

ECO report 2003

Think for tomorrow's sake...



Message from the President

Although the earth's natural environment has in its own cycles built-in functions to absorb and mitigate environmental load generated from socio-economic systems, their capacities are limited. Today, the earth environment problems have grown serious, leaving both spatially and temporally extensive impacts such as the global warming and the loss of biodiversity.

Under these circumstances, what is required of us is to achieve the improvement of eco-efficiency surpassing economic growth. It is also essential that producers, consumers and the administration should make their endeavors for environment preservation in their respective positions.

Our company is making progress incessantly, eyeing the technological fronts in the motorization-related area such as spark plugs, sensors and the information & telecommunications area, using ceramic technology as our core competence.

Since our products are used mostly as parts of another product, demonstrating advantages in terms of impacts on the environment is more difficult for them than for final products. We, however, have developed and released onto the world market a number of truly environmentally conscious products in our business areas.

Our spark plugs can extract the full potential out of engines in the entire revolution range from a low speed to a high speed. Our oxygen sensors contribute to global warming prevention through energy conservation and exhaust quality improvement, since they help control the oxygen content in exhaust gases. In the information & telecommunications area, we are developing a sophisticated new IC package technology to improve the processing speed and performance of MPU (micro processor unit) as well as help miniaturize and reduce the weight of MPU.

Meanwhile, we must implement consistent measures to control environmental impacts from our business activities. As an actual improvement made in FY2002, we established technology to switch from chlorinated organic solvents to alternative media and completed a total switchover in November 2002.

In the area of the reuse of waste as resources, the Miyanojo Factory achieved zero emission in September 2002 as a result of the promotion of sorted collection and recycling. Other factories continue their effort to attain zero emission for the achievement of zero emission within FY2003.

With respect to chemical substances control, we have established a system to control them including those subject to the PRTR law according to their hazard ranks. Now we are planning to introduce an online system for MSDS (Material Safety Data Sheet) management in FY2003. Although we achieved 15% reduction of CO₂ in terms of emission per unit production relatively to 1990, the total CO₂ emission had increased due to increased production. We will continue our efforts for improvement steadily including the renovation of production facilities.

As a part of an effort to implement environmental management in our operations including those undertaken by affiliates, the five domestic affiliates (included in our consolidated base accounting) obtained registrations in FY2002 and we aim to obtain a single ISO14001 registration for the entire group companies by the end of FY2003. We also intend to enhance environmental management in our overseas operations through adoption of consistent management policies and promotion of centralized control.

In tackling environmental problems, we need to continue our endeavors in a steady, consistent manner based on a sense of participation cultivated in each employee's mind. In the meantime, we should maintain good communication with the public on environmental affairs as part of our social responsibility.

We release our "Eco Report 2003" covering FY2002 here. (We are planning to report our group companies' efforts separately in site reports in the future.) We believe this booklet will help you grasp the achievements we made in our activities to pursue sustainable growth with principal emphasis on environment preservation. We hope to obtain your understanding and support as well as hear your frank opinions.



President Seiji Haga



Activity topics

Promotion of the group's single ISO14001 registration

09

Total disuse of chlorinated organic solvents

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Zero emission

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■ Editorial Policy

In editing this report, we place emphasis on a lucid presentation illustrating the activities promoted at NGK SPARK PLUG to lower environmental load. We used the "Environment Report Guideline," "Sustainability Reporting Guideline" and "Environment Reporting Guideline" released from the Ministry of Environment, GRI and the Ministry of Economy, Trade and Industry respectively as reference.

- Intended readers : All stakeholders including customers, investors, shareholders, residents of neighboring communities, business associates and employees.
- Period covered : Data cited are actual figures recorded for the period from April 1, 2002 to March 31, 2003.
- Scope of coverage : NGK SPARK PLUG Co., Ltd.: Head Office/Factory, Komaki Factory,

Miyanajo Factory, Ise Factory
Domestic affiliates (7 companies): Iijima Ceramic Co., Ltd.
Nakatsugawa Ceramic Co., Ltd.
Kani Ceramic Co., Ltd.
Nansei Ceramic Co., Ltd.
Nittoku Alfa Service Co., Ltd.
Nittoku Unyu Co., Ltd.
Ceramic Sensor Co., Ltd.

Where a different definition applies such as for environmental accounting, the scope of coverage is specified in each article.

- Issuance : August 2003
 - This is the fourth report published annually since the first one in 2000.
 - The Japanese edition of Eco Report is also available.
 - Eco Report 2003 and previous issues are also available at our web site: <http://www.ngkntk.co.jp/environment/>
- Next publication schedule : August 2004
- Publishing director : Genjiro Hashimoto (Chief Environment Administrator)
- Editor in chief : Shunichi Takagi (General Manager, Environment & Safety Management Dept.)
- Site reports : We have covered detailed data of our environmental load reduction activities promoted at the four factories of NGK SPARK PLUG (Head Office/Factory, Komaki, Miyanajo, Ise), Iijima Ceramic, Nakatsugawa Ceramic, Kani Ceramic and Nansei Ceramic as site reports. Nittoku Alfa Service, Ceramic Sensor and Nittoku Unyu are included in the report for the four factories of NGK SPARK PLUG. Contacts for requesting site reports are shown in the Data Section (P28).
- Communication : • Stakeholders: Messages on this report were received from four stakeholders. (P29)
 - Questionnaire: The following subjects in which many readers expressed their interest in the questionnaire survey in Eco Report 2002 were reflected to this report.
 - Introduction of environmentally conscious product development.
 - The state of green procurement promotion.
 - Communication with local communities.
 - Mail address: To hear opinions or questions on our environmental effort from more people, we have designated the following mail address as the dedicated e-mail address for environmental affairs. eco@mg.ngkntk.co.jp

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Corporate profile



Corporate data

Corporate name : NGK SPARK PLUG CO., LTD.

Head Office : 14-18, Takatsuji-cho, Mizuho-ku, Nagoya

Foundation : October 26, 1936

Capital : 47,869,270,000 yen

Business :
 ① Manufacturing and sales of spark plugs and related products for internal combustion engines
 ② Manufacturing and sales of new ceramics and their applications.

Group companies : 34 subsidiaries (13 in Japan, 21 overseas), 7 affiliates

■ Corporate performance (FY2002)

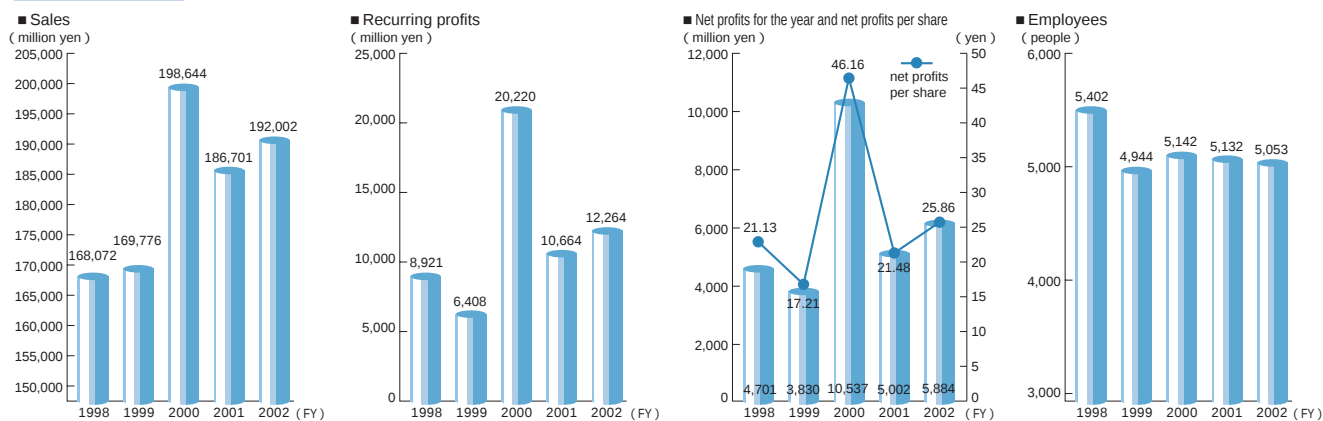
	Non-consolidated	Consolidated
Sales	192,002	228,928
Recurring profits	12,264	15,018
Net profits	5,884	7,347
Net profits per share	25.86	32.36
Number of employees	5,053	9,306

The unit of sales, recurring profits and net profits for the year is million yen, and the unit of net profits per share is yen.
 The number of employees is as of March 31, 2003.

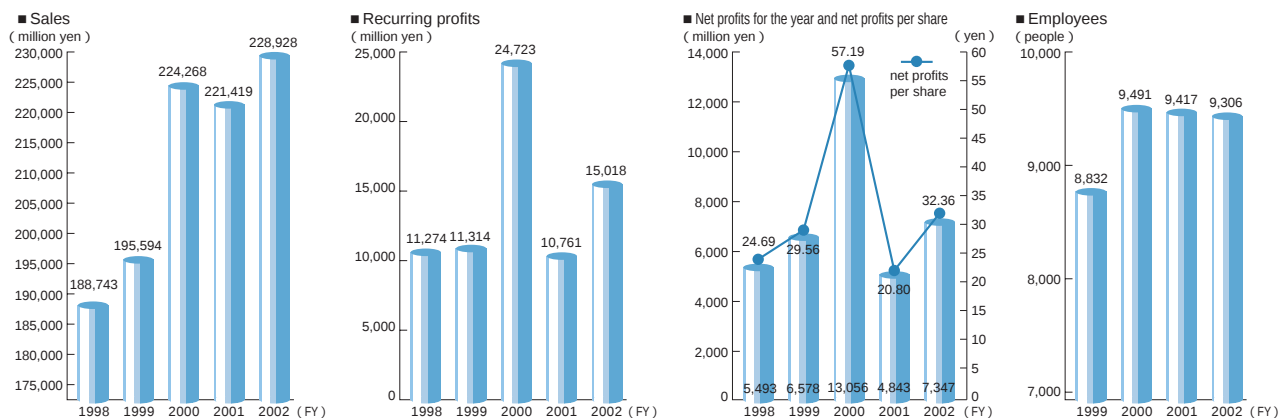


■ Graphical representation of corporate performance indices

Non-consolidated



Consolidated





Products supporting the world



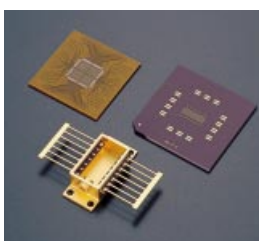
• Spark plugs & Glow plugs

They are essential parts for automobile engines. NGK spark plugs have developed with the history of the company. Our current development emphasis is placed on an environmentally conscious design ensuring consistent efficiency, better exhaust quality and energy saving.



• Sensors

We have developed and marketed various types of sensors that are indispensable in controlling emissions and improving the fuel efficiency of vehicles, conserving energy and global warming prevention. We have also developed sensors which aid in preserving our comfortable living space.



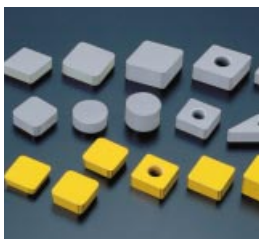
• Semiconductor components

Our ceramic and organic packages fulfill diversifying requirements of semiconductor components that sustain the evolution of the IT industry, while allowing them to attain higher integration, larger throughputs and smaller size for better environmental compliance.



• Electronic components

Mobile phones have become an indispensable item in people's life today. Working inside them are our dielectric filters and antennas, essential for sending or receiving radio waves. It is our never-ending challenge to achieve clearer voice communication and lighter weight.



• Cutting tools

Our advanced cutting tools developed with unique technology are enjoying a good reputation: the ceramic series is suitable for high-speed cutting of cast iron and heat-resistant alloys, while the cermet series is used for semi-finishing and finishing of various steel works.



• Ceramic application products

We also offer a variety of products that take advantage of the features of new ceramics. They cover a wide range of product areas including from industrial machinery parts to ozonizers as an eco-product, ceramic heaters as a consumer product and artificial bones.



Corporate philosophy

Aiming to become a proposal-making corporation,
we continue to present new values to the world.

With global views and ideas, we pursue new values linking technology and people.

Slogan

With established trust and confidence inside and
outside the company, we aim to contribute to the peoples of the world
by creating and putting at their disposal new values for the future.



The history of our environment preservation activities

- Feb.1973 ► Safety and Environment Section (present Environment & Safety Management Dept.) was established.
- Mar.1974 ► Safety and Sanitation Committee and Antipollution Committee were established.
- Apr.1980 ► Antipollution agreement was concluded between Komaki Factory and Komaki City.
- Apr.1980 ► Antipollution agreement was concluded between Miyanojo Factory and Miyanojo Town.
- Nov.1980 ► Energy Conservation Expert Committee was established.
- Nov.1980 ► Miyanojo Factory introduced a closed wastewater treatment system to its plating plant.
- Nov.1993 ► Antipollution agreement was concluded between Ise Factory and Ise City.
- Apr. 1994 ► Ise Factory introduced a closed wastewater treatment system to its plating plant.
- Apr. 1999 ► Environment declaration was announced.
- Jun. 1999 ► Reorganization of Antipollution Committee into Environment Committee. Environmental management system was reviewed and Energy Conservation Expert Committee was organized.
- Aug.1999 ► Head Office/Factory obtained an ISO14001 registration.
- Oct. 1999 ► Waste Sub-committee, Green Procurement Sub-committee, Chemical Materials Sub-committee were established.
- Sep.2000 ► The first edition of Eco Report was issued.
- Dec.2000 ► A single ISO14001 registration covering the company's entire operation sites (Head Office/Factory, Komaki, Miyanojo and Ise) was obtained.
- Jun. 2001 ► The first environment convention was held.
- Jul. 2001 ► Cogeneration plant was installed in Miyanojo Factory and utilization of plating plant waste heat was commenced.
- Sep.2002 ► Miyanojo Factory achieved zero emission.
- Dec.2002 ► A single ISO14001 registration covering the Nittoku group (including the following affiliates: Iijima Ceramic, Nakatsugawa Ceramic, Kani Ceramic, Oguchi Seiki, Nansei Ceramics) was obtained.
- May 2003 ► Voluntary soil survey and soil improvement was performed on the company premises and reported to Nagoya City.
- Head Office/Factory and Komaki Factory achieved zero emission.

Our business activities and environmental impacts



Relations between our operations and the environment

While the commercialization of fuel cells, a much expected energy source causing very low environment load, is desired, we are also promoting the development of sensors used in combination with fuel cells, but engines burning fossil fuel are still leading the world's motorization scenes at present. NGK spark plugs that provide ignition sparks for all sorts of engines used on land, at sea or in the air and various sensors monitoring engine performance keep on working all the time in their respective places to maximize efficiency and minimize environmental load.

Innovations to the size and performance of our semi-conductor and other high-tech ceramic components, has provided a means to improve the environmental compliance of the telecommunications equipment in which they are installed.



Impacts on the Environment from our operations.

Our products are composed mainly of ceramic and metal parts. Ceramics consume much energy during the sintering stage of their production. In the old days, everyone looked admiringly at black smoke rising from the chimneys as a fine symbol of the ceramics industry. Many things have changed since then, the least of which being the change from Type A Oil to natural gas as a cleaner burning fuel that greatly reduces pollution. Our manufacturing plants are focused on minimizing material waste and ensuring production processes such as plating of metals are conducted in a way to minimise environmental load. Our product development teams are also focused on minimizing environmental load by striving to reduce the size of products and using materials with minimal byproducts, and all the while, ensuring performance is maintained.

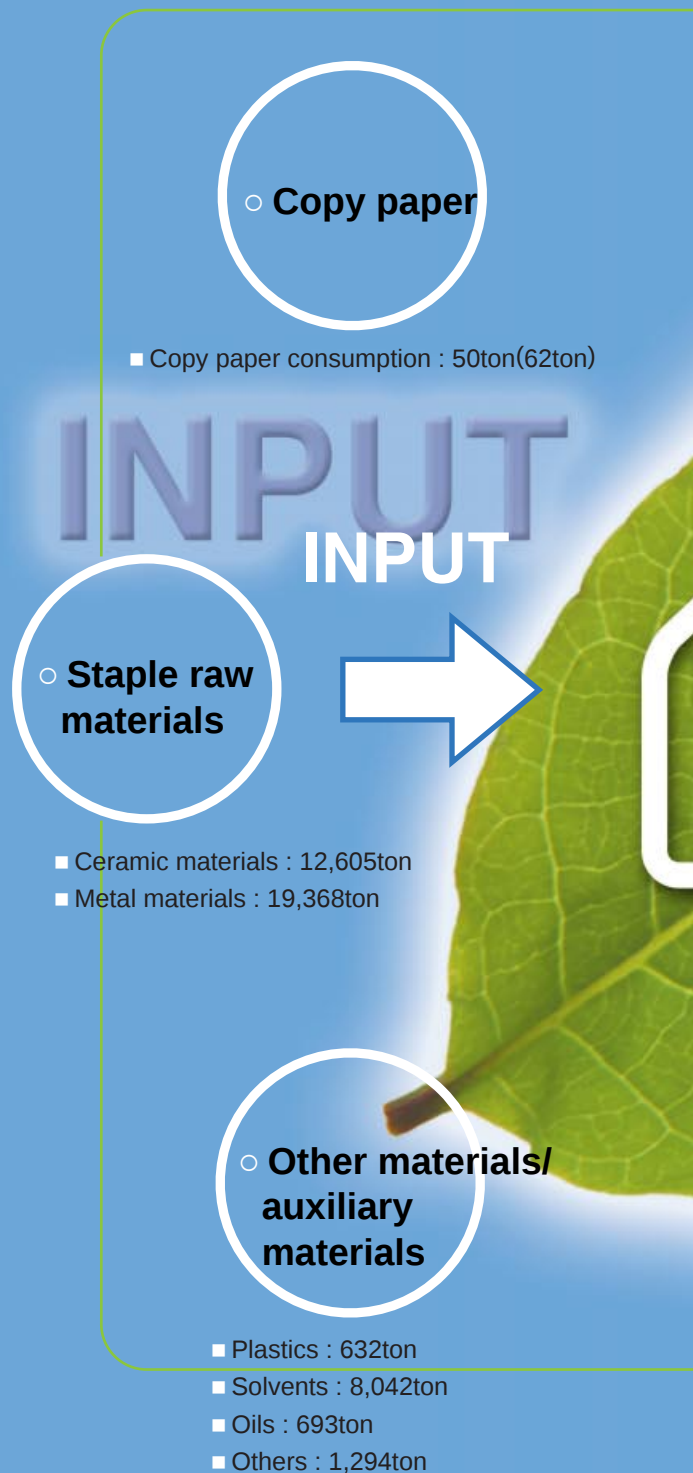


Commitment to Recycling

We have achieved zero emissions at three out of four operation sites in Japan. This was achieved by reusing ceramic refuse, improving the life of chemicals used in plating processes and recycling plating sludge.

We strongly promote the use of recycled materials. In our sites we use construction materials (steel frames, cement, bitumen) made of recycled sintered ceramic waste and other composite material waste generated in the factories. The use of recycled materials extends further with our use of recycled copy paper, toilet paper and cloths throughout the company.

NGK SPARK PLUG's material balance in FY2002





Energy

- Purchased electricity : 190,310,000KWH(272,620,000KWH)
- Gas : 15,522,472m³(16,228,929m³)
- LPG : 1,334,668m³(2,039,497m³)
- A oil : 3,151KL(3,201KL)
- Diesel oil : 291KL
- Kerosene : 4KL

CO₂ emission from energy consumption

- Production : 121,384ton(152,619ton)
- Transportation : 765ton

Release of PRTR-regulated substances

- Air : 16.1ton(144.3ton)
- Water : 0.5ton(0.9ton)

Product shipment

- Products : 27,064ton
- Wrapping/packaging : 2,295ton

- Wastewater : 1,660,401ton(1,949,711ton)

Wastewater

Wastes

- Recycled wastes : 16,073ton(18,304ton)
- Landfill/burning disposal : 594ton(1,191ton)

Water

- Tap water : 747,364ton(909,559ton)
- Well water : 913,037ton(1,040,152ton)

- Plant recycled water : 752,222ton(818,940ton)

■ The figures in parentheses represent data for the Nittoku group, which include affiliates (Iijima Ceramic, Nakatsugawa Ceramic, Kani Ceramic, Nansei Ceramic and Ceramic Sensor) besides the four NGK SPARK PLUG factories (Head Office/Factory, Komaki Factory, Miyanojo Factory and Ise Factory).
Since some operation sites have no installations to measure discharged volume, the combined volume of tap water and well water was taken as wastewater volume.

Environmental principle



Environment declaration (made in April 1999)

We aim to create new values through all our corporate activities such as development, manufacture and sales of environmentally friendly NGK spark plugs and NTK new ceramics products and the provision of services relating to them as a company protecting the global environment and living in symbiosis with society.

In order to achieve this goal, we have compiled an environment action schedule based on our environment policy and will promote management permitting sustainable development and corporate activities always considerate of environment preservation.



Environment policy (revised in April 2000)

1. We commit ourselves to environment preservation and will grasp the effect of corporate activity on the environment accurately, set environmental objectives and targets, and review them regularly for continual improvement of our Environmental Management System (EMS) and performance.
2. We will comply with all the requirements concerning environment preservation of laws, regulations and agreements and every other requirement we have accepted.
3. Priorities in environmental measures
 - a. We will endeavor to prevent air, soil and water pollution.
 - b. We will promote energy conservation.
 - c. We will promote the reduction and effective utilization of wastes in a bid to make good use of resources.
 - d. We will endeavor to design and develop environmentally conscious products.
 - e. We will always respect the environment for local communities.
4. We will implement environmental education and PR activities so that employees are conscious of the importance of and their role in preserving the environment. We will also request our suppliers and contractors to understand our intent and cooperate with us.

■ Four Nittoku factories include the Head Office/Factory (including Nittoku Alfa Service), Komaki Factory (including Ceramic Sensor and Nittoku Unyu), Miyanajo Factory and Ise Factory.

Affiliates mean our four affiliate companies, Iijima Ceramic, Nakatsugawa Ceramic, Kani Ceramic and Nansei Ceramic.

Group companies refer collectively to the four Nittoku factories and the affiliates.

■ 2003 Action Schedule includes a medium-term plan covering until FY2005.

■ For action schedules of affiliates, please see site reports.

1. Komaki Factory direct sector fell short of the target because it failed to achieve energy saving proportional to the declined sales.
Miyanajo Factory fell short of the target because heavy-oil fired cogeneration system introduced in June 2001 increased its CO₂ emission.
Ise Factory indirect sector recorded an increase of CO₂ emission by 26% because an incineration plant started operation in March 2003.
2. Since the rate of wastes utilized effectively was improved, we advanced the target year to achieve zero emission by FY2003.
3. We did not record any violation of a law or regulation concerning the environment.



Environment action schedule (drawn up in April 2002)

Item	FY2002 objectives
EMS construction	• To continue an effort to obtain registrations to have major domestic affiliates registered by FY2003.
Air, soil and water pollution prevention	• To promote thorough control of the release and transfer and reduce the use of hazardous substances (those subject to PRTR law in particular).
	• To disuse chlorinated organic solvents totally at all factories in Japan by FY2002.
Energy conservation promotion	• The direct production sector will decrease total CO₂ emission per unit production by 1% per annum. • Other sectors will decrease total CO₂ emission by 1% per annum.
Reduction and effective utilization of waste	• To achieve zero emission at all factories in Japan by FY2004.
Development of environmentally conscious products	• To further enhance the lines of environmentally conscious products. • To construct and operate an environmental assessment system for product design and development.
Respect for the environment for local communities	• To promote cleanup activities in the neighborhoods of factories. • To promote the beautification of factories' premises. • To actively participate in local communities' environment preservation activities.

FY2002 achievements	Rating	FY2003 action schedule		Relevant laws and regulations 3	Relating pages															
• Five domestic affiliates out of nine obtained registrations in December 2002.		Group companies • To continue an effort to obtain registrations to have major domestic affiliates registered by FY2003.	Group companies • To construct and operate EMS based on ISO14001 at every operation site of the Nittoku group. • To construct EMS at major affiliates including those operating overseas by FY2005.	• Environmental laws and regulations in general	09 10 11															
• Each division identified a few hazardous substances causing the most serious environmental load, implemented and confirmed the effect of control measures.		Group companies • To promote thorough control of the use, release and transfer of hazardous substances.	Group companies • To promote thorough control and reduce the use of hazardous substances. Four Nittoku factories • To reduce the combined total release of PRTR law-regulated substances by 50%, in the period FY2002 to FY2005. Affiliates • To reduce the release of PRTR law-regulated substances by 20% (per unit production), in the period FY2001 to FY2005.	• Offensive odor control law • Ozone layer protection law • Water pollution control law • Air pollution control law • Sewage management law • Law concerning special measures against dioxins • Chemical substance control law • Poisonous and deleterious substances control law • Law concerning special measures against PCB • Soil pollution countermeasure law • Automobile NOx, PM regulation law • Industrial water law • Industrial safety and health law	13 14 27 28															
• Chlorinated organic solvents were totally disused since March 2002.		Group companies • To disuse ozone depleting substances totally by FY2004. Affiliates • To disuse chlorinated organic solvents totally by FY2004.																		
<table><tr><td></td><td>Direct</td><td>Indirect</td></tr><tr><td>Head Office/Factory</td><td>○</td><td>○</td></tr><tr><td>Komaki</td><td>×</td><td>○</td></tr><tr><td>Miyanojo</td><td>×</td><td>—</td></tr><tr><td>Ise</td><td>○</td><td>×</td></tr></table> ○ Achieved × Failed 1		Direct	Indirect	Head Office/Factory	○	○	Komaki	×	○	Miyanojo	×	—	Ise	○	×		Group companies • The direct production sector will decrease total CO2 emission per unit production by 1% per annum. • Other sectors will decrease total CO2 emission by 1% per annum.	Group companies • To continue an effort to reduce CO2 emission and prevent global warming. • The direct production sector will reduce CO2 emission by 4% (per unit production) from FY2001 by FY2005. • Other sectors will reduce total CO2 emission by 4%, in the period FY2001 to FY2005.	• Energy conservation law • Law for promotion of global warming countermeasures • Kyoto protocol • Montreal protocol	15 16
	Direct	Indirect																		
Head Office/Factory	○	○																		
Komaki	×	○																		
Miyanojo	×	—																		
Ise	○	×																		
• Miyanojo Factory achieved zero emission in September 2002.		Four Nittoku factories • To achieve zero emission at every factory by the end of FY2003 and promote waste reduction. 2 Affiliates • To achieve zero emission by FY2005.	Group companies • To continue an effort to reduce wastes and promote effective utilization of resources.	• Waste disposal law • Law for promotion of effective resource utilization	17 18															
• Hexavalent chromium was totally removed from use in spark plugs. • Lead was totally removed and discontinued from use in the glaze of spark plugs.		Group companies • To further enhance the lines of environmentally conscious products. • To construct and operate an environmental assessment system for product design and development. • To promote procurement of environmentally friendly materials. • To achieve the following eco-product procurement rates: Four Nittoku factories: 85% or more Affiliates: 70% or more	Group companies • To develop technology with life-cycle assessment (LCA), which evaluates environmental load and contributes to environment preservation, taken into consideration in the product design and development phase and promote green procurement.	• Container and packaging recycling law • Green purchase law • Chemical substance examination and regulation law • ELV directive • RoHS directive	12 19 20 21 22															
• Cleanup activities were undertaken two or more times a year. Actively participated in events organized by local municipalities as well.		Group companies • To promote cleanup and beautification activities in the neighborhoods of factories. • To actively participate in local communities' environment preservation activities. • To improve transparency through information disclosure and risk communication.	Group companies • As a member of the local community, to continue an effort to form a symbiosis with society through environmental preservation activities.	• Fire services law • High-pressure gas safety law • Noise regulation law • Vibration regulation law	23															

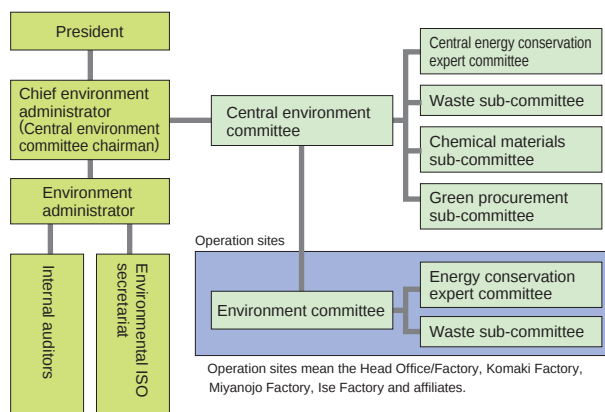
Environmental management system



Organization

Since 1973 we formed organized committees to be responsible for environmental issues and environmental preservation. To effectively communicate and promote the environmental policies throughout the whole company, we have enhanced the responsibilities of these committees. Our present organization has a number of expert committees and sub-committees, controlled by the Environment Committee, each covering various specialty areas. Under this organization structure, every committee has its own plans and objectives, drawn from the Environment Policy, which they strive to achieve.

■ Environmental management organization



Increased the number of sites registered to ISO14001

We are taking active steps to implement Environmental Management Systems (EMS) to all our sites. Our EMS is based on the International Standard, ISO14001. We believe that registration to this standard will strengthen our management's ability to preserve the environment and improve transparency of our activities to the public.

In December 2002, our four factories in Japan were registered together, under a single certificate. Our overseas affiliates are currently acquiring separate registrations but in the future, we intend to combine all our sites under the one group registration. Having the same registration for all companies, means that everyone follows the same environmental policies, manuals and system. This allows for sharing of objectives, better information flow and control, and improved transparency among the companies.

■ ISO14001 registration status

	Office/Factory	Date of registration	Certifying organization
Head Office site	Head Office/Factory	August 1999	TÜVRheinland Japan
Komaki site	Komaki Factory	December 2000	
Miyanojo site	Miyanojo Factory	December 2000	
Ise site	Ise Factory	December 2000	
Domestic affiliates	Nittoku Alfa Service Co., Ltd.	August 1999	
	Ceramic Sensor Co., Ltd.	December 2000	
	Nittoku Unyu Co., Ltd.	December 2000	
	Iijima Ceramic Co., Ltd. Oguchi Seiki Co., Ltd. Nakatsugawa Ceramic Co., Ltd. Nansei Ceramic Co., Ltd. Kani Ceramic Co., Ltd.	December 2002	
	Kamioka Ceramic Co., Ltd. Nichiwa Machinery Co., Ltd. Nittoku Seisakusho Co., Ltd. Tono Ceramic Co., Ltd.	Registration expected in FY2003	
Overseas affiliates (only those that have already obtained registrations)	NGK Spark Plug (USA), Inc., WV factory	July 2000	TÜV RHEINLAND OF NORTH AMERICA
	NGK Spark Plug (USA), Inc., IRV factory	August 2001	ABS QUALITY EVALUTION INC.
	Ceramica e Velas de Ignicao NGK do Brazil Ltda.	December 2001	AFAQ
	NGK Spark Plug Industries Europe S.A.	May 2000	BSI (British Standard Institute)
	Siam NGK Spark Plug Co., Ltd.	November 2002	TÜV

Oguchi Seiki and Nittoku Seisakusho were agglomerated as Nittoku Seisakusho in April 2003.



Environmental management system audit

We improve our EMS continually by letting PDCA cycles run along the ISO environmental management system standard.

An internal audit conducted once a year is performed by teams of two internal auditors registered with the company according to the internal audit check list. If any nonconformities or problems are pointed out in the internal audit, corrective actions will be taken promptly. The internal auditors receive skill-maintenance training every year to maintain and enhance their auditing ability.

External Auditors audited the company's EMS in FY2002 and offered twelve points for improvement across the four operation sites. At the completion of the audit, the auditors expressed their satisfaction that the EMS was being properly operated and expressed confidence in our process of continual improvement.

■ Number of ISO14001 auditors

Assistant EMS examiners	6
Internal environmental auditors	254



Audit by external auditors



Audit by internal auditors



Skill-maintenance training of internal auditors



State of compliance with statutory regulation

To ensure compliance for our corporate activities, we give our best to take necessary steps promptly to comply with any amendments to laws, and to say nothing of the established statutory regulation, according to the environmental measures stipulated in our corporate behavioral norm. Our factories do their best to comply with the relevant statutory regulation and other requirements agreed to with the authorities according to our environment policy. In addition, they have concluded antipollution agreements with autonomous bodies and voluntarily accepted standards harsher than those required under the law in an effort to prevent

pollution.

In FY2002, we had no reported violation of regulatory values nor any actions or complaints were instituted or received from local residents with respect to pollution or matters relating to it.

■ FY2002 records for four Nittoku factories

Number of reported violations of statutory regulation, penalties and actions	0
Claims made by stakeholders	0



Risk management

We conduct environmental risk management according to our environment policy to prevent air, soil and water pollution.

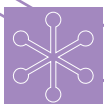
We also give our employees disaster control education and training to prepare ourselves well in the event of an accident.

■ Improvement of soil contamination at the north parking lot of the Head Office

The Ministry of the Environment enhanced regulation of soil pollution by enforcing the Soil Pollution Countermeasure Law based on the Environmental Quality Standards for Soil Pollution in February 2003. We started a soil contamination survey of our plant sites in June 2001 to identify the state of soil pollution. As a result of the survey, we found that soil was contaminated by lead and hexavalent chromium, which were detected in the highest points at concentrations of about 12 times and 1.2 times higher than their respective tolerable concentration levels in soil set by the standards, in the parking lot developed on the site of the former north plant building. We voluntarily reported the results to Nagoya City in February 2002 and promoted soil improvement work under the guidance of Nagoya City.

History of rectification of soil contamination	Actions
June 2001 ~ January 2002	As a result of the soil survey at our Head Office/Factory, contamination by lead and hexavalent chromium was detected in the former plant site (present parking lot)
February 2002	Reported the results to Nagoya City and submitted a soil improvement plan.
June 2002 ~ August 2002	Soil improvement work
November 2002	Pavement work completed and put to use as a parking lot.
May 2003	Submitted a completion report to Nagoya City and obtained its approval.





Environmental accounting

In 1999 we introduced environmental accounting as a tool to facilitate managerial decision making and promote information disclosure by quantitatively measuring investment costs and expenses incurred in connection with environmental measures and their effect. For FY2002, we prepared consolidated-base accounting data also covering our affiliates that attained ISO14001 registrations under our single registration certificate. The total environment preservation cost incurred by NGK SPARK PLUG in FY2002 was ¥7,789 million on a non-consolidated basis and ¥8,275 million on a consolidated basis. The breakdown shows that over 60% of the spending went towards R&D with costs within the business area as the second largest cost item.

The cost saving effect of environment preservation measures taken in FY2002 was measured at ¥517 million.

■ Effect of environment preservation measures shown in yen

The period covered is from April 1, 2002 to March 31, 2003.

Unit: million yen

Areas of recognized effect		Amount
Revenue	Revenues generated from the recycling of wastes generated in operations or used products.	48
Cost saving	Energy cost saving achieved with energy conservation efforts.	164
	Waste disposal cost saving achieved with resource saving and recycling efforts.	117
	Other cost saving achieved by environmental measure-related rationalization.	188
Total		517

■ Environment preservation cost

Unit: million yen

Items			NGK SPARK PLUG (non-consolidated)				2 NGK SPARK PLUG (consolidated)	
Classification	Major efforts		Investment		Expense		Investment	Expense
			FY2001	FY2002	FY2001	FY2002	FY2002	
Costs within the business area	Pollution prevention cost	Air/water pollution prevention and noise reduction	474	142	1,063	1,109	151	1,354
	Global environment preservation cost	Global warming prevention, energy conservation	8	6	132	128	7	152
	Resource circulation cost	Effective resource utilization, industrial waste treatment/disposal	30	27	537	495	33	659
	Sub-total		512	175	1,732	1,732	191	2,165
Upstream & downstream cost		Recycling of products, etc., green purchase differences	0	0	5	5	0	5
Management activity cost		Employee environmental education, EMS construction and operation	7	9	392	253	9	284
R&D cost		R&D of products promoting environment preservation	815	601	5,745	4,726	601	4,726
Social activity cost		Nature protection, afforestation, environmental ads	0	0	109	114	0	119
Environment damage correction cost		Repair of soil contamination, disrupted nature	0	0	17	174	0	174
Total			1,334	785	8,000	7,004	801	7,474

■ Environment preservation cost has been classified into subsets according to the guidelines published by the Ministry of the Environment, while proportional allocation based on rules set by the Nitto group was applied in calculating each amount on the basis of actual investment costs and expenses recognized as of a direct nature.

1 Expenses associated with a voluntary soil survey and soil improvement work undertaken on the company's premises following the legislation of the soil pollution countermeasure law.

2 Five affiliates, Iijima Ceramic, Nakatsugawa Ceramic, Kani Ceramic, Nansei Ceramic and Ceramic Sensor, are included in our consolidated-base accounting.

■ Environment preservation effect measurements

Classification		Environment preservation effect (non-consolidated)				(consolidated) FY2002 results
Effect measured in the business area	Types of effect	FY2001 results	FY2002 results	Year-on-year	Rating	
Effect measured with respect to resources input into operations	Energy consumption					
	Purchased electricity (10,000 KWH)	19,153	19,031	- 0.6 %	🟢	27,262
	Gas (m³)	15,485,436	15,522,472	+ 0.2 %	🟢	16,228,929
	LPG (m³)	1,124,996	1,334,668	+ 18.6 %	🟢	2,039,497
	A oil (KL)	2,455	3,151	+ 28.4 %	🟢	3,201
	Water consumption					
	Tap water (ton)	658,617	747,364	+ 13.5 %	🟢	909,559
	Well water (ton)	1,066,831	913,037	- 14.4 %	🟢	1,040,152
	PRTR law-regulated substance consumption (ton)	552	510	- 7.6 %	🟢	738
	Copy paper consumption (ton)	60	50	- 16.7 %	🟢	62
Effect measured with respect to environmental load and wastes from business activities	CO ₂ emission from energy consumption (ton)	118,197	121,384	+ 2.7 %	🟢	152,619
	Emission per unit production (ton-CO ₂ /output added value) (ton/million yen)	1.22	1.20	- 1.1 %	🟢	1.51
	Recycled plant wastewater (ton)	621,161	683,242	+ 10.0 %	🟢	749,960
	Waste (ton)					
	Recycled mass (ton)	13,406	16,073	+ 19.9 %	🟢	18,304
	Landfill, burning disposal (ton)	1,357	594	- 56.2 %	🟢	1,191
	PRTR law-regulated substance released to air and water (ton)	23	17	- 26.1 %	🟢	145



Eco-efficiency

To realize a sustainable society, we need to heighten our resource and energy utilization efficiency and lower environmental load per unit economic activity as much as possible.

We intend to promote our environmental preservation activities with emphasis on eco-efficiency by using eco-performance indices.

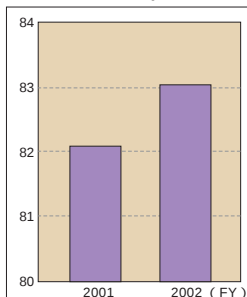
In our company, eco-efficiency is calculated with the following formula, in which CO₂ emission and waste discharge from the production processes are used as environmental load.

$$\text{Eco-efficiency} = \frac{\text{Output added value}}{\text{Environmental load}}$$

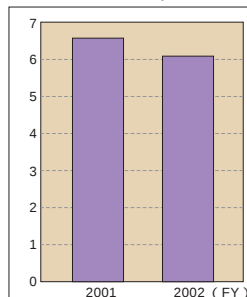
We intend to continue our effort to improve eco-efficiency.

Output added value is calculated by subtracting the material costs and the costs of outsourced processing from the sales.

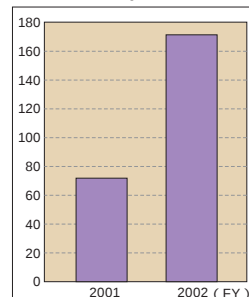
■ CO₂ index from production



■ Waste index from production



■ Landfill/burning disposal index from production



Green procurement

In purchasing and using various supplies necessary for our routine operations, we will shift our priority to environmentally conscious products. In this way, we will improve our employees' consciousness of environment preservation at our workplaces, while promoting various efforts leading to 3R's (reduce, reuse and recycle), energy and resource conservation.

■ Basic stance

In procuring or purchasing raw materials, parts, goods and services, we will give a careful thought to purchase only those things that are really necessary, give priority to those that cause less environmental load, and purchase from suppliers who positively commit themselves to environment preservation.

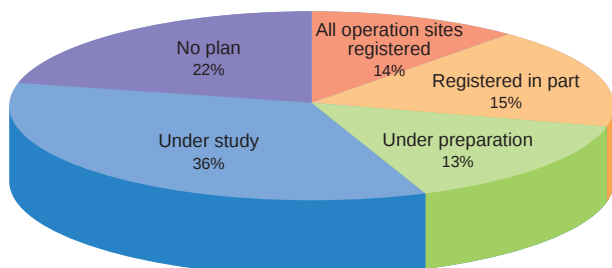
■ Request to suppliers

In FY2002, we conducted an environmental management status survey to hear from about 380 suppliers, an increase by 110 companies over the previous year, their corporate attitudes toward environmental affairs for correct recognition and request for their cooperation to our cause.

We are also promoting environment preservation activities in cooperation with suppliers by establishing in October 2001 green purchase guidelines, which explain our basic idea on green procurement to our suppliers, to bring our environment policy into effect.



■ State of ISO14001 registration of our major suppliers (results of FY2002 survey)



■ Control and reduction of hazardous substances

In response to the growing need for control and reduction of the use of hazardous substances, we are controlling all hazardous substances contained in the products and parts we procure by setting hazard ranks.

■ Classification for hazard ranking

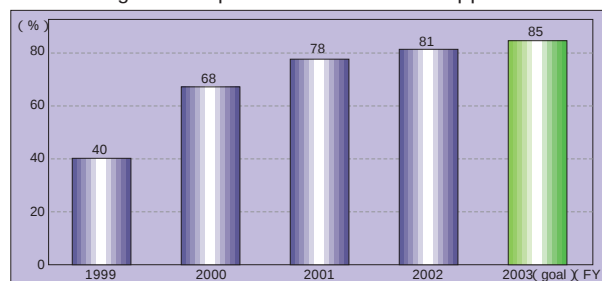
Inhibited substances	Chemical substances designated by our company among those that are subject to statutory regulation to ban manufacture, etc. under relevant laws including Chemical substance examination and regulation law, Industrial safety and health law, Water pollution control law, Air pollution control law, Ozone layer protection law, and Law concerning special measures against dioxins because of their known harm to the environment or human health.
Limited substances	Chemical substances designated by our company among those that are subject to statutory regulation under relevant laws including Waste disposal and public cleansing law and Law for promotion of global warming countermeasures because of their known harm to the environment or human health.
Voluntary control substances	Chemical substances designated by our company among those that are named in relevant laws including Chemical substance control law, Poisonous and deleterious substances control law, Fire services law, and High-pressure gas safety law because of their suspected harm to the environment or human health.

■ Shift to eco-products promoted for office supplies

We are promoting a shift to environmentally conscious eco-products that cause less environmental load actively for office supplies and daily necessities consumed in our company. The ratio of eco-products to the total purchases reached 81%, an increase by 3% over the previous year, in FY2002. During the year, we published internal guidelines in October 2002 as part of our effort to improve our employees' consciousness.

We intend to continue our effort along the present line to switch to products that are designed to allow replacement or refill of consumable elements and increase the purchase of eco-products.

■ Percentage of eco-products in the office supplies



Measures to prevent air, soil and water pollution



Construction of a system to control hazardous substances

We have established a system to control hazardous substances according to their hazard ranks (determined on the basis of statutory regulation in Japan and overseas, developments anticipated in the future, and customer-imposed regulation of the content in products) and restrict their use from the development phase.

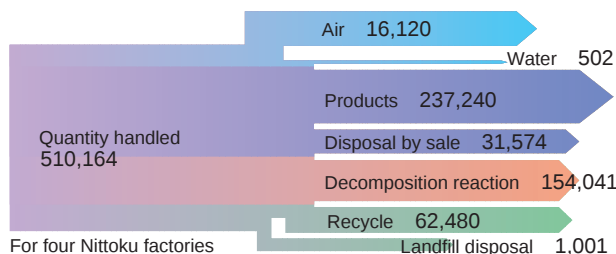
■ Control of PRTR law-regulated substances

We aim to reduce the release of PRTR law-regulated substances by 50% in the period FY2001 to FY2005. NGK SPARK PLUG as a whole handled 29 substances totaling 510 tons (down 7.6% from the previous year) and released 16 tons (down 27.3% from the previous year) in FY2002. They included 15 substances subject to a reporting obligation under relevant laws.

In FY2002, we established technology permitting the use of alternative media to replace chlorinated organic solvents and completed a total switchover.

Having constructed an MSDS (Material Safety Data Sheet) management system to ensure proper control of risks associated with chemical substances, we provide information on approximately 3,000 products to draw users' attention to care required in handling and any applicable laws.

■ PRTR law-regulated substance input and output (kg)



■ Aggregate figures concerning PRTR law-regulated substances:

For: four Nittoku factories

(Unit : kg)

Ordinance No.	Chemical substances	Quantity handled	Release quantity			Removal/disposal quantity Decomposition reaction	Disposal as wastes		Quantity released and rating			Quantity handled FY2001
			Air	Water	Soil		Landfill	Recycle	FY2001	FY2002	Rating	
1	Water-soluble zinc compounds	39,393		9		0	8	6,794	8	9	+	33,077
30	Condensation polymer of 4,4'-isopropylidenediphenyl and 1-chloro-2,3-epoxypropane (alias, bisphenol A epoxy resin) (only that in the liquid form)	1,206				0	66	0				
40	Ethyl benzene	2,520	303			2,216		0	326	303	-	3,119
43	Ethyleneglycol	1,440						1,440				
63	Xylene	29,092 (44,392)	1,732 (9,252)			20,266 (20,266)		7,180 (8,548)	1,784	1,732	±	32,103
64	Silver and its water-soluble compounds	2,528					2	299				33,077
68	Chromium and trivalent chromium compounds	6,846 (18,948)					300 (3,629)	4,227 (4,245)				4,147
69	Hexavalent chromium compounds											2,113
100	Cobalt and its compounds	2,568					7	59				2,370
108	Inorganic cyanogen compounds (except complex salt and cyanate)	7,178 (12,096)		(1)		4,105 (5,152)		38 (2,418)			+	9,357
144	Dichloropentafluoropropane	10,410	10,410						3,600	10,410	+	3,600
200	Tetrachloroethylene								729		-	4,258
207	Water-soluble copper salts (except complex salt)	36,974		38				991	28	38	+	24,375
211	Trichloroethylene	1,085	1,085						10,867	1,085	-	14,720
227	Toluene	123,397 (246,648)	2,032 (120,644)			120,696 (120,696)		447 (1,086)	4,434	2,032	-	121,664
230	Lead and its compounds	46,972 (55,443)		3 (3)			3 (4,590)	16,549 (17,987)		3	+	90,922
231	Nickel	149,767 (152,255)										162,033
232	Nickel compounds	9,717 (11,233)		6 (6)			7 (7)	2,790 (4,306)	31	6	-	8,974
253	Hydrazine	(7,790)	(519)	(384)		(1,773)		(5,114)				
270	Di-n-butylphthalates	(36,011)	(1,508)			(4,325)	(7,730)	(7,690)				
272	Bis (2-ethylhexyl) phthalates	(1,931)				(105)		(1,612)				
283	Hydrogen fluoride and its water-soluble salts	(3,151)		(18)				(3,119)				
299	Benzene	5,727				5,714			4	13	+	7,166
304	Boron and its compounds	8,766 (10,396)	127 (127)	447 (447)			518 (569)	282 (305)	894	619	-	8,448
309	Poly (oxyethylene) nonylphenoether	6,510				66		6,443				7,592
310	Formaldehyde	6,911	238			44		6,527	6	238	+	3,420
311	Manganese and its compounds	8,530	2				25	8,087		2	+	5,578
314	Methacrylic acid	1,342	133			934		275	157	133	-	1,557
346	Molybdenum and its compounds	1,287 (14,625)					55 (1,810)	52 (827)				1,627
		510,164 (738,061)	16,120 (144,279)	502 (905)		154,041 (161,291)	1,001 (18,444)	62,480 (88,172)	22,868	16,622	-	552,218

■ The figures shown in parentheses represent data of the Nittoku group, which includes our four factories (Head Office/Factory, Komaki, Miyanajo and Ise) and affiliates (Iijima Ceramic, Nakatsugawa Ceramic, Kani Ceramic, Nansei Ceramic and Ceramic Sensor).

1) The shaded boxes show the substances we reported to the prefectural government, etc. pursuant to the PRTR law as substances required of a report in FY2002 (those that are handled in excess of 5 tons a year at a location). When a quantity handled at a location (factory) was less than 1 ton, the quantities of such a substance were added to neither of the Release quantity and Removal/disposal quantity.

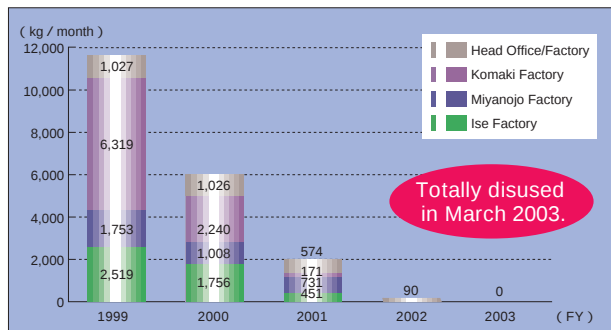
2) How to interpret ratings: - means a decrease from the previous year. ± means on the same level with the previous year (within ±5%). + means an increase over the previous year.

■ Major efforts to reduce the use of hazardous substances

Hazardous substances	Major actions taken
Chlorinated organic solvents	We totally disused chlorinated organic solvents (trichloroethylene, tetrachloroethylene, dichloromethane, etc.), which were used as dispersant for making up raw material slurries or cleaning agents, in March 2003 by developing technology permitting the use of alternative solvents.
PCB	High-voltage equipment and ballasts for fluorescent lamps containing PCB are kept in good custody at the Head Office/Factory and Komaki Factory.
Ozone-depleting substances/ greenhouse gas	Tests are now underway to switch to alternative products: dichloropentafluoropropane (HCFC-225)

No dioxins are generated from our operations.

■ Efforts to reduce the use of chlorinated organic solvents



Cases of successfully achieved improvement

■ Actions to eliminate hazardous substances from a spark plug

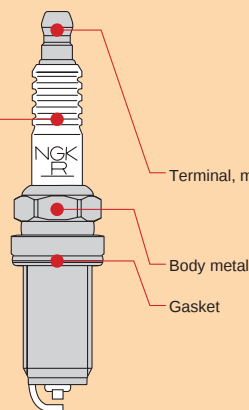
Lead-free glaze

Glaze (containing lead oxide) → Lead-free glaze

[Switchover completed in FY2002]

Key issue in the development

How to maintain a glossy finish and the smoothness of a surface.



Weight reduction (miniaturization)

Light weight achieved by the development of a compact spark plug → Resource saving, improved fuel economy

[Continual improvement]

Key issue in the development

Approximately 6% weight reduction was achieved in five years.

Environmental improvement made in the chromate treatment process

Galvanized colored chromate (containing hexavalent chromium) → Galvanized trivalent chromate (free of hexavalent chromium)

[Switchover completed in FY2002]

Key issue in the development

How to provide a good anticorrosion property without impairing the appearance

■ Noise reduction of a mill blending/crushing operation

Glow Plug Dept.

Our crusher mill in the glow plug raw material process generated noises of over 90dB. To protect operators' health and reduce offensive noises crossing beyond factory borders, we studied the feasibility of covering the equipment with various acoustic sheets, and found that a combination of an acoustic sheet with a metal liner and an air-pack sheet, a cushion material with small cells containing air trapped inside, could produce significant noise reduction. The layer of air trapped inside an air-pack sheet produced an acoustic effect greater than expected, allowing us to lower the noise level down to 81.2dB with a simple, inexpensive means. Then, the noise level was further lowered to 78.4dB, or a class 1 noise control level, with the implementation of a measure to control motor noise.



Mr. Kesamitsu Kanamaru, Glow Plug Dept.

Noisy

Can't hear voices on the telephone.

Can't even have a chat.

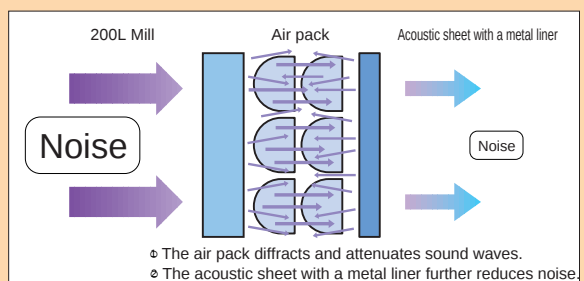
Sound-level meter

90.2dB

History and results of improvements

Measures	Schematic showing improvement	Acoustic material	Effect in dB
Original state		No measures taken	90.2
Measure 1		An acoustic sheet with a metal liner was wound around the mill.	90.0
Measure 2		The mill was wrapped three times with an acoustic sheet, a polyurethane sheet on top of it, and then an acoustic sheet again.	88.9
Measure 3		The mill was wrapped with air-pack sheets with independent air cells twice and then an acoustic sheet on top of them.	82.5
Measure 4		The same acoustic measure was applied to the sides of the mill.	81.9
Measure 5		The same acoustic measure was applied to the front safety gate.	81.2

Mechanism of the acoustic effect



Promotion of energy conservation



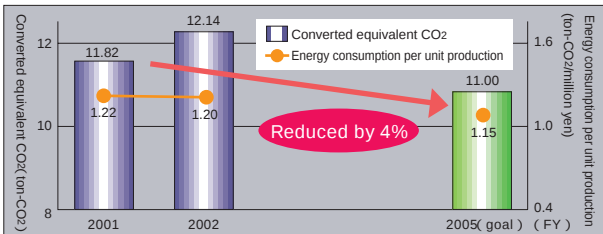
CO₂ reduction plan

Our stated goal is, "The direct production sector should reduce CO₂ emission per unit production by 4% from FY2001, and other sectors should reduce total CO₂ emission by 4% from FY2001 by FY2005."

Our FY2002 objectives are as follows:

- The direct production sector should decrease total CO₂ emission per unit production by 1% per annum.
- Other sectors should decrease total CO₂ emission by 1% per annum.

CO₂ emission reduction goal



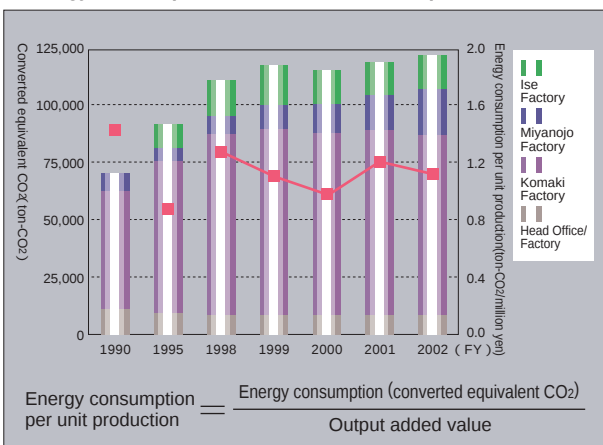
CO₂ emission reduction

We reduced our CO₂ emission by 15% from FY1990 to FY2002 in terms of energy consumption per unit production, thanks to improved productivity, etc. In FY2002 alone, we achieved 1.1% reduction against 1% targeted in our plan.

To examine the breakdown by sector, however, the direct production sector registered CO₂ emission per unit production 1.4% worse than its previous year figure, while the indirect sector improved CO₂ emission per unit production by 10% (or by 6.6% in the total emission) and offset the increase recorded by the direct production sector.

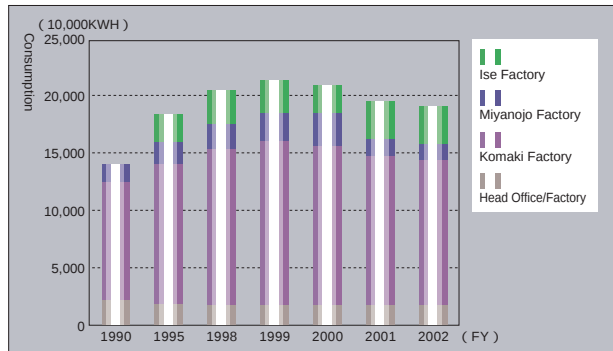
In the indirect sector, the energy conservation efforts made in the everyday life of our employees are beginning to bear fruits.

Energy consumption records (converted equivalent CO₂)

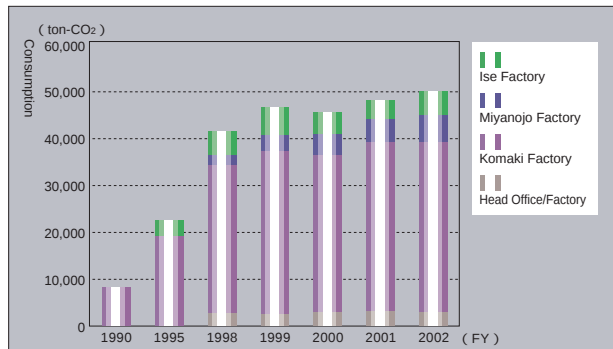


Trends observed in our energy consumption

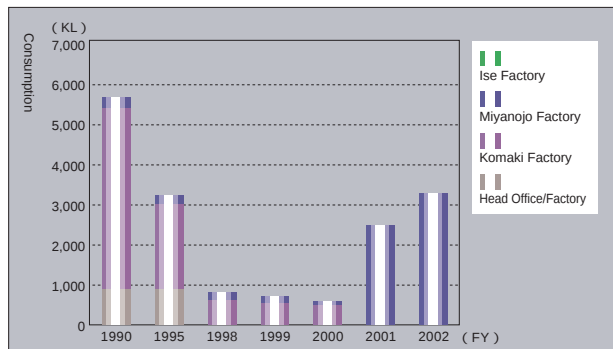
Electricity



Gas (converted equivalent CO₂)

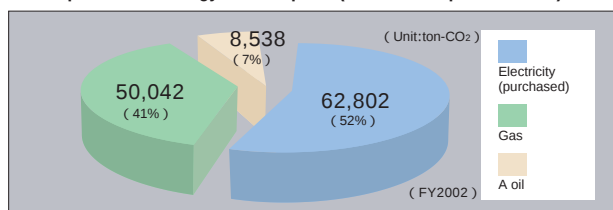


Type A oil



The Miyanojo Factory introduced a cogeneration plant in FY2001, which pushed up the company's overall heavy oil consumption.

Composition of energy consumption (converted equivalent CO₂)





Cases of successfully achieved energy conservation (Office sector)

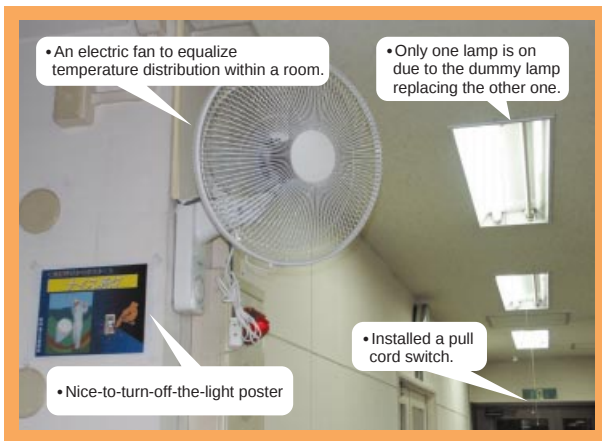
Plug Planning & Administration Dept. and
Production Engineering Dept. of Head Office

A team of seven including the manager has implemented various energy conservation measures in its monthly activity to eliminate wasteful use of lights and air-conditioning systems without employing sensors or other automatic means as long as possible. For improvement of lighting, we have performed illuminance measurement during the day and night, at over 50 points, and reduced the number of fluorescent lamps according to the measurement results, while paying due respect to employees' safety and health by ensuring that specified illuminance levels and workability were both satisfied even after energy conservation measures were taken. As a result, we achieved significant energy saving reaching 20% for air-conditioning systems alone or 16% as overall electricity consumption.



Mr. Akiyuki Saeki,
Production Engineering Dept.

■ Workplace implemented with energy conservation measures



Logistics

We have rationalized our material flow systems linking our factories in the production phase before the shipment of products by introducing efficient transportation means and a modal shift as part of our effort to reduce CO₂ emission.

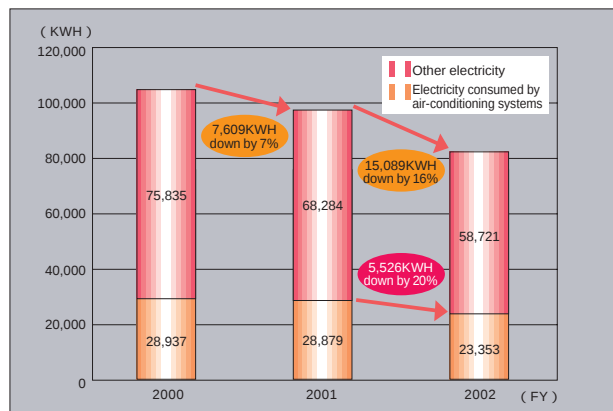
■ Major actions taken

- 1 We have switched one of the three inland freight services connecting Miyanojo Factory and Head Office to one utilizing a ferry boat for the section between Osaka and Shibushi.
- 2 We used to ship all the goods from Nagoya Port to overseas destinations. Now we ship 40% of the final products from Hakata Port, which is closer to the Miyanojo factory, thus eliminating unnecessary transportation.

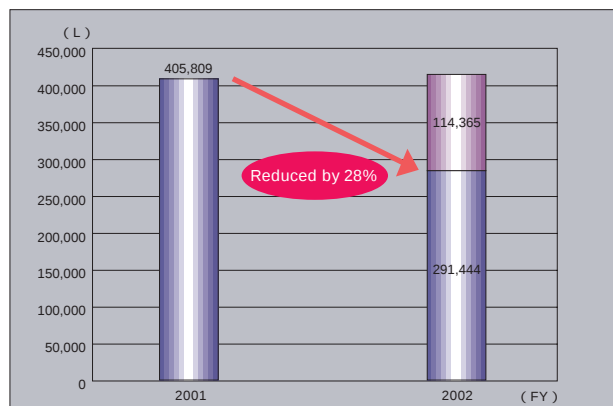
■ Major actions and their effect

	FY2001	FY2002
Fluorescent lamps	• Review of collective control switches (May) • Installation of pull cord switches: 10 places in Production Engineering Dept. (October) • Replacement of 23 lamps with dummy lamps (December)	• Installation of pull cord switches: 33 places in Planning & Administration Dept. (October) • Installation of pull cord switches: 26 places in Production Engineering Dept. (October) • Appointment of persons responsible for turning off power. (October)
Air-conditioning system	• Installation of a timer on the locker room air-conditioning system as a precaution in case it is inadvertently left on. (June)	• Installation of electric fans: 3 in Production Engineering Dept. (June/July) • Air-conditioning system disconnected by breakers during off-season (April, May, October, November) during long holidays (July, August, December, January)
Others	• Foundation of the departmental energy conservation committee (April) • Formulation of electricity conservation rules. • Adoption of LCD displays for PCs: 18 replaced (May) • Installation of shading films (June)	• Toilet stool heaters turned off during long holidays (May, July, August, December, January) • Posters urging to turn off lights put up (October)

■ Effect of conservation measures on electricity consumption



■ Reduction of fuel consumed for transpiration



Reduction and effective utilization of wastes

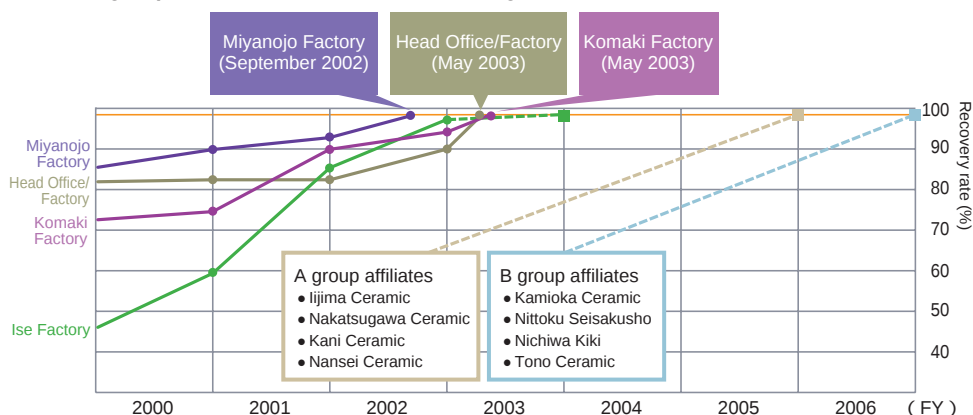


Zero emission activities

As a result of our continual efforts over the past four years to promote sorted collection and recycling of wastes generated in various steps of the raw material, design and production processes, Miyanojo Factory achieved zero emission with its recovery rate exceeding 98% in September 2002. We aim to achieve zero emission at every factory in

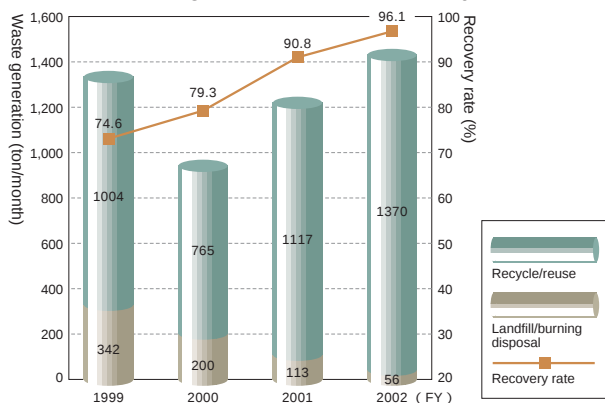
FY2003. Those factories that have already attained zero emission will change their view point and concentrate their efforts to minimize input mass by promoting "Reuse" and "Reduction" of raw materials within our company, grasping material flows of the entire processes as the material balance.

■ Nittoku group's zero-emission achievement targets and results



Article reported on the Minami Nihon Shimbun on November 6, 2003

■ Trends of waste generation and the recovery rate



Our definition of zero emission

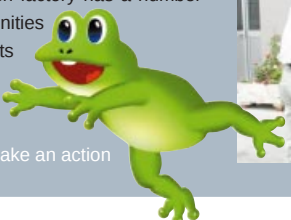
In our company, zero emission is defined as the state in which the quantity of the wastes, including both industrial wastes and general wastes from our operations, that is buried or burnt for disposal is reduced to a level that makes the recovery rate 98% or higher. Setting the border line at 98% for zero emission is to avoid excessive energy consumption that would result from perfectionism to recover garbage such as cigarette butts and tea leaves, which is most suitably burnt for disposal.

The recovery rate is the percentage of waste that is reused and recycled.

■ Five steps providing improvement opportunities in the recycle center

The recycle center of each factory has a number of steps providing opportunities for improvement besides its routine process to collect, sort and compact wastes.

then take an action



[Collect]

Centralized control for better efficiency



[Sort]

Sorted collection to recover wastes as resources





Activities to reduce total waste generation

To suppress waste generation at the source, we are pushing designs/improvements that stop or decrease waste generation in various stages of the production processes. Our improvements, include the adoption of different materials or product shapes in the product design stage, the review of production conditions and the promotion of optimization in the process improvement area and the reduction of defect rates and the elimination of waste in the production stage.



Cases of successfully reduced wastes

■ Reduction of copy paper

We drew up basic policies to run a reduction campaign.

■ Basic Policies

- In producing copies, use the both sides of paper to reduce paper consumption.
- As long as possible, documents should be distributed in an electronic form. Papers should be converted into image files (Acrobat, Docuworks, etc.) wherever possible, while electronically produced documents (Word, Excel, etc.) should be distributed via the company's local area network without printing them out.
- All documents electronically produced or received from other divisions should be checked on PCs by way of using the print preview function, etc. so that print errors or print trials may be avoided.

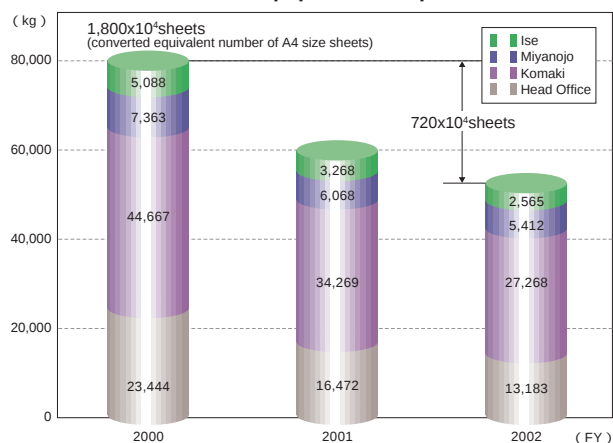
■ Improvement of the useful life of chemicals

We have successfully reduced the discharge of used chemicals as liquid waste from the organic package production process by extending the useful life of chemicals through careful reexamination and review of the chemicals' properties and use conditions by all members of the workplace. Although it was rather a short project lasting for half a year only, we implemented improvements in stages, while maintaining the qualities, until we successfully reduced liquid waste to half.

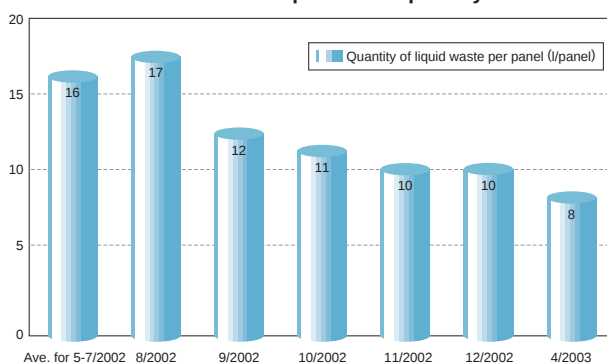
■ Implementation of on-the-spot inspection of waste-disposal service providers

The amended waste disposal and public cleansing law obligates an operator to ascertain proper intermediary or final disposal of wastes that are generated on the actual disposal site. We sent our 52 representatives to 23 waste-disposal service providers during FY2002 and confirmed that their facilities and operation manners were legal and satisfactory.

■ Trail of reduction in our paper consumption



■ Trail of reduction in the liquid waste quantity



[Compact]

Reduce volume to improve transportation efficiency



[Learn]

Find in wastes hints for a way to improve our operations



[Communication]

Opportunity to share environmental information



Environmentally conscious product development



Environmentally friendly technology

Our 25% global market share of automotive spark plugs is the highest in the world. Our most recent success was the development of a spark plug using iridium alloy in the tip of the centre electrode. This spark plug offers improved ignition, startup and acceleration performance of vehicles and has contributed to a reduction of fuel consumption and exhaust emissions.

We also manufacture automotive sensors used to monitor exhaust gas composition, temperature and air-fuel ratio during combustion. These are all critical components in helping the vehicle's Emissions Control System keep the vehicle running at optimal conditions and in doing so minimizing pollution and improving fuel economy.

In response to the incessant challenges faced, we have successfully developed a sensor for Fuel Cell Vehicles. This is a great step forward towards the realization of these next generation cars with truly clean emissions.

In developing our semiconductor and electronic parts with smaller size and lower power consumption, we are contributing towards resource conservation directly through less material used and indirectly by saving power. We have also developed organic packages and filters used in PCs and mobile phones, which develop incessantly toward downsizing. We have also developed organic packages supporting high-density flip-chip bonding of multi-terminal IC such as MPU, etc., using highly reliable, low permittivity, low dielectric loss resin materials, and support products ever advancing in their performance, compactness and lightweight.

In the ceramic application area, we have developed a ceramic heater by utilizing our IC package technology. It has achieved downsizing and weight reduction from the conventional metal heater, while it provides better chemical resistance and durability due to the characteristics of ceramics.

Cutting tools made of alumina- and silicon nitride-based ceramics and cermet cutting tools permit dry cutting, which means cutting without oil. Ceramic cutting tools and cermet cutting tools are used for machining of cast iron and steel respectively. These cutting tools have such advantages that they permit a machining operation without cutting fluid, which turns to industrial wastes, while their useful life as a tool is in no way impaired by doing so.

Antenna Switch Module

With high integration, minimal loss and high damping performance, these components have facilitated both low-profile and high-density packaging as well as a reduction in size and weight of mobile communications terminals.



Crystal Device SAW Filter package

Compact and thin packages that are surface mounted on the circuit boards of communications equipment, enabling a reduction in size and weight.



Wide Range Oxygen Sensors

Leading edge automotive sensors capable of measuring a wide range of air-to-fuel ratios from the exhaust gas.



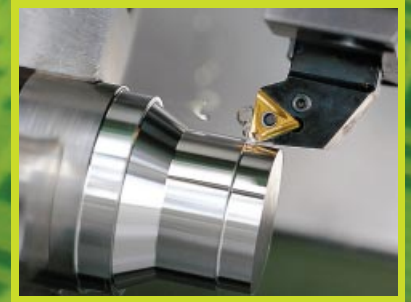
Ceramic Heater

Composed of resistance wires encased in ceramic bodies, these heaters have excellent chemical resistance, reliability and longevity.



Ceramic Cutting Tools

These ceramic cutting tools are capable of dry cutting (i.e. cutting fluid is not required) which results in less environmental load.

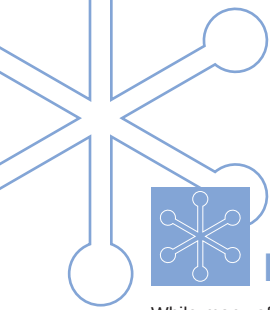


TECHNOLOGY



Iridium plug

With the adoption of a high-melting-point iridium allow in the center electrode, it realizes excellent combustion efficiency and good fuel economy.



Eco-products

While many of our products are small functional parts, each of them has some function that connects the product to an environmental benefit. Here, we will introduce you to some of our particularly environmentally conscious products materialized with the newest technology from those

exhibited at the Automotive Engineering Exposition (People's and Cars' Technology Fair) held in Yokohama on May 21 (Wed) through 23 (Fri), 2003.

Long Reach Small Spark Plug Iridium Type

Aim of development

Downsizing, lightweight and engine cooling performance improvement (for high output engines)

Background Diversifying engine uses, higher engine output, faster engine revolution speed

Freer engine layout, engine cooling performance improvement

Small spark plug

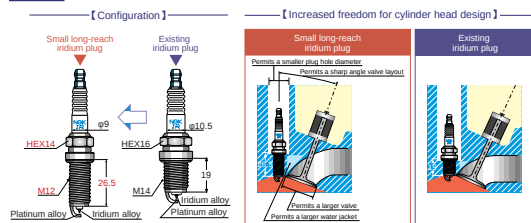


Effect

When compared with the existing M14-HEX 16 X 19.0mm reach iridium plug

1. Downsizing	• Plug hole diameter ▲ 3mm • Thread diameter ▲ 2mm
2. Lightweight	▲ 12%
3. Engine Performance improvement	• Higher output • Antiknock performance improvement • Permits multiple valves, larger valves, a sharp angle valve layout • Improved engine cooling performance permits advancement of ignition timing by 3 °A
4. Plug performance	Equivalent to the existing iridium plug

Features



Proposed application gasoline engines in general

Small Diameter Glow Plug (M8-HEX 8)

Aim of development

Glow plug installable in a narrower space for the increased freedom of cylinder head design.

Background Enhanced emission regulation, introduction of mileage regulation, higher engine output

Restrictions imposed by the direct injection system and multiple-valve design on cylinder head design.

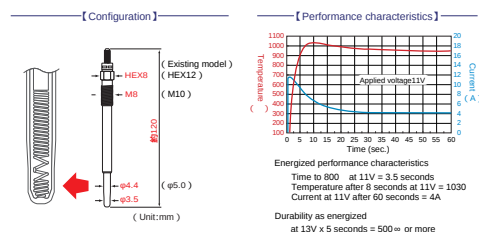


Effect

When compared with the existing M10-HEX 12 type

1. Light-weight plug	▲ 20%
2. High performance engine	Direct injection, multiple-valve and enlarged water jacket Easier with a smaller glow plug hole
3. Plug performance	Equivalent to the existing plug

Features ① Light weight, small diameter
② Creates extra room for engine head design



Proposed application a) 4 valve DI diesel engines b) small DI diesel engines

New Type NGK Quick Glow System

Aim of development

Improvement of diesel engine startability and emission

Background Enhanced emission regulation, introduction of mileage regulation

Lower compression ratio will impair engine startability

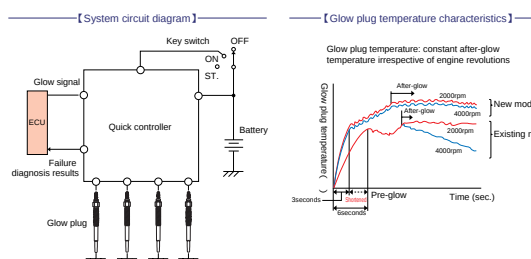


Effect

1. Engine startability improvement, shorter pre-glow time.	2. Engine emission improvement, steadier combustion
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Features

- Pre-glow time shortened by 3 seconds
→ Rapid temperature rise achieved by the adoption of a smaller diameter (5.0 mm - 3.5 mm) heater section.
- Stabilization of after-glow temperature
→ By the addition of a controller, glow temperature control has become possible with glow resistance monitoring. (The existing model is left to cool down with the increase of engine revolutions)
- Glow plug and controller failure diagnosis
→ Diagnosis results fed back to ECU. (In the case of the existing model, the detection of a glow plug failure on the user's part required through observation of lowering startability.)



Proposed application small- and medium-size diesel engines

Fuel Vapor Concentration Sensor (FVCS)

Aim of development

Development of a durable, non-heating type sensor that can measure quickly and accurately the concentration of fuel vapor gas (HC) under widely varying flow-rate, pressure and temperature conditions.

Background Enhanced exhaust regulation

Development of emission control system that makes SULEV or zero evaporation as represented by PZEV feasible.

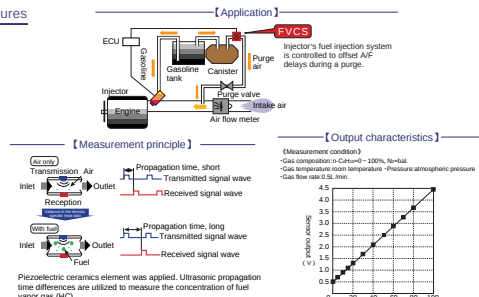
Expanded canister capacity, increased purge volume and frequency make fuel vapor gas (HC) management a more serious concern.



Effect

1. Offsets a canister purge. 2. Offsets delays by A/F feedback control 3. Copes with sharp changes in the concentration	Mitigates emission and drivability deterioration (achievement of robust emission control)
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Features



Proposed application Hybrid vehicles corresponding to ZEV/PZEV LEV-II, vehicles with high EVAP generation, vehicles having lean-burn engines

Hydrogen Leak Monitoring Sensor for Fuel Cell Application

Aim of development

Development of a safety sensor to detect a hydrogen leak for fuel cell application.

Background

Emission of fuel cell system is quite clean, but explosive hydrogen gas is used.

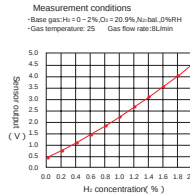
Safety system to prevent explosive accident is necessary.



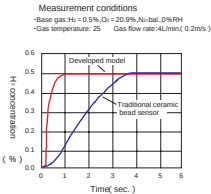
Effect

1. Because of its low power consumption, continuous monitoring of gas leak is possible.
 2. Quick response even at low concentration gas.
- It is useful to achieve more safety fuel cell system.

Output characteristics



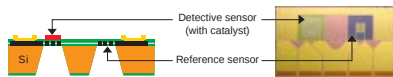
Response time



Features

1. Adoption of a micro-heater bring low power consumption and quick response.
2. Very low concentration gas can be detected due to the contact combustion method.
3. Can be arranged for various onboard installation conditions.

Sensor structure



Application

- a) Fuel cell vehicles
- b) Stationary fuel cell (ex. home-use)

Cutting Tool: HW2, HW3 (alumina-based ceramic inserts)

Aim of development

High-speed dry machining of cast iron

Background

Registration under ISO14001, reduction of plant equipment cost

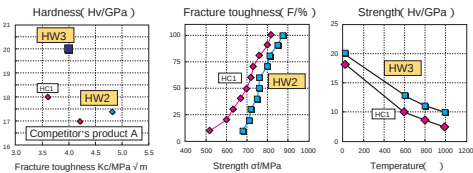
Environmental improvement, reduction of consumables (machining cost)
 Reduction of energy required by the use of cutting fluid (circulation, filtration)

Disuse of cutting fluid



Effect

1. HW2 Higher strength and toughness compared with existing alumina tools
2. HW3 Excellent wear resistance



Features

1. Because of its strength and toughness surpassing that of the conventional alumina tools, HW2 ensures stable machining operation as well as a longer life.
2. HW3 shows unparalleled wear resistance due to its alumina structure reinforced with a highly heat resistible special additive permitting a still faster machining speed.

Applicable works

- a) Rough machining and finishing of liners
- b) Machining of cast iron with a high-speed lathe
- c) Rough machining of cast iron rolls



LCA

We intend to promote technological development, paying attention to LCA (Life Cycle Assessment), which helps promote environment preservation by providing the overall picture of environmental load caused by a product in its design and development stage.



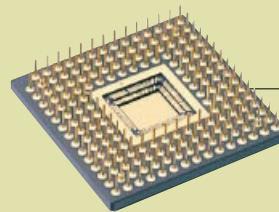
Comparison of LCA of ceramic and organic IC packages

For IC packages designed for the same application, but varying in the base material, we conducted an LCA to identify their impacts on global warming (CO_2 emissions) over the period from the collection of raw materials to production.

An organic package generates 30% less CO_2 per package, while a ceramic one generates 30% less CO_2 per weight.

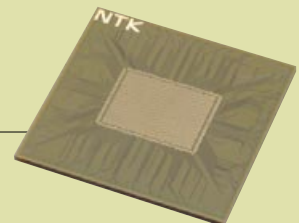
Through this study, we were able to understand that what really caused considerable environmental load in the production process was gold used for plating besides possible energy conservation measures identified for various processes.

We also learned that we could find a number of areas that would provide effective means to mitigate environment load in the



■ Ceramic package

■ Organic package



design of ceramic packages when product downsizing advanced in the future.

Communication



Communication with local communities

Corporations must make every effort to manufacture their products whilst taking care of the environment around them. From visible pollution to dusty air, from bad odors to minimizing waste, there are many areas to promote environment preservation activities in an attempt to harmonize with the local communities and make our factories friendly to both people and the earth. Extending on this idea, many of our employees have embraced volunteer work and take part in community clean-up activities to establish good relations with their neighbors. The Ise Factory has developed a biotope, though quite small in size, where Cyprinodont and other aqueous inhabitants are beginning to settle. We are looking forward to days when we can enjoy viewing fireflies with residents of neighboring communities.



Ise Factory's biotope

• Head Office/Factory



- Sep. 2002 (30 people)
Clean-up around the factory and along the trunk road.
- Oct. 2002 (5 people)
Clean campaign Nagoya 2002
- Mar. 2003 (30 people)
Clean-up along the trunk road around the factory. In cooperation with Nagoya Chamber of Commerce's "No litter campaign."

• Komaki Factory



- Sep. 2002 (50 people)
Clean-up around the factory and the Habashita river.
- Oct. 2002 (8 people)
"Komaki City's stop litter resident rally" around the city hall.
- Apr. 2003 (9 people)
Komakiyama clean-up campaign.

• Miyanojo Factory



- July 2002 (26 people)
Clean-up of local roads around the factory.
- Oct. 2002 (19 people)
Clean-up of local roads around the factory.

• Ise Factory



- Sep. 4, 2002 (33 people)
Clean-up along the trunk road and school-designated commuting roads in Enza-cho.
- Sep. 11, 2002 (30 people)
Clean-up along the trunk road in Ueno-cho.

- Iijima Ceramic
July 2002 (18 people)
Nov. 2002 (9 people)

- Nakatsugawa Ceramic
July 2002 (8 people)

- Kani Ceramic
Feb. 2003 (14 people)

- Nansei Ceramic
Sep. 2002 (14 people)
Mar. 2003 (15 people)

- Oguchi Seiki
Sep. 2002 (6 people)
Mar. 2003 (3 people)



Acceptance of visitors for a plant tour

The need of mutual visits to study each other's environmental effort is perceived strongly for exchange beyond the type and scale of business in order to spread the cause of environment preservation further in society. It seems very important to have opportunities to see other enterprise's operations, learn their environmental effort and listen to other people's opinions on our environmental effort. Since environment preservation is a common theme to be shared in society, we will continue our efforts to coordinate with other relevant organizations to realize a "Visit and exchange" workshop as a joint event of the relevant government, private and academic organizations.



Exchange of opinions after a plant tour

Month of visit	Name of the plant tour	Factory visited	Number of participants
Sep. 2002	Kubota Yakyukai	Komaki	57people
Apr. 2003	Nittoku suppliers association (material sector)	Head Office	22people
July 2003	Chubu Industrial Association, environmental study tour	Komaki	19people



Commendation and accreditation

Energy conservation center distinguished achievement award	Receipt of an eco-operation site certificate
Case report: Energy conservation of a large-scale air-conditioning system achieved with an outside air temperature control method	Nagoya city eco-operation site
Feb. 2003, Spark Plug Div. Komaki Production Dept. Energy Conservation Center	May 2003, Head Office/Factory Eco-City Promotion Section, Environment Bureau, Nagoya City
Mr. Kazuhiko Kozuka, Spark Plug Div. Komaki Production Dept.	

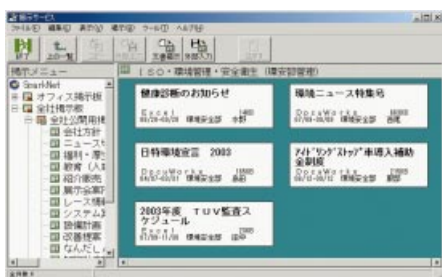
Environmental training and education



Internal network

We have opened an electronic BBS site on our intranet to help our employees share information.

We also exchange opinions on environment preservation activities actively through electronic cabinets and by internal e-mail.



Measures to encourage the acquisition of generally accepted qualifications

To ensure continual improvement of environment preservation activities along the company's environment policy, we develop, train and nurture dedicated staff such as a pollution control manager, according to the needs identified for each operation site.

		Head Office	Komaki	Miyanojo	Ise	Others	Total
Pollution control manager	Air	9 (2)	19 (2)	5 (2)	1 (0)	2	36 (6)
	Water	11 (0)	32 (4)	12 (2)	1 (0)	5	61 (6)
	Noise	16 (2)	14 (2)	10 (2)	0 (0)	4	44 (6)
	Vibration	9 (2)	13 (2)	4 (2)	1 (0)	3	30 (6)
Work environment measurement engineer		6 (0)	7 (0)	0 (0)	3 (0)	0	16 (0)
Environmental measurement engineer		0 (0)	1 (0)	0 (0)	1 (0)	0	2 (0)
Energy manager	Heat	4 (0)	5 (1)	3 (1)	0 (0)	1	13 (2)
	Electricity	6 (1)	2 (1)	4 (1)	2 (1)	0	14 (4)
Specialty controlled industrial waste manager		9 (1)	7 (1)	5 (1)	3 (1)	3	27 (4)

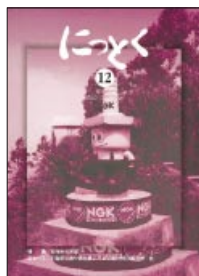
The figures in parentheses indicate the number required under laws.

The numbers shown are based on the count of the holders of each qualification.



Employee magazine "Nittoku"

We have pages dedicated to the environment in our monthly employee magazine, "Nittoku." The magazine deals with environment-related events and topics both in Japan and overseas, impacts of environment-related regulation on our company's activities, etc. to help enhance our employees' environmental consciousness.



Environment convention

On June 12, 2002, the second environmental convention was held.

While a number of reports were made by factories to introduce their cases of environmental improvement such as "Waste reduction" and "Energy saving activities," distinguished achievements were commended officially by the president.

At the convention, presentations of employees' personal efforts towards environmental preservation were given.

In conjunction with the convention, an eco-poster competition was held. All employees of the Nittoku group of companies and their families were eligible for entry into the eco-poster competition.



Poster drawn by Miss Kaori Ogawa (11), the eldest daughter of Mr. Masahiro Ogawa of Nakatsugawa Ceramic.



Nittoku environment news letter

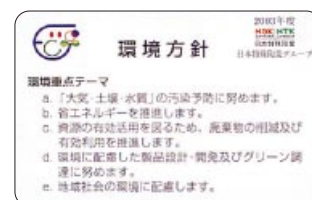
As part of our environment training and education effort directed to individual employees, we issue "Nittoku Environment News" periodically to provide information on our ISO14001-based activities, environment preservation activities and various events.



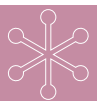
Environment card

We distribute an environment card to every employee of the Nittoku group so that everyone can understand the purport of our environment policy and the priorities of our environmental effort and observe them consciously.

The environment card is designed to enhance an employee's commitment to environment preservation by putting down on it the purpose and objectives of the organization's effort and the themes of his/her own effort.



Occupational safety and hygiene



Basic policies

- The objectives of safety and hygiene management activities are to manage risks and take preventive measures against industrial accidents.
- In order to prevent industrial accidents and occupational diseases, all managers and supervisors including the President shall ensure uninterrupted operation of the safety and hygiene management system, and obtain cooperation from all employees, to develop comfortable and safe workplaces.
- In the meanwhile, all employees shall consider safety and hygiene as their own issue, comply with basic rules, practice anticipatory safety and hygiene precautions, and endeavor to maintain and improve their own health.

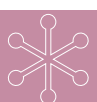
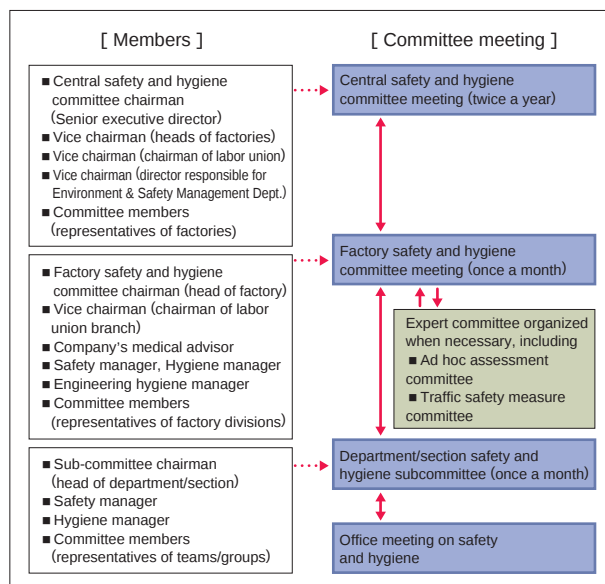


Risk assessment

As a preparatory step before the establishment of an industrial safety and hygiene management system, a risk assessment system development committee has been organized in the company jointly by the company and the labor union to study a risk management system for identification and assessment of potential risks to prevent accidents and health problems.



Safety and hygiene management organization

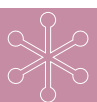
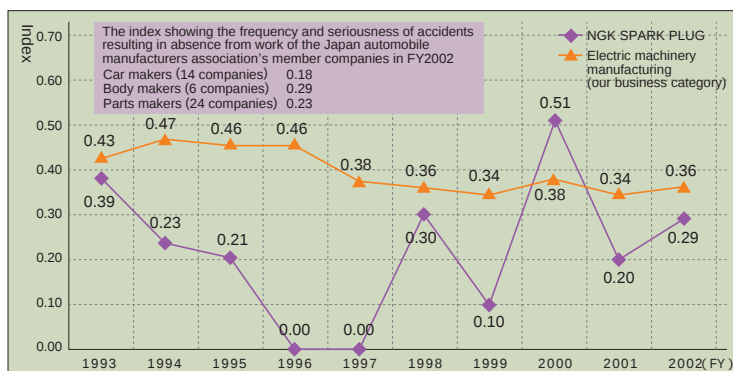


Trend of an index showing the frequency and seriousness of accidents resulting in absence from work

Although the index showing the frequency and seriousness of accidents resulting in absence from work of our company has been lingering around 0.3 for the last five years, its yearly fluctuations are getting larger. To stabilize yearly fluctuations and lower the index value itself, we will activate various safety activities to decrease industrial accidents, setting our goals to the prevention of accidents during non-routine operations.

■ Trends of the frequency of accidents resulting in absence from work and the index

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002
Number of accidents resulting in absence from work	3	2	2	0	0	3	1	5	2	3



Mental health

Due to an ever complicating society, there are many people suffering from a mental disorder, or severely stressed.

In FY2001 we opened a "mental counseling network center" outside the company in our effort to take care of our employees' mental health. We provide mental care services through telephone counseling and interviewing.



Earthquake disaster prevention committee

We have established an earthquake disaster prevention committee so that we may be prepared for a large-scale earthquake with sound precautions and risk management system and can protect employees. We also organized various activities to prevent disaster and minimize damages including the improvement of buildings and evacuation drills.

Employment and personnel management system



Development of a family-friendly and harassment free workplace

Following the legislation of the amended equal opportunity law in 1999, areas opened to female workers are expanding.

In our company, we are endeavoring to develop a workplace that permits staff to rear a child or take care of an invalid without giving up his/her work, by introducing a child rearing/invalid caring leave system. In the meantime, we are also taking measures to eradicate sexual harassment from our workplaces including activities to enlighten people through our employee magazine, education to managers, the establishment of an internal network and contacts for counseling service through the Sexual harassment Countermeasure Committee as our central organization.

< Number of employees who took child rearing/invalid caring leave >
(Cumulative total number as of the end of June 2003)

● Child rearing leave...232 people ● Invalid caring leave...4people

< Behavioral norm set by the Sexual Harassment Countermeasure Committee >

- (1) Preventive measures: enlightenment of people to prevent harassment cases (manager training → application to workplaces)
- (2) Prompt action against a harassment case: if a harassment case occurs, a prompt action should be taken to investigate the case and enforce proper instructions to prevent further detrimental development of the case or the recurrence of a similar case.
- (3) Disciplinary action to a serious offender: in case of an offence, the case should be reported to the Disciplinary Committee with recommendations of an appropriate penalty.



Re-employment system of ex-employees who retired because of the retirement age

In view of the possible upward revision of the Koseinenkin annuity system's qualifying age, a social need directed to enterprises to increase employment opportunities for those who are over 60 is growing. Under these circumstances, we have introduced a re-employment system of ex-employees who retired because of the retirement age since April 2001 to utilize knowledge, skills and experience cultivated by our employees in their careers effectively.



Support to volunteer activities

It is of benefit to and can be a valuable asset for both company and employees that our employees are participating in voluntary activities and cultivate their personality. To support our employees' voluntary public welfare activity, we introduced a volunteer leave (approximately 10 days a year) and temporary retirement (an employee is entitled to take leave for a consecutive period of 2 years and 4 months or a shorter duration once in his/her employment) system in October 1996.

Mrs. Chie Hayashi of R&D Center, who took child rearing leave



I have availed myself of this system twice. I took one-year leave and then returned to my work, and now I think I was lucky to be able to use this system. During my leave, I really enjoyed life, devoting my whole time to my family, and after I made a comeback, I somehow managed to fulfill my duties at the workplace while rearing a child at home thanks to support rendered by my colleagues and family. If I had chosen to resign from the company, instead of taking leave under this system, when I gave birth to my child, I would have longed for opportunities outside home because I could not have contented myself with life confined in home. Of course, I can't have everything in my favor. I sometimes feel both mentally and physically weary, but my children's smiling faces are always my relief. I believe that many women will avail themselves of this system and enjoy a lively life in the future.



Happy life seminar

Since June 1994 we started to organize a seminar to which employees who had become 50 years old were invited (together with their spouses) to learn how they should plan their life after retirement to lead a better, more fulfilled second life through lectures and group discussions considering three key elements: purpose of life, health and finance.

< Participants in Happy life seminar
(the number of employees excluding spouses) >

● FY2002...104 people ● Cumulative total to date...788 people



Data section

Period covered: April 1, 2003 — March 31, 2003

■ Water, air and noise

Operation site	Item	Type	Measurement unit	Statutory regulation value	Voluntary regulation value	Average	MAX	MIN
Head Office/Factory	Air	Dust	(mg/Nm ³)	150	120	7	15	2
		NOx	(ppm)	180	144	64.3	90	22
	Wastewater	pH		5.0 ~ 9.0	5.7 ~ 8.7	6.9	7.6	5.8
		SS	(mg/L)	600	480	37.2	140	5
		BOD	(mg/L)	600	480	34.8	200	5.4
		n-Hexane	(mg/L)	30	24	4	24	0.5
		Cyan	(mg/L)	1	0.8	0.1	0.4	0.1
		Total chromium	(mg/L)	2	1.6	0.05	0.11	0.04
		Hexavalent chromium	(mg/L)	0.5	0.4	0.04	0.04	0.04
		Zinc	(mg/L)	5	4	0.77	2	0.09
		Lead	(mg/L)	0.1	0.08	0.02	0.04	0.02
		Nitrogen	(mg/L)	240	192	13.7	22	1.3
		Phosphorus	(mg/L)	32	25.6	0.52	1.4	0.05
	Noise	Morning	(dB)	70	68	58.4	66.6	53.1
		Daytime	(dB)	70	68	59.0	66.1	53.3
		Evening	(dB)	70	68	57.4	65.2	53.2
		Night	(dB)	65	64	56.1	63.1	53.0
Komaki Factory	Air	Dust	(mg/Nm ³)	200	160	8.5	46	2
		NOx	(ppm)	200	160	62.2	120	11
	Wastewater	pH		6.0 ~ 8.0	6.2 ~ 7.8	7.3	7.6	6.9
		SS	(mg/L)	30	24	3.6	7	1
		BOD	(mg/L)	25	20	4.5	7.2	1.4
		n-Hexane	(mg/L)	5	4	<1.0	<1.0	<1.0
		Cyan	(mg/L)	0.5	0.4	<0.1	<0.1	<0.1
		Total chromium	(mg/L)	1	0.8	<0.04	<0.04	<0.04
		Hexavalent chromium	(mg/L)	0.2	0.16	<0.04	<0.04	<0.04
		Copper	(mg/L)	1	0.8	0.02	0.05	0.01
		Zinc	(mg/L)	3	2.4	0.23	1	0.05
		Lead	(mg/L)	0.1	0.08	<0.02	<0.02	<0.02
		Nitrogen	(mg/L)	120	30	9	29	3.6
		Phosphorus	(mg/L)	16	4	0.33	0.6	0.15
	Noise	Morning	(dB)	65	63	57	61	52
		Daytime	(dB)	70	68	58	64	51
		Evening	(dB)	65	63	56	61	48
		Night	(dB)	60	58	55	58	50
Miyanojo Factory	Air	Dust	(mg/Nm ³)	300	240	<7	<7	<7
		NOx	(ppm)	180	144	<65	<65	<65
		Dust 1	(mg/Nm ³)	100	80	7	8	6
		NOx 1	(ppm)	950	855	715	850	580
		SOx 1	(Nm ³ /h)	3.9	3.12	0.19	0.23	0.14
		SOx 2	(Nm ³ /h)	3.9	3.12	0.19	0.23	0.14
	Wastewater	pH		6.0 ~ 8.0	6.5 ~ 7.8	7.5	7.9	7.1
		SS	(mg/L)	35	28	7	14	4
		BOD	(mg/L)	20	16	7.3	14	2
		n-Hexane	(mg/L)	5	4	<2.5	<2.5	<2.5
		Cyan	(mg/L)	1	0.8	<0.05	<0.05	<0.05
		Hexavalent chromium	(mg/L)	0.5	0.4	<0.05	<0.05	<0.05
		Copper	(mg/L)	3	2.4	0.16	0.27	<0.05
		Zinc	(mg/L)	5	2.4	0.08	0.08	0.07
		Lead	(mg/L)	0.1	0.08	<0.01	<0.01	<0.01
		Colons	(counts/cm ²)	3000	2400	0	0	0
	Noise	Morning	(dB)	60	55	45.5	53	40
		Daytime	(dB)	65	60	48.5	51	47
		Evening	(dB)	60	55	46.4	50	40
		Night	(dB)	50	50	44.5	50	40
Ise Factory	Air	Dust	(mg/Nm ³)	300	100	<5	-	<5
		pH		5.9 ~ 8.6	6.0 ~ 8.4	7.4	7.9	6.9
	Wastewater	SS	(mg/L)	90	45	2.2	7.1	1
		BOD	(mg/L)	25	20	3.2	12	1
		Nitrogen	(mg/L)	120	60	8.7	15.7	4.1
		Phosphorus	(mg/L)	16	8	1.5	4.8	0.2
		Colons	(counts/cm ²)	3000	1000	0	0	0
	Noise	Morning	(dB)	55	55	50.0	51.7	47.5
		Daytime	(dB)	60	58	48.6	55.1	42.3
		Evening	(dB)	55	55	44.8	49.0	41.9
		Night	(dB)	50	50	45.3	48.7	41.5

■ Wastewater from Head Office/Factory is treated pursuant to the Sewage Management Law.

Operation site	Item	Type	Measurement unit	Statutory regulation value	Voluntary regulation value	Average	MAX	MIN
Iijima Ceramic	Air	Dust	(mg/Nm ³)	100	100	2.6	5	1.4
		NOx	(ppm)	150	150	101	120	87
	Wastewater	pH		5.8 ~ 8.6	6.0 ~ 8.0	7.2	7.5	7
		SS	(mg/L)	50	10	2.1	5	1
		BOD	(mg/L)	30	25	2.0	3.4	0.5
		n-Hexane	(mg/L)	5	5	1	1	<1
		Cyan	(mg/L)	0.5	0.3	0.01	0.03	<0.01
		Total chromium	(mg/L)	1	1	<0.02	<0.02	<0.02
		Hexavalent chromium	(mg/L)	0.3	0.3	<0.02	<0.02	<0.02
		Copper	(mg/L)	2	2	0.043	0.08	<0.005
		Zinc	(mg/L)	3	3	<0.05	0.12	<0.05
		Lead	(mg/L)	0.1	0.1	0.006	0.006	<0.005
		Phosphorus	(mg/L)	16	16	0.75	1.2	0.2
		Colons	(counts/cm ²)	3000	3000	2.3	4	0
	Noise	Morning	(dB)	N.A	65	50.5	50.5	50.5
		Daytime	(dB)	N.A	65	50.0	50.0	50.0
		Evening	(dB)	N.A	65	50.8	50.8	50.8
		Night	(dB)	N.A	55	49.3	49.3	49.3
Nakatsugawa Ceramic	Air	Dust	(mg/Nm ³)	200	150	9	53	2
		NOx	(ppm)	144	130	68.5	78	47
	Wastewater	pH		5.8 ~ 8.6	6.2 ~ 8.2	7.4	7.7	7.3
		SS	(mg/L)	50	35	2.3	9	1
		BOD	(mg/L)	15	13	2.1	3.9	0.5
		n-Hexane	(mg/L)	5	4	0.5	0.5	0.5
		Nitrogen	(mg/L)	10	10	1.8	5.5	0.7
		Phosphorus	(mg/L)	3	2.5	0.03	0.06	0.01
		Colons	(counts/cm ²)	3000	1000	39.4	120	30
	Noise	Morning	(dB)	60	58	48	48	47
		Daytime	(dB)	65	63	48	51	45
		Evening	(dB)	60	58	48	50	43
		Night	(dB)	50	50	47	50	43
Kani Ceramic	Air	Dust	(mg/Nm ³)	200	200	<6.0	<6.0	<6.0
		NOx	(ppm)	230	230	111	111	111
	Wastewater	SOx	(Nm ³ /h)	1.61	1.61	<0.01	<0.01	<0.01
		pH		5.8 ~ 8.6	5.8 ~ 8.6	6.5	6.5	6.5
		SS	(mg/L)	200	200	42	42	42
		BOD	(mg/L)	160	160	94	94	94
		n-Hexane	(mg/L)	5	5	3.9	3.9	3.9
	Noise	Morning	(dB)	50	50	48.5	52	43
		Daytime	(dB)	60	60	48.8	53	43
		Evening	(dB)	50	50	49.5	52	47
		Night	(dB)	45	45	49.8	53	47
Nansei Ceramic	Wastewater	pH		5.8 ~ 8.6	5.8 ~ 8.6	7.5	7.7	7.3
		SS	(mg/L)	200	90	6	8	4
	Wastewater	BOD	(mg/L)	20	20	10	14	3
		Lead	(mg/L)	0.1	0.1	0	0	0
		Nitrogen	(mg/L)	120	100	22	54	8.8
		Phosphorus	(mg/L)	16	16	2.10	5.33	0.74
		Colons	(counts/cm ²)	3000	1000	0	0	0
	Noise	Morning	(dB)	55	55	51.4	54.8	46.6
		Daytime	(dB)	60	60	54.7	58.4	46.5
		Evening	(dB)	55	55	47.7	48.9	44.4
		Night	(dB)	50	50	47.3	49.9	44.2
Ceramic Sensor	Air	Dust	(mg/Nm ³)	0.1	0.08	0.002	0.002	0.001
		NOx	(ppm)	150	120	43.5	78	9
	Wastewater	pH		6 ~ 8	6 ~ 8	7.1	7.4	6.8
		SS	(mg/L)	18	14.4	5.3	9	2
		BOD	(mg/L)	18	14.4	4.6	5.7	2.4
		COD	(mg/L)	18	14.4	11.5	4	8.2
		n-Hexane	(mg/L)	2	1.6	1	1	1
		Nitrogen	(mg/L)	30	24	18.8	24	11
		Phosphorus	(mg/L)	4	3.2	0.79	1.4	0.41
	Noise	Daytime	(dB)	70	70	57.1	60.9	51.1
		Night	(dB)	60	60	55.1	59.4	51.0

- 1... These data are of the #1 diesel engine for a cogeneration system.
- 2... We have completed corrective actions by expanding the purification tank.
- 3... We are implementing corrective actions such as the replacement of the exhaust fan motor and the improvement of exhaust outlet diffusers.
- 4... We have completed corrective actions by expanding the purification tank.

PRTR

(Unit : kg)

Operation site	Ordinance No.	Substance name	Quantity handled	Release quantity			Decomposition reaction	Landfill disposal	Recycle
				Air	Water	Soil			
Head Office/ Factory	1	Water-soluble zinc compounds	8,029						1,964
	40	Ethyl benzene	1,242				1,242		
	63	Xylene	14,861	19			14,842		
	68	Chromium and trivalent chromium compounds	2,791					7	1,099
	108	Inorganic cyanogen compounds (except complex salt and cyanate)	1,137				1,128		
	144	Dichloropentafluoropropane (alias HCFC-225)	3,475	3,475					
	211	Trichloroethylene	1,085	1,085					
	227	Toluene	114,811	322			114,489		
	231	Nickel	38,136						
	299	Benzene	5,727	13			5,714		
	304	Boron and its compounds	1,021						8
Komaki Factory	1	Water-soluble zinc compounds	5,779		9		0	8	60
	30	Condensation polymer of 4,4'-isopropylidenediphenyl and 1-chloro-2,3-epoxypropane (alias, bisphenol A epoxy resin) (only that in the liquid form)	1,206				0	66	0
	40	Ethyl benzene	1,278	303			974		0
	63	Xylene	14,231	1,712			5,424		7,180
	64	Silver and its water-soluble compounds	1,354						297
	68	Chromium and trivalent chromium compounds	1,592					293	715
	100	Cobalt and its compounds	2,568					7	59
	108	Inorganic cyanogen compounds (except complex salt and cyanate)	4,670				1,606		38
	207	Water-soluble copper salts (except complex salt)	36,974		38				991
	227	Toluene	8,586	1,710			6,207		447
	230	Lead and its compounds	6,733		3			13	526
	232	Nickel compounds	9,717		6			7	2,790
	304	Boron and its compounds	5,230		447			518	242
	309	Poly (oxyethylene) nonylphenoether	6,510				66		6,443
	310	Formaldehyde	4,583	4			44		4,432
	311	Manganese and its compounds	6,582	2				3	6,559
	314	Methacrylic acid	1,342	133			934		275
	346	Molybdenum and its compounds	1,287					55	52
Miyanajo Factory	1	Water-soluble zinc compounds	25,585						4,770
	68	Chromium and trivalent chromium compounds	2,464						2,413
	108	Inorganic cyanogen compounds (except complex salt and cyanate)	1,371				1,371		
	144	Dichloropentafluoropropane (alias HCFC-225)	6,935	6,935					
	231	Nickel	111,632						
	304	Boron and its compounds	2,515	172					32
Ise Factory	43	Ethylene glycol	1,440						1,440
	64	Silver and its water-soluble compounds	1,174					2	2
	230	Lead and its compounds	40,240						16,023
	311	Formaldehyde	2,328	234					2,094
	311	Manganese and its compounds	1,948					22	1,528
Iijima Ceramic	63	Xylene	4,995	3,627					1,368
	68	Chromium and trivalent chromium compounds	1,349					812	
	108	Inorganic cyanogen compounds	4,918		1		1,047		2,379
	230	Lead and its compounds	1,610						61
	231	Nickel	2,488						
	232	Nickel compounds	1,516						1,516
	270	Di-n-butylphthalates	5,413				3,779		1,634
Nakatsugawa Ceramic	346	Molybdenum and its compounds	2,396					625	
	63	Xylene	10,305	3,893					
	68	Chromium and trivalent chromium compounds	10,753					2,518	18
	227	Toluene	119,251	118,612					639
	230	Lead and its compounds	1,777						871
	270	Di-n-butylphthalates (DBP)	27,519				546	6,547	5,668
	272	Bis phthalates (DOP)	1,931				105		1,612
Kani Ceramic	346	Molybdenum and its compounds	10,943					1,130	775
	270	Di-n-butylphthalates (DBH)	3,078	1,508				1,183	388
Nansei Ceramic	230	Zinc oxide	5,083					4,577	506
Ceramic Sensor	253	Hydrazine	7,790	519	384		1,173		5,114
	283	Hydrogen fluoride and its water-soluble salts	3,151		18				3,119
	304	Boron and its compounds	1,631					51	23

Wastes

Operation site	Unit	Recycled quantity	Landfill/burning disposal
Head Office/Factory	ton	964	86
Komaki Factory	ton	10,451	410
Miyanajo Factory	ton	3,067	41
Ise Factory	ton	1,591	56
Iijima Ceramic	ton	1,228	150
Nakatsugawa Ceramic	ton	80	258
Kani Ceramic	ton	10	54
Nansei Ceramic	ton	10	72
Ceramic Sensor	ton	904	63

Contacts for inquiries

Operation site	Contacts for inquiries (Dept. name/tel)	
NGK SPARK PLUG	Head Office/Factory	Environment and safety Management Dept. + 81 52-872-5980
	Komaki Factory	Environment and safety Management Dept. + 81 568-76-1544
	Miyanajo Factory	Environment and safety Management Dept. + 81 996-53-2211
	Ise Factory	Environment and safety Management Dept. + 81 596-39-1534
Iijima Ceramic	General Administration Dept.	+ 81 265-86-5211
Nakatsugawa Ceramic	General Administration Dept.	+ 81 573-68-5484
Kani Ceramic	General Administration Dept.	+ 81 574-63-2511
Nansei Ceramic	General Administration Dept.	+ 81 599-65-3366
Ceramic Sensor	General Administration Dept.	+ 81 568-76-5400

Messages from stakeholders

Note: These messages were originally submitted in Japanese and have been translated for this report.

CHUBE RECYCLING(NPO), Ms. Keiko Nakagawa

Since your field of operation is automobile components, which are not familiar to ordinary citizens, information release is important for you all the more. Particularly, "Communication with local communities" as covered in this report will become a very important issue in the future to put our efforts together for the development of a sustainable society. I was impressed by the fact that you had achieved zero emission at three factories already and your strenuous efforts to reduce wastes generation in the company. I hope this series of reports will develop and provide a useful tool for your internal environmental education as well as communication with local communities.



Central Japan Industries Association. Ms. Megumi Yamada

I was deeply impressed by NGK SPARK PLUG's effort for environmental preservation, particularly its employees' sincere attitude with which they earnestly thought out how they should break down the top management's policies into actual environment preservation activities for implementation by departments and individual employees. We can also perceive it from this report. I believe that such activities will develop from an enterprise level to a regional level and then become a global environment preservation movement someday. Your Eco Report is a guidebook for industries, and I believe it will undoubtedly increase your followers to participate in the activities in the future.



TÜVRheinland Japan Ltd., Mr. Manabu Honda

This year's edition of your Eco Report covers diversified topics with some detailed explanations and data on key issues, showing the remarkable progress you have made. Your ISO14001-based management system covering a number of sites in a centralized manner, is operated steadily under the excellent guidance of the Central Environment Committee. The fundamental ideas of environmental management formulated by the Head Office are effectively conveyed to all relevant sites including your affiliates. I am looking forward to seeing you rising to the further challenge of controlling greenhouse gases, which are expected to increase their importance in the future.



Employee, Technical Ceramics Group, Mr. Tomoaki Shindo

This report helps us renew our recognition that various departments' environmental efforts, when put together, have led to the achievement of zero emission and other significant results such as energy conservation achieved by the Nittoku group as a whole as well as our knowledge on various company-wide efforts being paid for environment preservation. Activities to reduce environmental load is a project requiring incessant effort to preserve and leave the environment as better as we can for our future generations. It is like a never-ending voyage, if I am to compare it to. Then an Eco Report is the log of our activities and should play the role of a compass to show our present position and the direction to head for. I am looking forward to seeing more reports in the future.



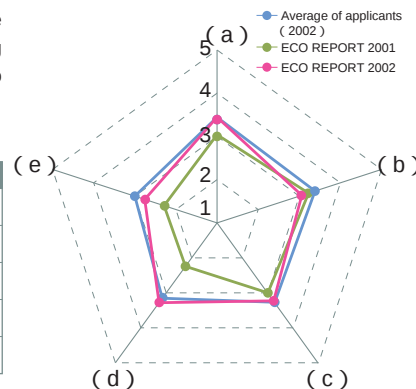
■ Results of rating of Eco Report 2002 (previous year's edition)

Results of rating in the sixth Green Reporting Award Contest organized jointly by Toyo Keizai Inc. and the Green Reporting Forum are shown below. Due to the availability of examination results before the editing time limit of this issue, we were not able to reflect all of these examination results to this issue of our Eco Report, but we intend to make further improvements with the next edition.

■ Rated items and marks

	2001	2002	Average of applicants
(a) The company's environmental principles concerning environment-related information disclosure and environment preservation activity are clearly defined.	3.10	3.38	3.37
(b) The environment report has a systematic composition with the relations between items and their priority order made clear.	3.20	3.17	3.54
(c) The environment report shows environment-related performance of the company comprehensively and clearly in the context of its operations.	3.00	3.20	3.32
(d) The environment report includes the company's own evaluation and explanation of its environment-related performance.	2.30	3.31	3.18
(e) The company is paying efforts to ensure the reliability of information and establish good communication.	2.40	2.58	3.04

Average of 281 reports sent in for examination



Closing remarks

Since enterprises have increasingly greater influence on society with the advancement of globalization, information armaments and technological innovation, people now hold various expectations in them also in the field of performance of various social roles besides the conventional economic roles.

Particularly, with respect to actions against environmental problems, enterprises are required to comply with statutory regulation in controlling environmental load generated from their business activities, etc., honor corporate ethics, promote information disclosure and fulfill their social responsibility in many areas under a tacit understanding that they are to contribute to society and local communities.

This is the 30th year since our company first established a dedicated organizational unit for environment management. Our environment preservation effort has continued incessant development, changing its form of activity from factories' antipollution control to global environment preservation, and now we are expanding the scope of our activities based on continual improvement for environment preservation to include the entire group companies through our effort to integrate them in our single registration under ISO14001, which helps us clarify and organize our environment preservation activities as a system. While our single registration certificate is expected to cover all of our domestic group companies in FY2003, we feel that our group is gaining a solid, integral organization through sharing of information, centralized control and synergism appearing in our environment preservation efforts from such management practice.

We recognize that we are required to promote environment preservation also in our product development, accepting the need to reconcile manufacture with the environment as a prerequisite, and to achieve this, we need to pay steady efforts at all relevant sections and improve our development and engineering ability. It is also important to put forth our efforts and realize efficient logistic systems and resource circulations.

Further, we will provide various types of information including that on environmental load caused by our corporate activities through Eco Reports, plant tours and other opportunities to respond to and obtain useful feedback from our stakeholders. Of course, we think it is the most important thing for both company and employees that every employee works healthily and safely in our company.

This report has been compiled to serve as a sustainability report. The topics from our FY2002 activities include the single registration of the group, total disuse of chlorinated organic solvents and the achievement of zero emission. These are a proof that PDCA cycles based on the aforementioned environment management system have taken root in our organization.

We intend to promote various environmental efforts further to build a recycling-oriented society while ensuring our company's sustainable development. In the meantime, we will include among our objectives the continuing performance of our social role as a priority issue of our company.



Genjiro Hashimoto
Chief environment administrator

Request for cooperation to a questionnaire

Thank you for reading our "Eco Report 2003." In order to improve future reports, we would like to ask your cooperation to the enclosed questionnaire.

Please kindly send your completed questionnaire sheet to:

FAX +81 52-872-5942

...and act accordingly.



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For the protection of forest resources, we used recycled paper made of 100% used paper.
Considering the global environment, we used soy ink in printing this Eco Report.