation of evaporating concentrators.

## Air quality

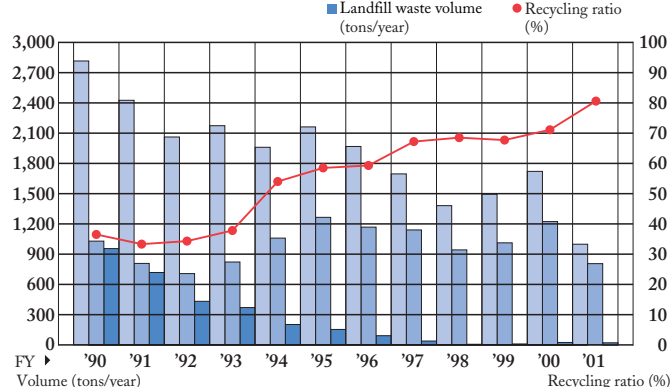
Item	Machinery	Regulatory requirements	NSK requirements	Actual value
NOx (ppm)	Boiler	180	150	110
Soot and dust (g/m <sup>3</sup> N)	Boiler	0.3	0.2	0.006
SOx (m <sup>3</sup> /hr)	Boiler	0.9	0.7	Less than 0.02

\*Actual value indicates the maximum volume at the relevant facilities.

## Fluctuations in unit CO<sub>2</sub> emissions



## Fluctuations in the recycling ratio and landfill waste volumes



## Released and transferred volume of subject substances of PRTR-law

Substance code	Substance name	Handled volume	Released to the atmosphere		Transferred to sewage		Consumed
			Released into water	Released into air	Transferred as wastes	Recycled	
16	2-aminoethanol	1,220	0	0	7	1,213	0
63	xylene	10,876	0	971	14	0	9,891
224	1,3,5-trimethylbenzen	2,226	0	619	9	0	1,598
227	toluene	4,733	0	2,782	43	0	1,908

# Soja Plant/Technology Department



## Outline

<b>Location</b>	1-8-1 Soja-machi, Maebashi-shi, Gunma
<b>Site Area</b>	73,381 m <sup>2</sup>
<b>Number of Employees</b>	1,156 (as of March 31, 2002)
<b>Products</b>	Automotive parts
<b>Acquisition of ISO 14001 Certification</b>	December 1999

## Status of Environmental Actions

The Soja Plant houses the research and development division for automotive parts and also has a manufacturing function. The research and development division acquired ISO 14001 certification in January 2002. At the plant, automotive parts, such as steering systems are manufactured, and large quantities of machining oils are used in the manufacturing processes. Due to the many kinds of manufactured parts, a variety of wastes are generated.

### ◎ Anti-global Warming

The target value for unit CO<sub>2</sub> emissions was achieved by energy conservation activities, such as the adoption of inverters to the air conditioning units and lights.

### ◎ Waste

A variety of wastes are generated at this plant and make it difficult to achieve zero emissions. Scraps of resin parts containing machining oil are normally disposed of by incineration. To remove the machining oil, the plant has installed a centrifugal oil-removal system, and achieved the recycling of all of these resin scraps. The reuse of recovered machining oil has reduced both the volume of waste generated and operational costs.

### ◎ Hazardous Chemical Substances

Machining oils with chlorine-related additives are used due to the strict technical requirements of the machining process. However, with highest priority placed on environmental protection, the plant is determined to solve technical issues so that machining oils free of chlorine-related additives can be used. Although many technological problems remain to be solved in order to replace such oil agents, the plant is concerned with its environmental impact, and has undertaken to eliminate chlorine-related additives from machining oils. Benzene is contained in gasoline for forklift fuel, and most of it is consumed.

Masaomi Takebe, Representative—Environmental Management

## Water quality

Item	Regulatory requirements	NSK requirements	Actual value
pH	5.8–8.6	5.9–8.5	8.0
BOD (mg/l)	25	24	3.8
COD (mg/l)	25	24	5.5
Suspended solids (mg/l)	50	45	3.2
Oils (mg/l)	5	4	1.0
Nitrogen (mg/l)	120	100	4.6
Phosphorus (mg/l)	16	14	0.15

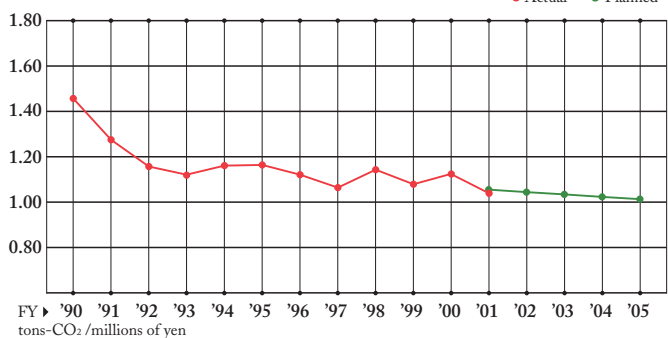
● Discharge point: River (Taki River)

## Air quality

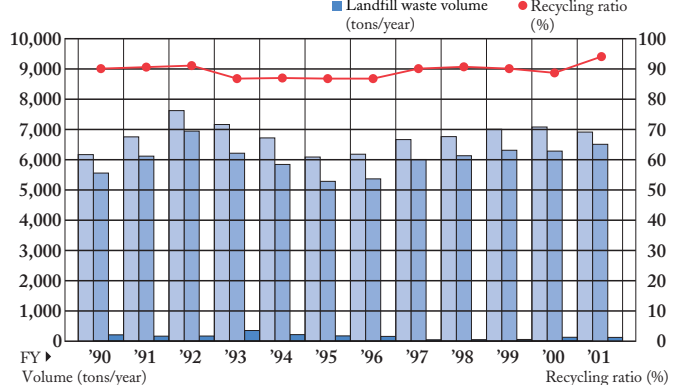
Item	Machinery	Regulatory requirements	NSK requirements	Actual value
NO <sub>x</sub> (ppm)	Boiler	180	150	110
Soot and dust (g/m <sup>3</sup> N)	Boiler	0.3	0.2	Less than 0.007
SO <sub>x</sub> (K value)	Boiler	17.5	8	Less than 0.2

\*Actual value indicates the maximum volume at the relevant facilities.

## Fluctuations in unit CO<sub>2</sub> emissions



## Fluctuations in the recycling ratio and landfill waste volumes



## Released and transferred volume of subject substances of PRTR-law

Substance code	Substance name	Handled volume	Released and transferred volume (Unit: kg/year)		
			Released to the atmosphere	Transferred to sewage	Consumed
			Released into water	Transferred as wastes	Recycled
40	ethylbenzene	2,447	463	0	1,745
			0	239	0
63	xylene	19,058	2,782	0	14,733
			0	1,543	0
224	1,3,5-trimethylbenzen	1,087	187	0	814
			0	86	0
227	toluene	21,202	6,470	0	12,790
			0	1,942	0
299	benzene	583	2	0	581
			0	0	0



# Saitama Plant/Saitama Precision Machinery and Parts Plant



## Outline

<b>Location</b>	1-1 Onuma, Hanyu-shi, Saitama
<b>Site Area</b>	280,627 m <sup>2</sup>
<b>Number of Employees</b>	615 (as of March 31, 2002)
<b>Products</b>	Automotive bearings; CVT; Precision machinery and parts
<b>Acquisition of ISO 14001 Certification</b>	September 1998

## Status of Environmental Actions

The manufacturing of automobile bearings and precision parts undertaken at this plant, necessitates the use of heat treatment and grinding equipment, which consumes large volumes of energy. Water-soluble machining oil agents are also frequently utilized.

### ◎ Anti-global Warming

Energy conservation activities included improvements in the efficiency of heat treatments and the installation of inverters in air conditioning fans. However, due to a significant reduction in precision parts production, unit CO<sub>2</sub> emissions actually increased considerably compared to the previous year.

### ◎ Waste

The plants improved the recycling rate to 97% in FY2001. This was achieved by the efficient operation of evaporating concentrators, which reduced the discharged volume of emulsion waste generated in the grinding and heat treatment processes, and by recycling safety shoes. The landfill ratio was reduced to 0.3%, and zero emissions were achieved.

### ◎ Hazardous Chemical Substances

Measures to eliminate ozone-depleting substances were taken and included replacement of turbo chillers by absorption type chiller/heater units, and the total abolition of CFC-11 was completed. The Saitama Plant reduced the number of products containing PRTR subject substances by 11%, replacing cleaning thinners with solvents containing no toluene.

### ◎ Environmental Risks

As preventive measures for soil and groundwater pollution, the plant plans to complete the unearthing of the underground oil tanks to above ground by the end of this fiscal year. This is part of a 5-year project in which the underground oil tanks will be switched to above ground tanks, walls to protect against oil leakage from underground tanks will be installed, and the subterranean pipes will be remodeled as above-ground pipes.

Mitsuru Mori, Representative—Environmental Management

## Water quality

Item	Regulatory requirements	NSK requirements	Actual value
pH	5.8–8.6	6.0–8.4	7.6
BOD (mg/l)	25	18	11.7
COD (kg/day)	5.1	–	3.6
Suspended solids (mg/l)	50	40	28.1
Oils (mg/l)	5	4	0.3
Nitrogen (mg/l)	60	20	11.6
Phosphorus (mg/l)	8	3	0.61

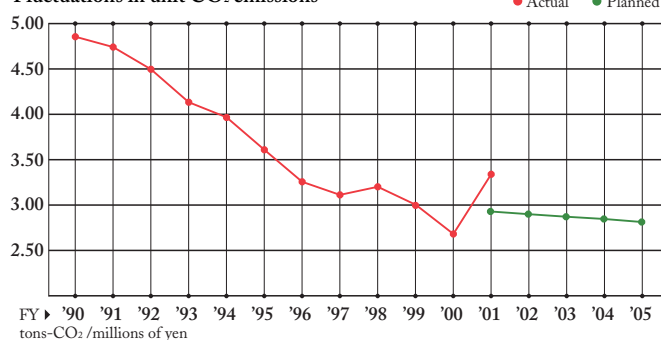
● Discharge point: River (Naka River)

## Air quality

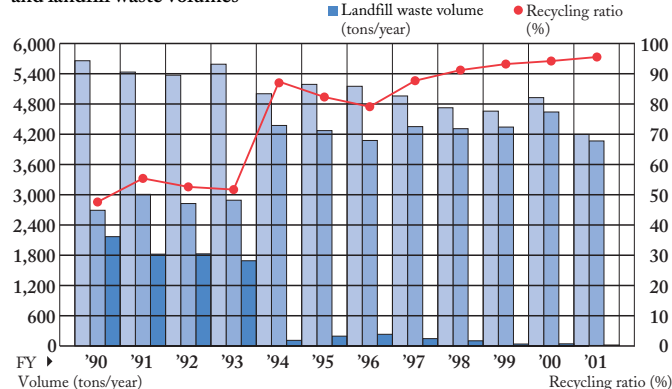
Item	Machinery	Regulatory requirements	NSK requirements	Actual value
NOx (ppm)	Boiler	150	13.5	120
	Heating furnace	180	150	40
Soot and dust (g/m <sup>3</sup> N)	Boiler	0.3	0.2	0.007
	Heating furnace	0.25	0.15	0.019
SOx (m <sup>3</sup> N/hr)	Boiler	1.42	0.6	Less than 0.003
	Heating furnace	1.53	0.75	Less than 0.004

\*Actual value indicates the maximum volume at the relevant facilities.

## Fluctuations in unit CO<sub>2</sub> emissions



## Fluctuations in the recycling ratio and landfill waste volumes



## Released and transferred volume of subject substances of PRTR-law

Substance code	Substance name	Handled volume	Released to the atmosphere	Transferred to sewage	Consumed
			Released into water	Transferred as wastes	Recycled
16	2-aminoethanol	2,942	0	0	0
			28	1,162	1,752
24	n-alkylbenzene sulfonic acid and its salts	1,179	0	0	1,138
			41	0	0
63	xylene	15,158	3,942	0	10,807
			0	10	399
227	toluene	3,115	475	0	2,633
			0	7	0



# Kirihara Precision Machinery and Parts Plant/NSK Autoliv Co., Ltd.



## Outline

<b>Location</b>	12 Kirihara-cho, Fujisawa-shi, Kanagawa
<b>Site Area</b>	44,044 m <sup>2</sup>
<b>Number of Employees</b>	446 (as of March 31, 2002)
<b>Products</b>	Mechatronics products; Precision machinery and parts (Kirihara Precision Machinery and Parts Plant); Seatbelts (NSK Autoliv)
<b>Acquisition of ISO 14001 Certification</b>	November 1999

## Status of Environmental Actions

The Kirihara Precision Machinery and Parts Plant and NSK Autoliv have acquired ISO 14001 certification. When the Precision Machinery and Parts Plant was established in January 2000, the plant changed from an assembly-focused business to production that includes machining processes. Due to this shift in production processes, the plant's impact on the environment has changed.

### © Anti-global Warming

Due to the changes in the product types, unit CO<sub>2</sub> emissions in FY2001 increased considerably compared to the figure in the previous year. These results have highlighted the necessity to further implement environmental measures, such as energy conservation by rationalizing the production system and reviewing the facilities. On the other hand, total CO<sub>2</sub> emissions have started decreasing, due to the use of city gas as an energy source upon the plant expansion last year. The further use of city gas and co-generation systems as an energy source will be considered.

### © Waste

At this plant, where precision parts and vehicle seatbelts are manufactured, a variety of wastes are generated that are difficult to recycle. In FY2001, fractional disposal and the development of recycling procedures enabled a recycling rate improvement of 5%. However, with regard to compound wastes of metal and plastic, the plant was unable to recycle the total volume, which continues to be the goal.

Kenichi Uehara, Representative—Environmental Management

## Water quality

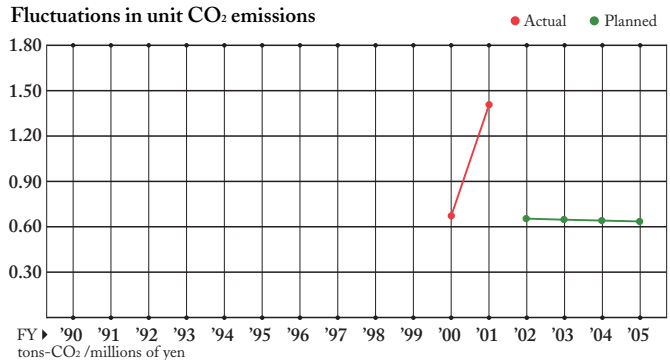
Item	Regulatory requirements	NSK requirements	Actual value
pH	5.8–8.6	6.2–8.2	7.9
BOD (mg/l)	60	55	3.6
COD (mg/l)	60	55	4.2
Suspended solids (mg/l)	90	85	2.1
Oils (mg/l)	5	4	1.0

● Discharge point: River (Hikichi River)

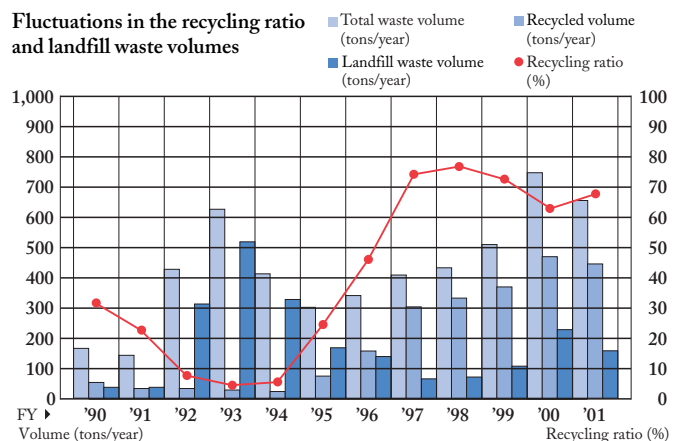
## Air quality

No applicable facilities

## Fluctuations in unit CO<sub>2</sub> emissions



## Fluctuations in the recycling ratio and landfill waste volumes



## Released and transferred volume of subject substances of PRTR-law

No subject substances of more than 1 ton are annually handled.

# NSK Fukushima Co., Ltd.



## Outline

<b>Location</b>	180-1 Nikaki, Tsutsumi, Tanagura-machi, Higashishirakawa-gun, Fukushima
<b>Site Area</b>	193,313 m <sup>2</sup>
<b>Number of Employees</b>	559 (as of March 31, 2002)
<b>Products</b>	Small size and miniature bearings
<b>Acquisition of ISO 14001 Certification</b>	July 1998

## Status of Environmental Actions

NSK Fukushima was founded in July 2001 as a spin off subsidiary of NSK Ltd. Before the divestiture, the plant had been manufacturing small size and miniature bearings primarily for IT-related instruments. However, since the company has taken over products manufactured at the Shiga Manufacturing Division and Fujisawa Plant upon its foundation, its environmental impact will change considerably in the future.

### © Anti-global Warming

Due to the reduction in production caused by the recession in business activity in the IT industry, the unit CO<sub>2</sub> emissions in FY2001 increased significantly in comparison to the previous year. In FY2002, the company will seek to reduce the unit CO<sub>2</sub> emissions in each process and critically review the facilities in order to achieve lower negative environmental impact.

### © Waste

The company has maintained a high level of achievement in terms of the recycling rate and landfill rate. Zero emissions were achieved in FY2001, while a 3% improvement in the recycling rate was realized by reducing the generation of waste grease in the manufacturing processes and by promoting recycling. Currently, the recycling rate is above 98%.

### © Environmental Risks

This plant faced a problem with an increased pH value in drainage due to photosynthesis of algae during the summer. A variety of countermeasures have been taken, including blocking sunlight to side ditches and installing fountain equipment in the discharge ponds to improve water flow. The company is also strengthening its monitoring system.

### © Other

In the natural areas around the plant, all employees participated as volunteers in removing weeds by hand without using any chemical pesticide, as part of environmental beautification activities.

Fumio Ogiso, Representative—Environmental Management Staff

## Water quality

Item	Regulatory requirements	NSK requirements	Actual value
pH	5.8–8.6	5.8–8.6	7.1
BOD (mg/l)	20	18	3.7
COD (mg/l)	–	–	–
Suspended solids (mg/l)	50	45	4.1
Oils (mg/l)	5	4.5	0.7
Nitrogen (mg/l)	60	30	1.1
Phosphorus (mg/l)	8	4	0.75

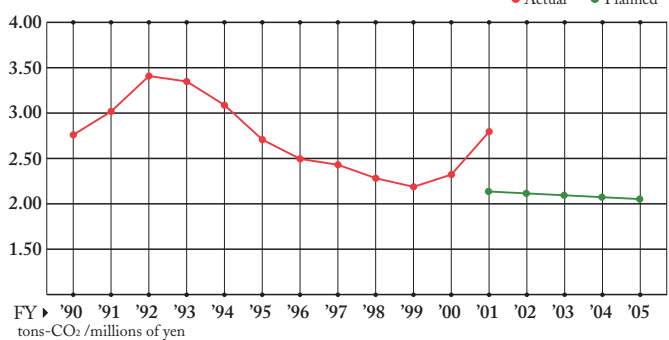
● Discharge point: River (Yashiro River)

## Air quality

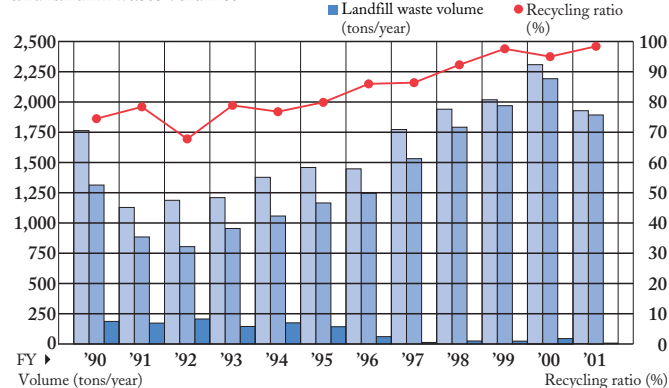
Item	Machinery	Regulatory requirements	NSK requirements	Actual value
NOx (ppm)	Boiler	180	–	94
Soot and dust (g/m <sup>3</sup> N)	Boiler	0.3	–	Less than 0.005
SOx (K value)	Boiler	17.5	–	0.55

\*Actual value indicates the maximum volume at the relevant facilities.

## Fluctuations in unit CO<sub>2</sub> emissions



## Fluctuations in the recycling ratio and landfill waste volumes



## Released and transferred volume of subject substances of PRTR-law

Substance code	Substance name	Handled volume	Released and transferred volume (Unit: kg/year)		
			Released to the atmosphere	Transferred to sewage	Consumed
63	xylene	3,556	1,983	0	726
			0	0	847

# NSK-Warner Kabushiki Kaisha



## Outline

Location	2345 Aino, Fukuroi-shi, Shizuoka
Site Area	136,430 m <sup>2</sup>
Number of Employees	822 (as of March 31, 2002)
Products	Manufacture of one-way clutches and products related to friction materials
Acquisition of ISO 14001 Certification	March 2001

## Status of Environmental Actions

In the areas around NSK-Warner where a 2002 World Cup soccer field was built, the surrounding environment has dramatically changed. In an attempt to become a corporation very involved in the community activities and concerns, various ambitious environmental actions have been undertaken.

### ◎ Hazardous Chemical Substances

In order to strengthen the management of chemical substances, NSK-Warner Plant analyzes what chemicals are used, where, and how much of each, and supports the reduction of the priority substances, that is, chemicals that are used in large quantities and are harmful to the environment. Since FY2001, the company has sought to reduce subject substances of PRTR-law by replacing toluene, which had been used in large volumes, with solvents that have lower adverse environmental impact. Regarding products containing substances that can harm the environment, the company is studying possible replacement materials and the reduction of the volume of hazardous chemical substances used.

### ◎ Anti-global Warming

CO<sub>2</sub> emissions in FY2001 slightly increased in comparison with the figure in the previous year due to increases in demand for electric power caused by the extremely hot weather. However, the company was able to achieve its goal to reduce the volume by 1% annually compared to the base year in 1999, by rationalizing the production system and improving production equipment and lighting equipment.

### ◎ Waste

Previously, waste such as friction materials generated during production had been incinerated. However, the NSK-Warner Plant stopped the use of incinerators in May 2001, and started to decrease the volume of waste by improving designs and recycling the remaining waste into cement and treating through a gasification process. By ensuring fractional recovery, the company has improved the recycling rate of copying paper, cardboard boxes, and packing materials, and reduced the volume of industrial waste in FY2001 by approximately 30%, compared to the figures in FY1998.

Masayuki Takagi, Representative—Environmental Management

## Water quality

Item	Regulatory requirements	NSK requirements	Actual value
pH	5.8–8.6	5.8–8.6	7.1
BOD (mg/l)	25	20	4.8
COD (mg/l)	–	–	10.5
Suspended solids (mg/l)	50	30	3.5
Oils (mg/l)	5	–	0.5

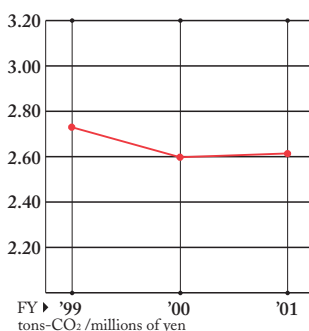
● Discharge point: River (Saka River)

## Air quality

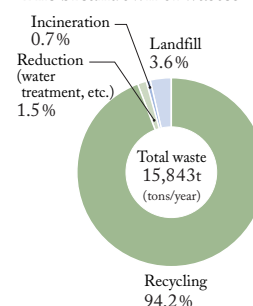
Item	Machinery	Regulatory requirements	NSK requirements	Actual value
NOx (ppm)	Boiler	180	–	72.0
Soot and dust (g/m <sup>3</sup> N)	Boiler	0.3	–	Less than 0.01
SOx (m <sup>3</sup> N/hr)	Boiler	2.95	–	Less than 0.005

\*Actual value indicates the maximum volume at the relevant facilities.

## Fluctuations in unit CO<sub>2</sub> emissions



## The breakdown of wastes



## Released and transferred volume of subject substances of PRTR-law

Substance code	Substance name	Handled volume	Released and transferred volume (Unit: kg/year)		
			Released to the atmosphere	Transferred to sewage	Consumed
16	2-aminoethanol	3,026	0	0	2,179
			242	605	0
30	bisphenol A	8,105	0	0	7,535
			0	570	0
47	ethylene diamine tetra acetic acid	1,370	0	0	1,335
			10	25	0
63	xylene	44,452	1,260	0	42,829
			0	363	0
67	cresol	1,867	1,620	0	148
			0	99	0
179	dioxins*	1.008	0.098	0	0
			0	0.91	0
227	toluene	29,126	27,127	0	507
			0	1,492	0
266	phenol	78,069	1,445	0	72,755
			0	3,869	0
309	poly (oxyethylene) nonylphenyl ether	2,688	0	0	2,180
			145	363	0

\* Unit of dioxins: mg-TEQ/year

No dioxins emissions after the abolition of incinerators in May 2001.

# NSK Micro Precision Co., Ltd.



## Outline

Location	645 Miyamae, Fujisawa-shi, Kanagawa
Site Area	5,619 m <sup>2</sup>
Number of Employees	254 (as of March 31, 2002)
Products	Miniature bearings and unit products
Acquisition of ISO 14001 Certification	June 2001

## Status of Environmental Actions

NSK Micro Precision is located in the natural surroundings of the Shonan region. The company contributes to the field of high technology by manufacturing miniature bearings, and unit products made with the latest bearing technology. Environmental conservation—long a priority of business affairs—is heavily promoted.

Many environmental conservation activities were initiated in its first full year since acquiring ISO 14001 in June 2001. All employees have participated in these activities. Even though certification was recently acquired, community conscious activities have been actively pursued, such as several years ago, when faced with a situation involving a noise problem. On that occasion, due to the residential development at the east side of the plant, measures such as putting up sound-proof walls were immediately employed. No problems with neighbors have been experienced since. Due to heightened local community concerns, greater emphasis will be placed on engaging in community-based activities such as the clean-up campaign.

The company is promoting the reduction of waste, recycling of resources, and the reduction of cleaning solvents (chemical substances). A total abolition of chlorinated organic solvent is progressing, by steadily introducing substitute cleaning methods. With regard to wastes, as a result of engaging in a year-long project, the goal to reduce and recycle wastes has been achieved. Wherever possible, available resources and abilities will be devoted to environmental conservation activities.

Nobumitsu Saito, Representative—Environmental Management

## Water quality

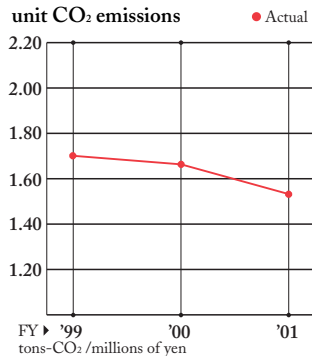
Item	Regulatory requirements	NSK requirements	Actual value
pH	5.8–8.6	5.8–8.5	7.6
BOD (mg/l)	60	58	19.5
COD (mg/l)	60	58	19.9
Suspended solids (mg/l)	90	88	11.8
Oils (mg/l)	5	4.5	1.0

● Discharge point: River (Kashio River)

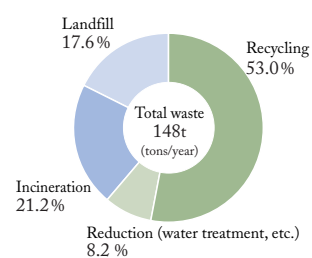
## Air quality

No applicable facilities

## Fluctuations in unit CO<sub>2</sub> emissions



## The breakdown of wastes



## Released and transferred volume of subject substances of PRTR-law

Substance code	Substance name	Handled volume	(Unit: kg/year)		
			Released to the atmosphere	Transferred to sewage	Consumed
			Released into water	Transferred as wastes	Recycled
144	dichloropentafluoropropane	1,975	1,735	0	0
			0	240	0
145	dichloromethane	13,663	11,375	0	0
			0	2,288	0



# Inoue Jikuuke Kogyo Co., Ltd.



## Outline

Location	1640-1 Sabi, Tondabayashi-shi, Osaka
Site Area	20,682 m <sup>2</sup>
Number of Employees	231 (as of March 31, 2002)
Products	Ball bearings; Related parts
Acquisition of ISO 14001 Certification	February 2002

## Status of Environmental Actions

Inoue Jikuuke Kogyo is located near the picturesque region of Konga Ikoma Quasi-National Park, nestled comfortably among mountains, greenery and water, manufacture ball bearings designed to accommodate the needs of diverse industries. Since agricultural fields surround the site and the plant uses large quantities of machining oils, stringent controls are applied. Like all other NSK Plants, strict adherence to environmental conservation activities, including management of water quality is a basic premise for conducting business activities.

In FY2001, there was three areas of focus: (1) prevention of environmental pollution; (2) measures for reducing environmental impact and for conserving materials; and (3) measures for energy conservation. Company staff engaged in activities to lessen landfill waste volume, and managed to recycle the grinding scraps, which had been the most serious problem, into cement raw materials. Used grinding stones were recycled into road construction materials. As a result, the landfill volume was reduced by 20% of the volume in the previous year, taking the plant closer to its goal of achieving zero emissions.

A monthly community clean-up operation is organized for cleaning roads and water channels around the plant as a step toward the development of community-oriented environmental activities.

In FY2002, Inoue Jikuuke Kogyo will add a fourth focus to the environmental agenda undertaken in FY2001: conservation of the natural environment.

Takanobu Harada, Representative—Environmental Management

## Water quality

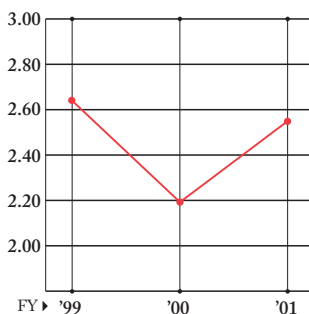
Item	Regulatory requirements	NSK requirements	Actual value
pH	5.8–8.6	6.3–8.3	7.1
BOD (mg/l)	150	100	27.9
COD (mg/l)	150	100	24.3
Suspended solids (mg/l)	200	120	6.0
Oils (mg/l)	4	3	1.3
Nitrogen (mg/l)	60	–	32.1
Phosphorus (mg/l)	8	–	2.8

● Discharge point: River (Unada River)

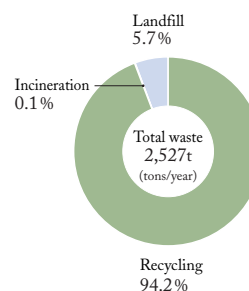
## Air quality

No applicable facilities

## Fluctuations in unit CO<sub>2</sub> emissions



## The breakdown of wastes



## Released and transferred volume of subject substances of PRTR-law

Substance code	Substance name	Handled volume	Released to the atmosphere	Transferred to sewage	Consumed
			Released into water	Transferred as wastes	Recycled
63	xylene	2,137	556	0	1,345
			0	0	236
145	dichloromethane	11,500	10,256	0	0
			0	1,244	0
227	toluene	1,814	6	0	1,808
			0	0	0

# NSK Kyushu Co., Ltd.



## Outline

<b>Location</b>	774 Nissei, Furukawa, Ukiha-machi, Ukiha-gun, Fukuoka
<b>Site Area</b>	152,000 m <sup>2</sup>
<b>Number of Employees</b>	276 (as of March 31, 2002)
<b>Products</b>	Precision machinery and parts (ball screws); Automotive parts (steering); Bearings for special environments
<b>Acquisition of ISO 14001 Certification</b>	October 2000

## Status of Environmental Actions

At NSK Kyushu, the nature of the business activities is continuously evolving. As a result, the impact on the environment changes, mainly in the form of escalating energy consumption. Environmental conservation is constantly promoted with careful consideration of the local environment's abundant water and greenery, by properly evaluating the environmental impact based on the environmental management system that was launched in 2000.

Renovation of the No.3 building in April 2001 combined with commencement of ball screw production and introduction of co-generation systems, have enabled the plant to reduce the quantity of CO<sub>2</sub> emissions in FY2001 to approximately 500 tons-CO<sub>2</sub>/year and decrease electric power consumption. The goal is to improve the current recycling rate of about 95% to achieve zero emissions by FY2003.

The company is also actively engaged in green activities. Ukiha-machi is designated as a non-restricted area of Yaba Hita Hikosan Quasi-National Park, and is famous for its fruit production. From the standpoint of maintaining harmony with the community and improving the working environment for its employees, the "promotion of green activities" is an essential part of company activities. Since the beginning of operation in April 1996, the results of this activity, encouraged by the entire corporation, have grown steadily. The plant's grounds now include a soccer field (with an all-natural lawn) open to local communities and abundant wooded areas. They serve not only as an "oasis for humans," but as a habitat for birds and other native animals.

In FY2002, NSK Kyushu intends to continuously engage in environmental activities, with the "reduction of wastes (reduce/reuse/recycle)" and the "promotion of green activities" as major targets.

Masahiko Kataharada, Representative—Environmental Management

## Water quality

Item	Regulatory requirements	NSK requirements	Actual value
pH	5.8–8.6	5.9–8.5	7.7
BOD (mg/l)	45	20	5.0
COD (mg/l)	45	20	7.8
Suspended solids (mg/l)	100	60	3.1
Oils (mg/l)	5	4	0.5
Nitrogen (mg/l)	120	100	12.6
Phosphorus (mg/l)	16	14	1.0

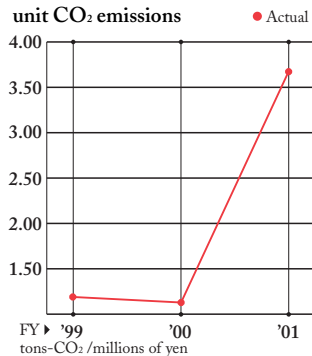
● Discharge point: River (Nitta River)

## Air quality

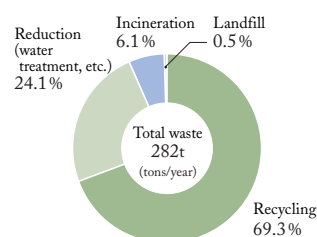
Item	Machinery	Regulatory requirements	NSK requirements	Actual value
NOx (ppm)	Boiler	180	160	96
	Diesel engine	950	–	490
Soot and dust (g/m <sup>3</sup> N)	Boiler	0.3	–	0.006
	Diesel engine	0.1	–	0.015
SOx (K value)	Boiler	17.5	13	1.25
	Diesel engine	17.5	–	0.19

\*Actual value indicates the maximum volume at the relevant facilities.

## Fluctuations in unit CO<sub>2</sub> emissions



## The breakdown of wastes



## Released and transferred volume of subject substances of PRTR-law

No subject substances of more than 1 ton are annually handled.

# NSK Torrington Co., Ltd.



## Outline

	Takasaki Plant (Head Office)	Haruna Plant
<b>Location</b>	358 Yawata-machi, Takasaki-shi, Gunma	941-2 Nakagawa, Nakasatomi, Haruna-machi, Gunma-gun, Gunma
<b>Site Area</b>	56,833 m <sup>2</sup>	88,187 m <sup>2</sup>
<b>Number of Employees</b>	817 (as of March 31, 2002)	307 (as of March 31, 2002)
<b>Products</b>	Needle bearings	Thrust needle bearings
<b>Acquisition of ISO 14001 Certification</b>	To be acquired in March 2003	January 2001

## Status of Environmental Actions

NSK Torrington has adopted "SIP Spirit" as a company policy. This spirit embodies "Service," "Individuality," and "Progress." Under this policy, all employees are encouraged to respond positively to changes in trends and industrial structures, to actively develop future plans, and to continue to progress. Environmental issues have become a major force affecting our lives. The stance we take toward the restructuring of our in-house production and its effects on environmental impact requires deep consideration. Business activities at NSK Torrington are promoted based on the SIP spirit and environment conservation highlighted as one of our top priorities.

The Haruna Plant acquired ISO 14001 certification in January 2001 and promotes environmental conservation activity, with particular attention being focused on global warming issues, which has been of great concern in recent years. As a result of reviewing operational conditions for steam boilers and air-conditioners, great achievements have been made, exceeding the original target values. The company also encouraged suppliers to stop the idling of vehicles at the plant, spreading this message throughout the entire Group. Since urgent improvements must be committed to regarding the issue of waste, the reduction of wastes is actively being promoted, with the goal of achieving zero emissions.

The transfer of production from the Kounosu plant, which was closed last year, has changed the environmental impact of the Takasaki Plant. The company intends to acquire ISO 14001 certification by the end of FY2002 and will boost environmental conservation efforts.

Takefumi Hirabayashi, Representative—Environmental Management

## Takasaki Plant

### Water quality

Item	Regulatory requirements	NSK requirements	Actual value
pH	5-9	5.9-8.5	7.4
BOD (mg/l)	600	500	17.7
Cyanide (mg/l)	1	1	0.1

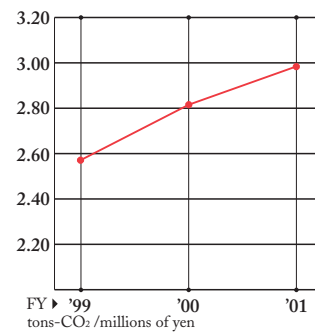
● Discharge point: Sewage treatment plant

### Air quality

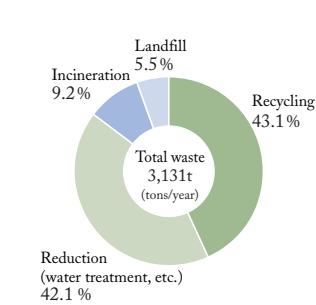
Item	Machinery	Regulatory requirements	NSK requirements	Actual value
NOx (ppm)	Boiler	150	140	130
	Diesel engine	950	900	800
Soot and dust (g/m <sup>3</sup> N)	Boiler	0.1	0.09	0.008
	Diesel engine	0.1	0.09	0.072
SOx (K value)	Boiler	17.5	5	Less than 0.3
	Diesel engine	17.5	5	Less than 0.3

\*Actual value indicates the maximum volume at the relevant facilities.

### Fluctuations in unit CO<sub>2</sub> emissions



### The breakdown of wastes



### Released and transferred volume of subject substances of PRTR-law

Substance code	Substance name	Handled volume	Released to the atmosphere		Transferred to sewage		Consumed
			Released into water	Transferred as wastes	Transferred as wastes	Recycled	
16	2-aminoethanol	1,069	0	428	0	0	0
			0	641	0	0	0
63	xylene	8,194	118	0	0	8,041	35
			0	0	0	563	0
108	inorganic cyanide compounds	1,865	0	1,302	0	0	0
			0	0	0	0	0
227	toluene	2,161	4	0	0	2,157	0
			0	0	0	0	0

# Shinnippon Koukyu Co., Ltd.



## Outline

<b>Location</b>	12 Kirihara-cho, Fujisawa-shi, Kanagawa
<b>Site Area</b>	18,200 m <sup>2</sup>
<b>Number of Employees</b>	107 (as of March 31, 2002)
<b>Products</b>	Manufacture of steel balls for ball bearings
<b>Acquisition of ISO 14001 Certification</b>	September 2001

## Status of Environmental Actions

Shinnippon Koukyu is located in a hilly area of Fujisawa, "the town of greenery, sunshine and sea breezes." The company is a specialized manufacturer of steel balls for ball bearings, and was established as a joint venture between NSK Ltd. and Amatsuji Steel Ball Mfg. Co., Ltd. Due to the perfect spherical nature of the steel balls, smoother rotations are produced, thereby contributing greatly to the conservation of energy and resources. However, the plant consumes large quantities of energy in the header, trimming and heat treatment processes, leading to heavy environmental impact. To counter this load, Shinnippon Koukyu has designated the environmental management system as part of its business activities designed to harmonize with the environment and also ISO 14001 certification was acquired in September 2001.

- Technological improvements in the header process enabled the plant to produce balls that need minimal trimming. This saves electric power by improving material yields and shortens the post-processing time. It has also greatly contributed to a reduction in the quantity of grinding swarf.
- The plant has mitigated the quantities of grinding swarf by modifying the magnetic separators that separate water from grinding swarf to reduce the water retention rate.
- The plant sells off waste oils, ensures fractional recovery of packaging materials, and recycles cardboard as well as the gasification of waste plastics. Plant employees have improved the recycling rate for wastes to 98%. The goal of the entire corporation is zero emissions by the end of FY2002.
- As part of our continuing effort to reduce the negative ecological effect of our business activities, the company is constantly promoting green purchasing by evaluating energy conservation and the recycling rate.

Hideo Nakada, Representative—Environmental Management



## Chitose Sangyo Co., Ltd.



### Outline

Location	561 Komagata, Hatsuma, Kakegawa-shi, Shizuoka
Site Area	29,046 m <sup>2</sup>
Number of Employees	82 (as of March 31, 2002)
Products	Turning process of bearing parts; Turning processing and assembly of automatic transmission parts for automobiles and motorcycle parts

### Status of Environmental Actions

Chitose Sangyo started operations in 1968 as a subsidiary of NSK Ltd. The company is located in the western part of Shizuoka Prefecture, equidistant from the Kanto and Kansai regions. In an environment surrounded by tranquil rice fields and tea plantations of the Onshu district, the operation includes turning processing of outer and inner rings of bearings, and turning processing and assembly of parts for automobile automatic transmissions and motor bicycles.

Since these operations are carried out in an area with abundant nature, the company needs to consider the neighboring agricultural lands in its business operations. Since these operations are carried out in an area with abundant nature, the company has to consider the effects its operations will have on the surrounding agricultural areas. Some of the measures to protect the ecology that Chitose Sangyo has implemented, include performing wastewater treatment using a joint purification tank, planting greenery in the neighboring residential area to reduce noise, promoting energy conserving activities and decreasing the amount of industrial waste.

The company plans to acquire ISO 14001 certification by the end of June 2003 and solidify its approach to protecting the environment. At present, environmental management systems are being configured in an attempt to promote development throughout the entire corporation.

Jinichi Okabe, Representative of Environmental Management

## Asahi Seiki Co., Ltd.



### Outline

Location	3-7 Tenjinmae, Kamo-cho, Toyohashi-shi, Aichi
Site Area	57,053 m <sup>2</sup>
Number of Employees	147 (as of March 31, 2002)
Products	Turning process of bearing parts; Thrust bearings and manufacturing of automobile parts

### Status of Environmental Actions

Asahi Seiki is an affiliate company of NSK Ltd. located in country abundant in nature, such as water and greenery. It is adjacent to Shobuen (Iris Garden), Kamo Shrine, and the Muro Irrigation Channel.

The primary products manufactured here includes turning rings (ball bearings and roller bearings), thrust bearings (finished products), and automobile parts for NSK-Warner. Due to the forging and heat treatment processes, the plant's environmental impact stemming from its heavy consumption of energy, is considerable. All employees are simultaneously involved in promoting energy conservation activities confirming the environmental conservation system, working towards the acquisition of ISO 14001 certification in 2003.

- To conserve energy, the adiabatic properties of the annealing furnaces were remodeled for the purpose of reducing radiation of heat. An amorphous transformer was also introduced.
- Regarding the consumption of tap water, steps such as automatic control of water tank levels, repairing water leaks, modification of water pressure, extending the life of processing solutions, and other water conservation measures were taken. As a result, water consumption was reduced by 40% compared to the figures in the previous year.
- Grinding swarf and shot powder were successfully recycled into iron and steel raw materials.
- Sound-proofing walls were constructed in the forging areas to reduce noise.
- Oil-retaining walls were installed in the wastewater treatment system to decrease environmental hazards. Also, in a centralized filtration system for grinding coolants, a detector was installed on the oil plate in order to prevent outflow of grinding coolants into the rainwater drainage due to malfunctions.

Kazuyoshi Yamada, Representative—Environmental Management

## Shinwa Seiko Co., Ltd.



### Outline

	Kutsuki Plant (Head Office)	Shinasahi Plant
Location	921 Miyamaebou, Kutsuki-mura, Takashima-gun, Shiga	1288-1 Shinjyo, Shinasahi-cho, Takashima-gun, Shiga
Site Area	18,723 m <sup>2</sup>	17,540 m <sup>2</sup>
Number of Employees	60 (as of March 31, 2002)	80 (as of March 31, 2002)
Products	Turning process of inner and outer rings for ball bearings	Turning process of inner and outer rings for ball bearings

### Status of Environmental Actions

Shinwa Seiko is located in northwestern Shiga Prefecture in an environment with a gorgeous view of Lake Biwa and Hirasan. This location, with abundant water supply and green foliage, accommodates the Kutsuki Plant and the Shin-Asahi Plant.

Shinwa Seiko carries out pre-processing for bearings, including forging, cold rolling and machining lines. The company has been aspiring to become NSK's world center for the pre-processing of ball bearings. Its primary goal is to establish itself as a reliable corporation by pursuing and improving QCD (quality, cost and delivery).

Based on the "Environmental Management Guidelines for NSK Affiliates," Shinwa Seiko began configuring the environmental management system in FY2000 and has been emphasizing field improvements based on the results of environmental assessment.

- Equipment for briquetting grinding swarf was introduced as early as 1998 in order to reduce the quantity of grinding swarf and to recycle them as a raw material for steel production.
- As preventive measures for environmental pollution, storage locations for chips and steel drums were remodeled last year.
- The company actively promotes separation and recycling of paper waste.

Shinwa Seiko's current strategic aim is to acquire ISO 14001 certification by December 2002. Following this schedule, the company will promote activities for environmental conservation, while raising employees' environmental awareness.

Akishige Akinaga, Representative—Environmental Management

## Nissei Urawa Co., Ltd.



### Outline

Location	5 Shouwanuma, Shoubu-machi, Minamisaitama-gun, Saitama
Site Area	18,974 m <sup>2</sup>
Number of Employees	141 (as of March 31, 2002)
Products	Manufacturing precision machinery (grinding machines for bearings, etc.); Manufacture of precision machinery parts (linear guides)

### Status of Environmental Actions

Nissei Urawa is located in the eastern region of Saitama Prefecture, near the Kuki Iris Park, surrounded by a plentiful water supply and fields of iris and lavender. The company manufactures precision machinery and parts for precision machinery, while maintaining harmony with the surrounding natural environment. Although the environmental impact is small because its primary operations are assembly processes, Nissei Urawa participates in ecological activities such as for pollution control, and reduction of wastes. The company hopes to be able to make its contribution to the environment by developing ecologically friendly machines.

- Sorting boxes are located in each section in the office so that copy paper, computer paper, and other recyclable paper can be classified for recycling. In addition, separation of used paper, including cardboard boxes, newspapers and catalogues, at point of disposal.
- The company has started to classify recyclable shock-absorbing materials, which had been incinerated. In the future, the use of materials for packaging and shock-absorbing materials will be promoted in an attempt to use resources more effectively.
- Metal scraps such as chips are also classified for recycling, and such wastes are outsourced to recycling vendors.
- As energy conservation measures, separate operational temperature ranges for heaters and air conditioners have been set for summer and winter respectively. Energy-efficient models are installed when the existing ones are replaced.

Bunji Azumi, Representative—Environmental Management



## Americas: NSK Corporation, Ann Arbor Plant



### Outline

Location	Ann Arbor, Michigan, U.S.A.
Site Area	217,000 m <sup>2</sup>
Number of Employees	314 (as of March 31, 2002)
Products	Automotive bearings
Acquisition of ISO 14001 Certification	November 2001

### Status of Environmental Actions

The Ann Arbor Plant is located at the southern edge of Ann Arbor, near Detroit, the automotive capital of North America. The plant has served as a ball bearing manufacturer for 89 years since its establishment, and has been at its present location for 45 years. In 1973, NSK reinvigorated the business as a joint venture company, and it has become an important base for the production of bearings for automotive applications. The surrounding areas have drastically changed from agricultural lands to development for office buildings and residential housing. Behind the plant, there is a creek that flows into the Huron River, an arterial waterway leading into the Great Lakes. Production operations are done. As a leading corporate citizen in the environment-conscious Ann Arbor area, the Ann Arbor Plant has taken its responsibilities seriously and continues to promote environmental protection activities.

#### ◎ Environmental Management System

Based on the concept of dealing with environmental issues in advance, the company acquired ISO 14001 certification in November 2000 so as to promote more efficient activities for environmental conservation by re-evaluating the existing system.

Separate teams have been organized to coordinate sustainable resolutions for each environmental concern.

#### ◎ Anti-global Warming

The goal for anti-global warming measures is the efficient use of electricity and natural gas for air conditioning and heating. In an attempt to maximize the efficiency of the energy use, the action teams consider it important to predict estimated energy consumption based on seasonal factors or production levels. As the first step, employees have analyzed the past data for electricity and gas consumption based on actual performance, and set up a system that can predict values as accurately as possible. This system will be used to plan future activities and assess the effects of improvements.

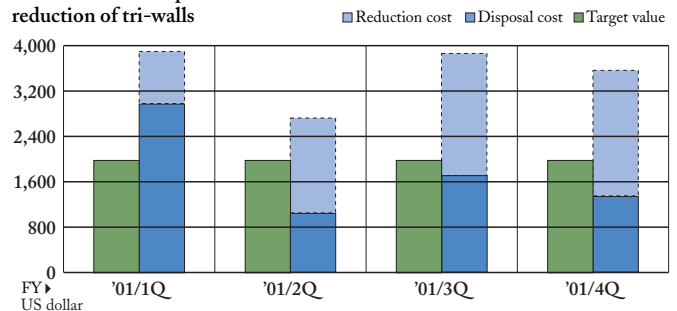
#### ◎ Hazardous Chemical Substances

Trichloroethane has traditionally been used in the cleaning processes, but was abolished at the plant before the establishment of legal regulations. Although hazardous chemical substances are rarely used at this site, a management team was formed to monitor this issue. In addition, a team was formed to control discarded batteries, fluorescent lamps, and mercury switches, and to ensure that they are treated properly. As a measure for ozone-depleting substances, CFC gases used in air conditioners were replaced with non-ozone-depleting gases several years ago.

#### ◎ Waste

The Ann Arbor plant started to reduce the quantities of disposed tri-walls (large cardboard containers with wooden frames) for packing of pre-processed products such as rings and shafts shipped from Japan or other factories. Although the majority of the tri-walls were returned for maximum reuse, the unresolved problem remains with the disposal of those tri-walls damaged from repeated use, and those that were cut when opened. The action team has refined the chopped-up tri-walls and made it possible to reuse them for storage of intermediate processed products in the manufacturing process, and arranged recycling vendors. As a result, the quantities of waste and the costs of treating waste were significantly reduced.

#### Performance of disposal cost reduction of tri-walls



#### ◎ Environmental Risks

Along with the expansion of production, in 1987 and 1988 the entire building interior was remodeled, and its incidental facilities were upgraded. In conjunction with this remodeling, to reduce the environmental hazards, a system that prevents oil discharges from flowing into rivers was installed. The factory wastewater is not discharged into public sewage, but is accumulated in a wastewater tank inside the plant. In case of outflow into the creek due to overflow from accidents or natural disasters, the system includes a manual shutdown valve that can pump the discharge out of the creek.

#### ◎ Social Contribution Activities

As part of beautifying activities in the Ann Arbor area, employees participate in river cleaning activities, and engage in undertakings such as mowing lawns and removing snow in the winter, aiming at business operations that are in harmony with local communities.

# Europe: NSK Bearings Europe, Ltd., Peterlee Plant



## Outline

Location	Peterlee, Durham, U.K
Site Area	124,200 m <sup>2</sup>
Number of Employees	730 (as of March 31, 2002)
Products	Automotive bearings; HUB unit bearings
Acquisition of ISO 14001 Certification	February 1999

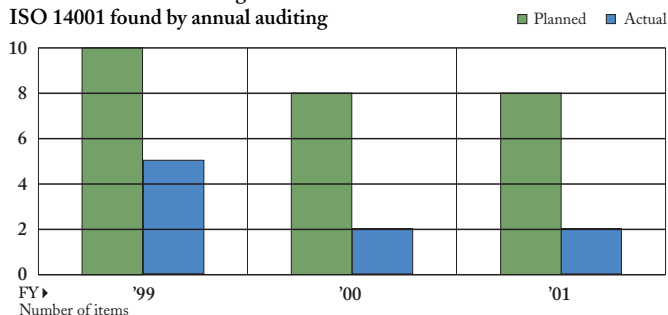
## Status of Environmental Actions

Since the beginning of operations in 1976 in northern England, the Peterlee Plant has had over 25 years of service, and has enthusiastically engaged in community-based business activities, whilst pursuing an integrated production system from forging to turning and finishing processes. NSK Bearings Europe, to which the Peterlee Plant belongs, places enormous importance on the environment, and boasts the outstanding title of the first to publish an environmental report in 1997. The Peterlee Plant also actively promotes activities for the conservation of the environment.

## Environmental Management System

As a means to protect our next generation and their futures, the company recognized the importance of environmental conservation and decided to acquire ISO 14001 certification in 1998. Before acquiring the certification, the Peterlee Plant disclosed information regarding the status of its activities to over 80 organizations, including public and private entities, to give them a thorough understanding of the plant's operations. As a factory management tool, the PDCA cycle (Plan Do Check Action) is circulated and the system performance is evaluated biannually to support continuous improvement in the company's activities. Through this management system, employee awareness of environmental conservation issues is enhanced.

Number of nonconforming cases with ISO 14001 found by annual auditing



## Anti-global Warming

Taking energy consumption and cost reduction into account, energy management has been dramatically improved. The pressure in the air compressor was reduced by 35% compared to that of conventional operation, and warm water discharged from the compressor is now utilized for heating. Moreover, an inverter was installed in the air conditioning units to reduce energy consumption. Additional improvements include changing the exhaust outlets.

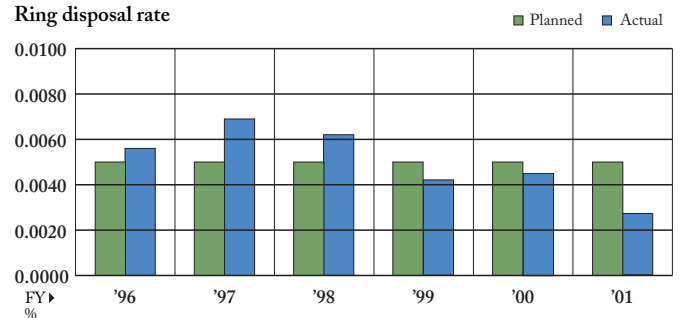
To reduce water consumption, water-saving valves were installed in the toilets.

## Waste

The company considers waste reduction as a major countermeasures against further negative environmental impact. The Peterlee Plant is making its ecological contribution by diminishing environmental impact and reducing treatment costs, and actively participating in activities for the reduction of waste.

- Chips produced by grinding swarf and metal scraps are recycled at 100%
- Quantities of rings and balls to be disposed of have been reduced

Ring disposal rate



- The coolant discharged during the grinding process was separated from the grinding sludge, and the grinding swarf were sold or recycled. A separated coolant was reused.
- The frequency of replacement of a grinding coolant was extended from once a year to once every two years without quality interference, by improving management of the grinding coolant. As a result, the volume disposed was reduced.
- By lowering the grade required, the oils used in the machining process were recycled and grease that had formerly been discharged was also re-used.
- Biodegradable packaging materials were used for just-in-time delivery; at the same, the use of recycled packaging materials was heavily encourage as a means of reducing environmental impact on the users' end.

## Environmental Risks

The operations at the Peterlee Plant produce no risks. However, the possibility of the outflow of harmful substances into the environment through drainage pathways was strictly assessed, and expedient countermeasures were affected. Against the possibility that oils and coolants accidentally flow out to rivers while waste is being removed or during transportation, an outflow prevention tools was installed and a quick response and reporting system was established. All employees receive education and training courses regularly so that they can respond quickly to emergency situations.

# Asia: NSK Korea Co, Ltd., Changwon Plant



## Outline

Location	Changwon, Kyungsangnam-Do, Korea
Site Area	46,114 m <sup>2</sup>
Number of Employees	246 (as of March 31, 2002)
Products	Small size bearings; Automotive bearings
Acquisition of ISO 14001 Certification	December 1997

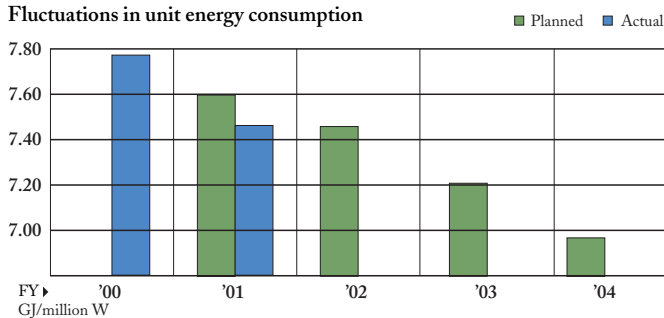
## Status of Environmental Actions

Production of small size ball bearings commenced in 1987 as a step toward the creation of a community-based plant. Since the beginning of operations, this plant was very much aware of environmental issues and safety measures. Among NSK's global network, the Changwon Plant was the first to acquired ISO 14001 certification. The plant has been continuously promoting improvement activities in an attempt to reduce environmental impact.

### ◎ Anti-global Warming

The company's mid-term goal is to achieve a 10% reduction in unit energy consumption per sale by FY2004, compared to that of FY2000, subsequently energy conservation activities have been developed. In FY2001, results could exceed the company's target value. The major activities were as follows: heat efficiency was increased by improvements in rationalized operation of boilers and by cleaning pipes in the boilers; the quantity of light oil used was reduced to a level, which was much less than our target value by adjusting valves in the vaporization pipes in air conditioners at our offices. In addition, electric power consumption was significantly reduced through the introduction of high-efficiency equipment (introduction of an electronic stabilizer for lighting instruments, and use of an inverter), by the management of power factors, and by conservation.

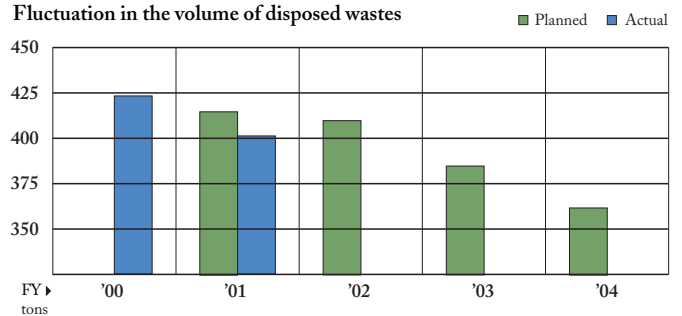
### Fluctuations in unit energy consumption



### ◎ Waste

From the outset, the goal was to reduce the quantity of waste by 14% by FY2004, compared to FY2000. The actual result was a reduction of 22 tons in FY2001, which was far beyond our expectations. As one example showing a significant effect, significant efforts were put into reducing oil waste. Traditionally, oil waste from each process has been disposed of in steel drums, so that total waste was disposed without checking the water contents. The water is now separated from the oil in a newly installed oil/water separation tank. As a result, oils can be reused and the quantity of waste has been reduced.

### Fluctuation in the volume of disposed wastes



### ◎ Hazardous Chemical Substances

Dichloromethane has been used as a cleaning agent, but its use was totally abolished in 1999. As a countermeasure against emissions of dioxins, the use of a small waste incinerator was stopped in 1998. In addition, we are planning to reduce use of halon-based extinguishers and CFC for refrigeration, as a countermeasure against ozone-depleting substances. Furthermore, the company intends to mitigate the volume of oils used in various processes.

### ◎ Environmental Risks

Assuming the possibility of environmental contamination by accidents or natural disasters, training for preventing disasters was conducted to enable us to quickly respond in case of emergencies. Also, in case of an oil outflow accident, training has been conducted periodically to enable employees to execute primary shutdown, secondary shutdown, recovery, and reporting system.



### ◎ Social Contributions

As a part of the plant's community-oriented business operations, the plant participated in a "one company-one river" management activity in order to accomplish tasks, such as the removal of pollutants from the rivers around the plant, removal of soil and sand, and weed control.





# Environmental Communications

## Environmental Education

To promote environmental activities, the most important action is to heighten individual employees' consciousness of environmental issues. Environmental education and awareness activities are available for all employees.

### ◎ Environmental Education and Awareness Activities

- According to the standards outlined in ISO 14001 certification, managers and supervisors as well as general employees can acquire environmental knowledge and technology through educational courses provided for different management levels.
- Environmental education has been incorporated into our educational curriculum. New employees and newly appointed managers (a total of 131 employees) have received environmental education at our head office.



- June has been designated as “Environmental Month.” As part of our event, NSK publishes four newsletters—each dealing with a different environmental topic and is posted on the company’s Intranet bulletin board. The four topics are: environmental issues, wastes, chemical substances, and global warming.
- Special topics concerning the environment are periodically reported in our in-house newsletter (NSK News) for domestic employees, and in our English-language version NSK NEWSLETTER for overseas employees.
- “ECO News” (issued bimonthly) has been posted on the bulletin board on our intranet, in an attempt to improve awareness of the environment by the sharing of information.
- As part of our awareness activities, employees at the Saitama Plant participated in the practical course, “Sainokuni Environmental College” (three months), and organized a team to observe and learn “environmental protection activities in neighboring companies.” We would like to further contribute to the environment by developing human resources capable of tackling ecological issues.
- The percentage of activities concerning environmental issues has increased at different sites. The activity with the theme “a reduction in packaging materials used,” which was conducted by the Otsu Plant (Shiga Manufacturing Division) was highly evaluated and was the grand prize winner at the all-NSK Conference.

## External Activities

NSK has been involved in numerous community activities. We will constantly look for ways to contribute to the general well being of the community in which we operate.

### ◎ Factory Volunteer Actions

- From a community activities view point, litter around the plants was collected by volunteers at each site. Other volunteer cleaning activities included participation in the Shonan Clean-up Campaign at the Enoshima seashore and in the Lake Biwa Water’s Edge Clean-up. The number of sponsored events was 26.

### ◎ NSK Welfare Fund

- The welfare fund (FUREAI Club) was established in 1995 for the purpose of supporting community volunteer activities and projects under the principle of “Let’s integrate into the community and build goodwill by donating instead of drinking a cup of coffee.” The number of volunteers has increased to 4,230 NSK employees.
- The Saitama and Fukushima Branches, as well as the Main Office each contribute by donating welfare vehicles to the community welfare groups. Donation of welfare vehicles was strongly approved by the Hanyu City Social Welfare Council, and a special award was presented to the Saitama Branch.



### ◎ Donation Activities for Foundations and Funds

- “Electro-Mechanic Technology Advancing Foundation” supported by NSK and its affiliates was established in 1981. The main objectives were to accomplish our desire for the dramatic development of mechatronics technology, to promote the advancement of mechanical technology, and to contribute to improvements in people’s lifestyles. The activities include supporting research projects at domestic colleges and research institutes.
- To endorse the theme of “Keidanren Nature Conservation Fund” with the objectives of supporting international nature protection projects and promoting the training of people working on environmental projects. Toward this end annual donations are made each year.
- NSK renewed its membership in the WWF (World Wildlife Fund) and supported various activities, such as the protection of nature in Japan, monitoring wildlife trading, and global environmental issues.
- Donations were made for overseas shipment costs to the Japan UNICEF Association and the Japan Relief & Clothing Center for underprivileged children worldwide.

### ◎ Participation in Local Government Activities

- Two employees from the NSK Fukushima attended the “Utsukushima Eco Leader Training Course” sponsored by Fukushima Prefecture and were appointed environmental protection promotion leaders (Utsukushima Eco Leaders).
- Representatives from the Ishibe Plant (Shiga Manufacturing Division) attended the “Basin/Environmental Summit in Koga” and the “Konan/Koga Mini-Lakes and Marshes Conference.” These meetings were held for the purpose of pursuing joint study and exchanges between local citizens and those associated with business operations, in order to share the awareness of current issues.

**Environmental Communications:**

In order for our readers to understand our commitment and activities, we publish and post environmental information using a variety of mediums.

**Website**

- The NSK environmental report can also be found on our website. Instead of presenting information one-sidedly, since September 2001 we have been accepting public opinions and advice through e-mail to encourage the free communication and exchange of ideas between NSK and our customers.

URL: <http://www.nsk.com>

E-mail: [eco@nsk.com](mailto:eco@nsk.com)



**Environmental Publicity and Advertisement**

- During the period from November 2000 through June 2001, NSK presented a special lecture series on “The Development of Toroidal CVT and Future Trends,” conducted by our lecturers at seven universities at various locations in Japan. The lectures were attended by 1,800 students.
- In response to newspaper articles on our commitments to environmental issues, the office of the Tokyo Small and Medium Business Investment Consultation Company requested a business tour of the Maebashi Plant and a lecture regarding NSK’s actions on environmental issues. We scheduled a tour of the Maebashi Plant in October. A lecture was given on “General Environmental Issues and Actions Taken by NSK,” and 26 people attended.
- In June, the Shanghai International Bearings & Bearing Equipment Exhibition was held in China. With an exhibition concept of “the global-friendly challenge and advanced technology,” our state-of-the-art products including KVS Roll-neck Bearings, CVT and EPS, NSK K1™ Series precision machine products, miniature bearings for HDD, and ROBUST Series bearings were exhibited.

- In order to publicize the outstanding contributions of NSK products to the environment, a special issue on the environment was published in the “NSK Technical Journal,” which is published periodically as an external PR journal. Starting from our commitment to environmentally friendly products, technical articles describe in detail our bearings, precision machinery components, and automotive parts from the standpoint of energy conservation, conservation of resources, cleanliness, and amenities. In this special issue, 15 environmentally friendly products, which were recently developed, were reviewed, and subsequently received sensational feedback from readers.



**Environmental Report**

- Actions taken with regard to environmental issues and our future commitments were reexamined, and our first environmental report was issued last year.
- In response to the distribution of 3,270 copies of the “Environmental Report 2001” (Japanese version) at the end of March 2002, 80 responses to the questionnaires were gratefully received.

Articles of most interest (multiple selections)

Voluntary Action Plans	43%	Environmental Education	24%
Environmental Management Organizations	43%	Manufacturing	24%
Environmental Accounting	35%	External Activities	18%
Product Development	29%	Initiatives Taken by Each Plant and Group Company	18%
Acquisition of ISO 14001 Certification	24%		

Your opinions are very valuable to us, and future environmental activities will be based on these comments. Thank you very much for your cooperation.

## Editorial Policy

This comprehensive report was compiled for the purpose of sharing our concepts of environmental protection activities, our commitments, and the extent to which they reflect on our stakeholders, including investors, stockholders, customers, and residents living within the vicinity of our business offices and plants, as well as our employees.

We strongly believe as component manufacturers that a reduction in environmental impact in the manufacturing division is critical, in addition to the environmental contributions made through our products.

### 1. Securing objectivity

In order to establish an objective understanding of our actions, the report was compiled based on the Environmental Reporting Guidelines (Fiscal Year 2000 Version) compiled by the Ministry of the Environment.

### 2. Assuring transparency

NSK recognizes the importance of candidly informing you of our activities; consequently even complaints from customers are clearly indicated in this report.

## Scope of the Report

NSK Group companies (including manufacturing affiliates at least 50% NSK-owned) were selected as subjects for NSK Environmental Management. In addition to affiliates manufacturing NSK-brand products, the scope of this report also includes affiliates in charge of pre-processes, such as turning processes for bearing parts; affiliates manufacturing steel balls; and affiliates manufacturing machinery. Although these affiliated companies are relatively small in scale and their environmental impact are not excessive, we believe that our commitments as a group to the reduction of environmental impact in all activity areas is essential. In the future, we will further expand the report's scope in an attempt to further fulfill our mission.

### 1. Scope of Subjects for NSK Environmental Management

- NSK, Ltd.

#### NSK Brand Product Manufacturing Affiliates

- NSK Autoliv Co., Ltd.
- NSK Fukushima Co., Ltd.\*<sup>1</sup>
- NSK-Warner Kabushiki Kaisha
- NSK Micro Precision Co., Ltd.
- Inoue Jikuuke Kogyo Co., Ltd.
- NSK Kyushu Co., Ltd.
- NSK Torrington Co., Ltd.

#### Affiliated Companies in Charge of Pre-processes

- Chitose Sangyo Co., Ltd.
- Asahi Seiki Co., Ltd.
- Shinwa Seiko Co., Ltd.

#### Steel Ball Manufacturing Affiliates

- Shinnippon Koukyu Co., Ltd.

#### Machinery Manufacturing Affiliates

- Nissei Urawa Corporation\*<sup>2</sup>

\*1. NSK Ltd. spins off the Fukushima Plant in July 2001 to become NSK Fukushima Co., Ltd. In this environment management system, it was included in the NSK Group along with NSK Autoliv Co., Ltd.

\*2. Nissei Urawa Co., Ltd. changed its name to NSK Machinery Co., Ltd. in June 2002.

### 2. Range of Subjects for Performance Data Processing Regarding Voluntary Action Plans

From the launching of our voluntary action plans in 1993, we have been considering data sustainability. NSK Fukushima Co., Ltd., which became independent last year, was included in the data processing. The Tamagawa Plant, which was closed in 1998, was included in the data processing for the period when the plant was in operation.

Shiga Manufacturing Division (Otsu Plant, Ishibe Plant)

Fujisawa Plant/Technology Division

Maebashi Plant/Technology Division

Soja Plant/Technology Division

Saitama Plant/Saitama Precision Machinery and Parts Plant

Kirihara Precision Machinery and Parts Plant

NSK Autoliv Co., Ltd.

NSK Fukushima Co., Ltd.

## Activity Period

FY2001 (from April 2001 through March 2002)

## Date Issued

September 2002 (Previous issue: September 2001, Next issue: September 2003)

## Related Information

Our environmental activities can also be viewed on the NSK website:

- URL: <http://www.nsk.com>

The related information can be obtained from the following booklets.

If you wish to obtain a copy, please contact the address below:

- Company Overview (Japanese, English, and Chinese versions)  
Introduction to the contents of 2002 business
- Annual Report 2002 (Japanese and English versions)  
Report on the business activities in 2001
- Motion & Control No. 12 (NSK Technical Journal No. 672),  
“Special Issue on Environmentally Friendly Products and Technologies”  
(Japanese and English versions)  
Detailed disclosure of our commitments to environmental protection regarding our products and technology
- Environmental Report 2001 (Japanese and English versions)

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