Summary of Environmental Activities for 2002, and Future Initiatives

The Environmental Report 2003 has been issued to present the results of NGK's environmental activities and its stance toward environmental issues, in accordance with the new three-year management plan.

All in all, the results of our activity in 2002 were favorable as we approach our target date of 2005. Under the environmental management system, the entire NGK Group is continuing to obtain ISO 14001 certification, with P.T. WIKA-NGK Insulators of Indonesia obtaining certification in 2002. To ensure more effective response to environmental concerns, we have enhanced green management at the Plant level and strengthened environmental management at the operating division level. We will continue to improve environmental accounting and environmental performance, compiling results for both domestic and overseas Group companies and working to further augment our efforts.

With the goal of further reducing the environmental impact of production activity we renamed "waste" as "by-products," marking a change in how we perceive the material, and have intensified our efforts to achieve zero emissions. We have made significant progress in reducing the amount of by-products generated, especially in ceramic materials. Energy-conserving combustion systems and other measures were implemented to reduce CO_2 emissions, but their results are not yet evident, and in fact there was a slight increase last year. We are continuing our efforts to reduce CO_2 emissions from the ceramic firing process. In chemical substance management, especially for organic solvents, we are replacing harmful substances with alternates and installing systems to remove harmful substances, achieving excellent results such as an 88% reduction in xylene emissions from the Nagoya Plant and a reduction of about 32% in organic solvent emissions into the atmosphere for NGK overall.

A large number of NGK products and technology make real contributions to reducing environmental impact. We will continue to develop products such as diesel particulate filters (DPFs), large ceramic membrane water purification systems, and NAS® batteries in the fields of exhaust gas purification, water purification, and electric power storage, making environmental conservation activity a key part of the management stance. At the same time, we will continue active participation in the Environmental Partnership Organization Club (EPOC) and to promote better communication with society at large via this Environmental Report. Each and every employee is committed to continuing efforts to assist in conserving the global environment.

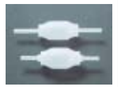
大野正直

Masanao Ono

Director and
Environmental Protection
Committee Chair

About the cover:

NGK believes that part of its corporate responsibility is to apply its core competency in ceramic technology to develop products which can help resolve global environmental issues. The cover of Environmental Report 2003 shows cross-sections of the HONEYCERAM® ceramic substrate for catalytic converters.



We are making every effort to recycle resources and protect the environment.

100%-recycled paper was used for the text of this publication and for the cover. By reusing old paper, NGK is helping to preserve greenery and making effective use of resources as well as reducing waste.

This report was printed with soy ink, which uses reduced levels of oil-based solvents compared with conventional inks. By using soy ink, we are reducing petroleum-product consumption and cutting emissions of volatile organic compounds (VOCs), a cause of atmospheric pollution during printing.

This report employed waterless printing, which reduces the burden on the environment caused by toxic waste liquids emitted during conventional printing. This environmentally friendly printing method meets all the laws and standards for prevention of water pollution and Green Purchasing and placed very little burden on the environment.

NGK INSULATORS, LTD.

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ENVIRONMENTAL REPORT 2003

NGK INSULATORS, LTD.

ENVIRONMENTAL REPORT 2003

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EDITORIAL POLI CY

This is the sixth edition of the Environmental Report by NGK Insulators, Ltd. (NGK), which has been issued since March 1999. This report is drafted in line with the Environmental Reporting Guidelines (Fiscal Year 2000 Version) issued by the Ministry of the Environment, and the data it covers is substantially in conformance with the Environment Ministry's Environmental Performance Indicators for Business (Fiscal Year 2000 Version).

The main point of change to take place in NGK's efforts in 2002 involved the Company's environmental management system: a system of business groups has been organized in addition to the existing system run by each site. Under this new system, the Company is strengthening its commitment to Green Management as well as devoting efforts to environmental conservation in each area. As we work toward achieving a recycling-based society, we are regarding what were formerly called "waste" as "by-products," which has further expanded our efforts to achieve effective use of resources.

This report is written primarily for such readers as NGK's customers, suppliers, shareholders, and investors, as well as for the residents of the areas where the Company's business sites are located, and the Company's employees. It has been also edited for general readers who are interested in NGK. In order to make this report even more readable and attractive, the number of pages has been increased and liberal use is made of photos, graphs, tables, and other aids. This report covers, in as much detail as is practical, NGK's business activities, the environmental impact of these activities, and the steps NGK has taken to reduce such environmental impact.

Term Covered

The term covered by this report is as follows:
Japan Ð April 1, 2002 to March 31, 2003
Overseas Ð January 1, 2002 to December 31, 2002
*The term "fiscal year" has been removed from this report.
The period indicated as "FY 2006" in last year's report is indicated by "2005" in this

Activities Covered

¥ NGK Insulators, Ltd.
Ð Nagoya Plant, Chita Plant, and Komaki Plant
¥ Domestic Group Companies (14 manufacturing companies)
Energy Support Corporation
Akechi Insulators, Co., Ltd.
Ikebukuro Horo Kogyo Co., Ltd.
NGK Filtech, Ltd.
NGK Adrec Co., Ltd.
NGK Kilntech Corporation
Heisei Ceramics Co., Ltd.
NGK Mettex Corporation
NGK Fine Molds, Inc.
NGK Optoceramics Co., Ltd.
NGK Printer Ceramics Co., Ltd.
NGK Okhotsk, Ltd.
Soshin Electric Co., Ltd.
Asahi Tec Corporation
¥ Overseas Group Companies (13 manufacturing companies)
Locke Insulators, Inc.
NGK-Locke Polymer Insulators, Inc.
NGK Europe S.A.
P.T. WIKA-NGK Insulators
NGK Insulators Tangshan Co., Ltd.
NGK Stanger Pty. Ltd.
NGK Ceramics USA, Inc.
NGK Ceramics Europe S.A.
P.T. NGK Ceramics Indonesia
Siam NGK Technocera Co., Ltd.
NGK Ceramics South Africa (Pty) Ltd.
NGK Metals Corporation
NGK Berylco France

Date Issued September 2003

Planned Date of Next Issuance August 2004

CONTENTS

COMPANY DATA

Corporate Name	NGK Insulators, Ltd.
Location	2-56 Suda-cho, Mizuho Nagoya 467-8530 Japan
	Phone +81-52-872-7171
Date of Establishment	May 5, 1919
Paid-in Capital	669.8 billion yen (as of March 31, 2003)
Number of employees	3,712 (as of March 31, 2003)
Business	Manufacture and sale of insulators and other electrical devices, industrial ceramic products, electronic components, and specialty metals, and plant engineering

Consolidated Subsidiaries

Domestic (27 companies)

Energy Support Corporation	Tohoku Energys Corporation
Kansai Energys Corporation	Kyusyu Energys Corporation
Chubu Energys Corporation	Hokuriku Energys Corporation
Tokai Energys Corporation	Energys Sangyo Corporation
Akechi Insulators Co., Ltd.	Ikebukuro Horo Kogyo Co., Ltd.
NGK Chem-Tech, Ltd.	NGK Filtech, Ltd.
NGK Adrec Co., Ltd.	NGK Kilntech Corporation
Heisei Ceramics Co., Ltd.	NGK Enviro-Equipment Service, Ltd.
NGK Mettex Corporation	NGK Fine Molds, Inc.
NGK Optoceramics Co., Ltd.	NGK Printer Ceramics Co., Ltd.
NGK Okhotsk, Ltd.	Soshin Electric.Co., Ltd.
M. Elec Company	Koshin Electronics Co., Ltd.
Sosyo Sales Co., Ltd.	Asahi Tec Corporation
Hoei Industrial Co., Ltd.	

Overseas (30 companies)

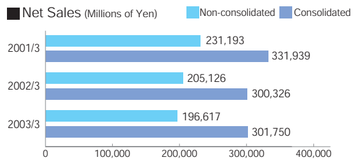
NGK North America, Inc.	Locke Insulators, Inc.
NGK-Locke, Inc.	NGK-Locke Polymer Insulators, Inc.
NGK Insulators of Canada, Ltd.	NGK Europe S.A.
P.T. WIKA-NGK Insulators	NGK Insulators Tangshan Co., Ltd.
NGK Stanger Pty. Ltd.	NGK Ceramics USA, Inc.
NGK Automotive Ceramics USA, Inc.	NGK Ceramics Europe S.A.
NGK Europe GmbH	NGK Ceramics Polska Sp. z o.o.
P.T. NGK Ceramics Indonesia	NGK Ceramics Suzhou Co., Ltd.
Siam NGK Technocera Co., Ltd.	NGK Technocera Suzhou Co., Ltd.
NGK Ceramics South Africa (Pty) Ltd.	NGK Metals Corporation
FM Industries, Inc.	NGK Electronics USA, Inc.
Soshin Electronics of America Inc.	NGK Berylco France
NGK Berylco U.K. Ltd.	NGK Deutsche Berylco GmbH
Soshin Electronics (M) Sdn. Bhd.	Soshin Electronics (HK) Ltd.
Asahi Somboon Aluminium Co., Ltd.	Asahi Somboon Metals Co., Ltd.

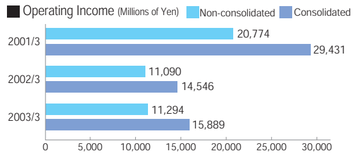
Nonconsolidated Subsidiary Accounted for by the Equity Method (1 company)

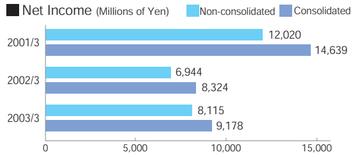
Soritsu Electronics Co., Ltd.

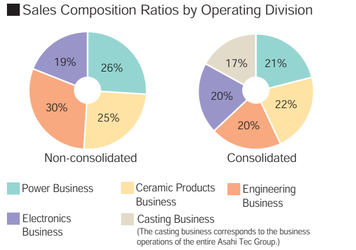
Affiliates Accounted for by the Equity Method (3 companies)

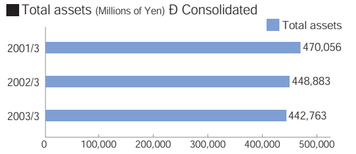
Risshin Electronics Co., Ltd.
Sangshin Elecom Co., Ltd.
Asahi Somboon Shippo Moulds Co., Ltd.











Contributing to Conservation of the Global Environment, with Our Ceramics Technology at the Core

松下 雋
Shun Matsushita
President and
Chief Operating Officer

MESSAGE FROM THE PRESIDENT

Our modern industrialized society has improved social convenience while heading into the twenty-first century. Conversely, however, this has also had a negative impact in the form of the environmental issues it has engendered. Meanwhile, it is also a fact that advances in science and technology are shedding new light on the causes and intrinsic nature of environmental issues, offering us the means to address these issues. For corporations as well as individuals, it is essential to press ahead with efforts to protect our irreplaceable global environment and to create a sustainable recycling-based society in which all living things can coexist.

At NGK Insulators, Ltd. (NGK), the ceramics technology that we have cultivated serves as the basis for providing a wide range of products for helping to ease environmental impact in four operating divisions: the Power Business Group, the Ceramic Products Business Group, the Engineering Business Group, and the Electronics Business Group. Among these, we hope to be able to make further social contributions by rolling out activities that make full use of our accumulated technical and developmental strengths in ecological areas centering on purification of exhaust emissions, water purification and treatment, and electrical power storage. Meanwhile, we must take solid steps to address the environmental impact of our business activities. The most critical issue we face is to suppress CO_2 emissions in the firing process for ceramic products. In our new three-year management plan instituted in April 2002, we have implemented Green Management as an action guideline that takes into account the close connection between business activities and environmental issues, and have rolled out business activities accordingly.

In our achievements in 2002, we were unable to reach our initial targets for amounts of CO_2 emissions. However, we made steady advances in such areas as equipment renovation and deployment of management systems, and are progressing toward achieving our targets for 2005. In the recovery of resources from by-products, we are working toward achieving zero emissions by 2005. We achieved our targets for management of chemical substances, including efforts geared to compliance with the PRTR Law. What is more, our activities for contributing to reducing environmental impact through products and technologies are expanding, and we will continue to devote ourselves to research and development to these ends.

This Environmental Report contains as much data as possible regarding our environmental management activities that include our domestic and overseas Group companies, and we are committed to further augmenting these activities. We are redoubling our efforts, with acquisition of ISO 14001 certification as a major indicator.

Communication concerning the environment is also an important social responsibility of NGK.

We are establishing manufacturing processes having less environmental impact in conformance with several laws relating to the construction of a recycling-based society, such as the Basic Law for Establishing a Recycling-Based Society, with an eye to setting reduction targets for total CO_2 emissions that are in line with the ratified Kyoto Protocol. On that basis, we believe that making contributions to society through NGK products and technologies are environmental conservation activities characteristic of NGK.

NGK will continue to work to obtain broad-based understanding and cooperation through our Environmental Reports, as well as vigorously promoting activities aimed at achieving corporate excellence based on global standards.

NGK – Conserving the Environment and Contributing to Society

NGK's business activities that create products based on the Company's own innovative ceramics technology are contributing to reducing environmental impact. Under our 2002 Three-year Management Plan, NGK is dealing with the newly raised issue of Green Management to strengthen responses to global environmental issues. The Company is also promoting reductions in the environmental impact of the full range of business activities from development and design to procurement, manufacturing and logistics, striving to achieve corporate excellence based on global standards.

Corporate Philosophy

"NGK products and technologies must create new value and contribute to the quality of life."

2002 Three-year Management Plan

Speedy Speedy Management

Together with ground-up revision of the processes for all tasks, NGK is making active use of new information tools and management methods to carry out the management decisions of the globally growing NGK Group even more rapidly.

Timely Concentration on Development

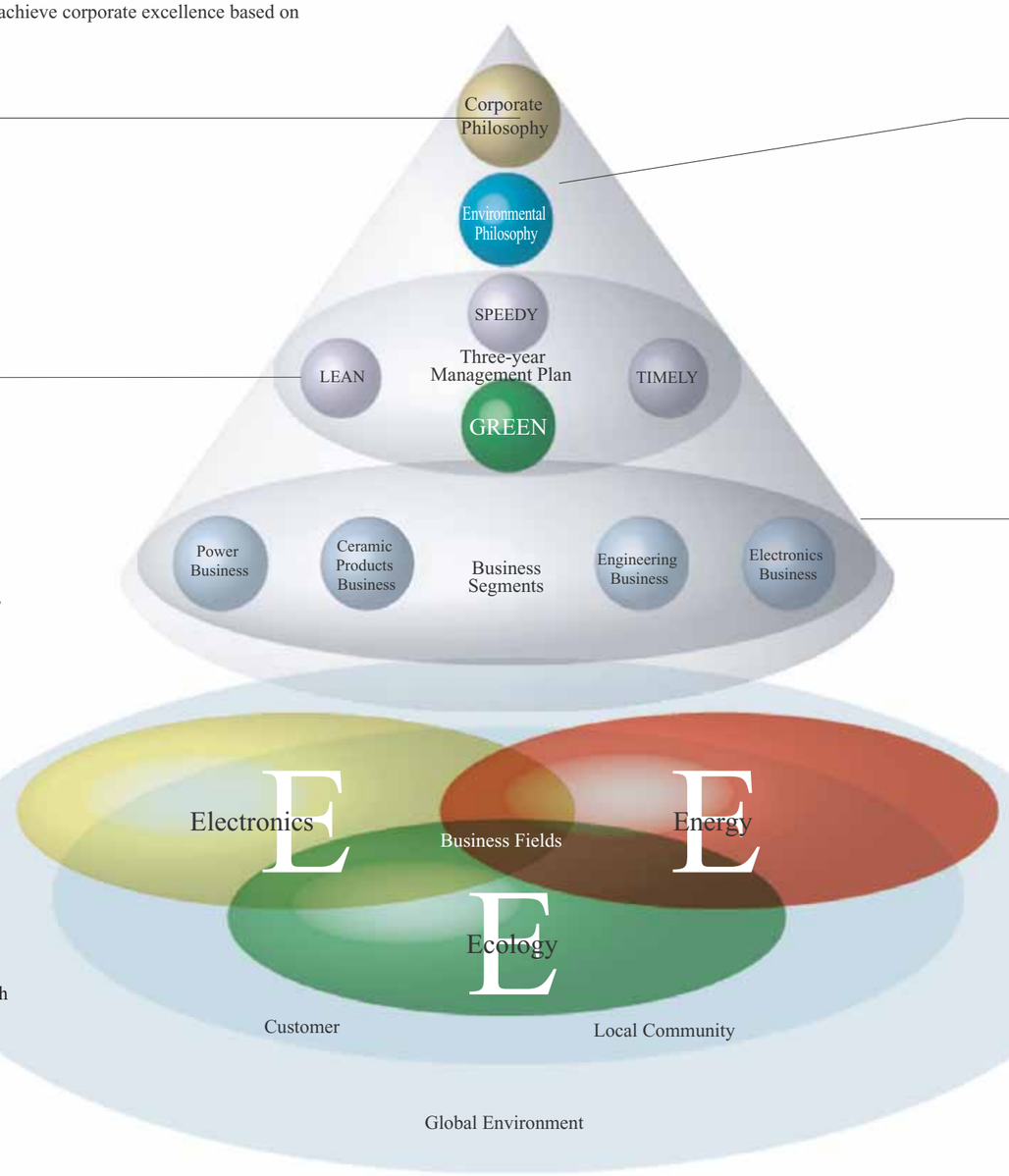
With ceramics technology positioned as a key technology, NGK is maintaining investment in research and development within the "Triple-E" business fields at around 6% of sales. The Company is striving to achieve strategic growth through the timely development of new products..

Lean Highly-Efficient Management

Aiming for a return on equity (ROE) of 10%, NGK is taking thorough steps to slim down assets through such measures as introduction of supply-chain management (SCM) and integration of equipment. The Company is further accelerating the utilization efficiency of management resources (personnel, property and funds).

Green Green Management

In order to fulfill its responsibility to maintain corporate excellence, NGK makes every effort to reduce the impact of its business activities on the global environment through such actions as measures to prevent global warming, recovery of resources from by-products, development of environmentally conscious products, and thorough implementation of Green Logistics.



Environmental Philosophy

On the basis of the Company's corporate philosophy, NGK focuses on the "Triple-E" areas of Ecology, Electronics, and Energy. Through our work in these areas, we seek to develop solutions to some of the critical challenges facing the next generation.

Main Pillars of Environmental Measures for 2003 to 2005
NGK is devoting every effort to research and development for protecting the environment, working to establish production technologies and develop materials with low environmental impact, including reductions in greenhouse gases as well as curbing the generation of industrial by-products and promoting resource recovery.

NGK's Four Business Segments

Power Business
NGK offers high-quality products in the area of electrical energy, such as the production of insulators for reliable power supply.

Ceramic Products Business
NGK offers leading-edge products based on innovative ceramics technology that support the growth of a diverse range of industries.

Engineering Business
Aiming for harmony between people and nature, NGK offers a wide array of facilities such as environmental conservation-related plants that protect people's lives and the environment.

Electronics Business
The electronics field continues to enjoy dizzying change and growth, and in this area as well NGK is making full use of fine ceramics technology to offer advanced products.

Environmentally Conscious Technologies and Products

With ceramics technology at our core, NGK is advancing the development of products and technologies to protect the global environment and our lives, including products that purify automotive exhaust emissions and achieve energy savings; environmental conservation plants such as those for water purification and treatment of by-products; and products that contribute to zero emissions and the creation of a recycling-based society.

Contributing to Air Purification

Purification of automotive exhaust emissions

Innovative Ceramics Technology for Purifying Exhaust Gases from Diesel Vehicles

Diesel Particulate Filter (DPF)

The regulation of the black smoke particulate matter (PM) in exhaust gases from diesel-powered vehicles has continued to become more and more stringent worldwide. NGK put HONEYCERAM¨ technology to full use to develop and manufacture a DPF that removes 90% or more of the PM produced by diesel engines. These DPFs are included in a monitoring vehicle test program in Europe of the Diesel Particulate NOx Reduction (DNPR*) System, which has been operated by Toyota Motor Corporation since March 2002, and they are expected to be commercially used in this system.

Demand in Europe for silicon carbide (SiC) DPFs is expected to increase dramatically beginning in 2005, and the company has built a new plant for SiC-DPFs at the Komaki area, beginning its operation in April 2003. NGK is proceeding with further R&D activities to solve PM problems and thus enhance the merits of diesel-powered vehicles, which boast lower CO_2 emissions, lower fuel consumption, and higher durability compared with gasoline-powered vehicles.

CERALLEC®, High Temperature Dust Collector

The CERALLEC¨ contributes to the improvement of the atmosphere by reducing dioxins produced by kilns and elimination of black smoke from fixed diesel-powered equipment.

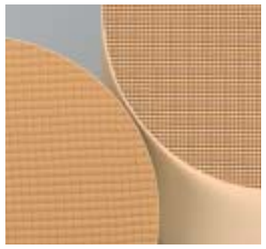
* The Diesel Particulate NOx Reduction (DNPR) System is an innovative exhaust gas purification system that continuously and simultaneously purifies harmful substances, such as soot-like particulate matter (PM) and nitrogen oxides (NOx), contained in the exhaust gas of diesel-powered vehicles.

We Want to Clean the Automobile Exhaust Emissions All Around the World

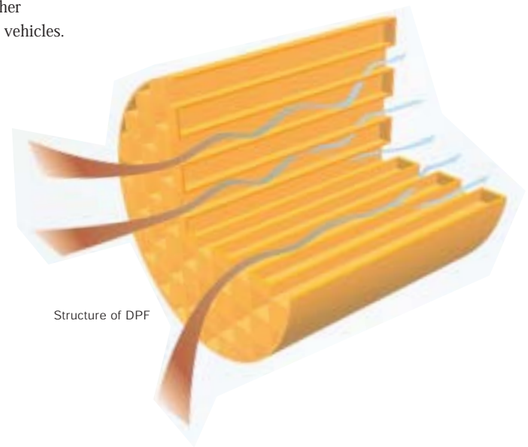
HONEYCERAM¨ Ceramic Substrates for Catalytic Converters

HONEYCERAM¨ is a ceramic substrate for catalytic converters for emission gas purification of gasoline-powered vehicles. By keeping the catalyst on the surface of the device and bringing it into direct contact with the exhaust gas, it converts harmful elements in the exhaust gas, such as HC, CO, and NOx, into harmless substance. To accommodate increasingly stringent emissions controls, NGK is further enhancing the performance of HONEYCERAM¨, achieving an ultra-thin wall of 0.05 mm.

NGK has released an aggregate total of some 600 million HONEYCERAM¨ around the world. The Company will continue to provide all the world's automakers with even higher-performance HONEYCERAM¨, thereby contributing to conservation of the global environment.



HONEYCERAM¨



Structure of DPF

Contributing to Water Purification

Safe and Speedy Purification of Water and Sewage

Launch of Japan's Largest Water-purification System Using Ceramic-membranes

Large Ceramic Membrane Water Purification Systems

This purification system uses a large ceramic membrane of 180 mm in diameter, 1,000 mm in length and pore size of 0.1 µm. Precision filtration using highly-porous ceramic membranes enables complete elimination of impurities such as bacteria and protozoa. This system can purify large volume of water, making it suitable for medium- and large-scale urban water-treatment plants.

In July 2002, the water purification system delivered to the Oguno Water Purification Plant of the Tokyo Metropolitan Government's Bureau of Waterworks went into operation. Containing four series of membrane units, each composed of 40 large ceramic membranes, the facility has a purification capacity of 3,400 m^3 of water per day, supplying some 7,600 people Ð making it Japan's largest water-purification facility using ceramic membranes.

Large ceramic membrane water purification system

Fast, Thorough Processing of Sewage in Large Cities

High-Speed Rainwater Treatment Systems

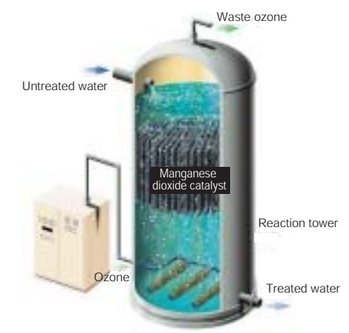
Large cities that laid sewer lines at an early date use combined sewer systems in which household effluent and the like flows through the same pipes as rainwater. NGK developed a high-speed rainwater treatment system to efficiently filter large volume of untreated sewage that overflow from combined sewer system into rivers and the sea when it rains. The system employs high-performance filter materials newly developed exclusively for rainwater treatment. The system can capture and remove 100% of refuse and foreign matter, and 70% of suspended solids using no chemicals.

Propeller-shaped filtering medium with excellent durability

Detoxification of Hazardous Substances in Water

Catalytic Ozone System for Dioxin Removal

This system efficiently decomposes and removes harmful substances such as dioxins and endocrine disrupters in wastewater. Manganese dioxide baked onto a ceramic substrate serves as a catalyst for oxidizing dioxins, rendering them harmless, while simultaneously reducing chemical oxygen demand (COD).



Structure of Catalytic Ozone System for Dioxin Removal

Contributing to Energy Conservation

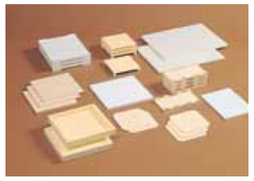
Achieving Energy Conservation and Helping to Prevent Global Warming

Growing Deliveries for Large-scale Electrical Energy Storage Systems in Japan

NAS¨ Battery (Sodium Sulfur Battery) Energy Storage Systems

NGK's ceramic-materials technology and production technology is the driving force behind the success in practical application of the world's first NAS¨ battery energy storage system - a compact secondary battery for large-scale energy storage. The batteries are charged with energy during the nighttime, when the fossil fuel ratio is low, and discharge electricity during daytime. What is more, this system produces zero atmospheric pollutants such as NOx, SOx, or black-smoke particulate matter (PM), and so it can be termed a clean energy storage system compared with self-generation from sources such as diesel generators. Because it uses nighttime power, which costs less than daytime power, it can contribute to cost reductions for electricity in factories, office buildings, waterworks and sewage facilities, hospitals, universities, etc. The systems are also suitable for use as an emergency power supply. The Company has installed approximately 50 systems in Japan, totaling the output power of over 30,000 kW. The Company has also delivered a system for demonstration to the American Electric Power Company, a major U.S. power company based in Ohio.

NAS¨ battery (sodium sulfur battery) energy storage system

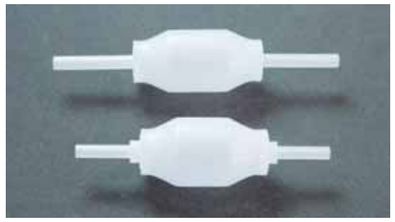


EXCERAM®, lightweight setters
EXCERAM¨ is a refractory that is 30% lighter than conventional setters due to the increased porosity of its alumina materials. These refractories absorb less heat during the firing process, and can therefore reduce fuel consumption and CO_2 emissions when they are used as kiln furniture.

Achieving Energy Savings, High Performance, and High Reliability

HICERAM¨ Translucent Alumina Ceramics

NGK proprietarily developed the production method for HICERAM¨ translucent polycrystal alumina ceramics. It finds use chiefly in the arc tubes for high-pressure sodium lamps that emit warm orange light in tunnels and on expressways, and in the arc tubes for ceramic metal halide lamps that emit bright white light at intersections, department stores, and the like. Because both types of lamps are energy efficient, they are expected to find wide use as replacement for existing lamps that are friendly to people and the environment.

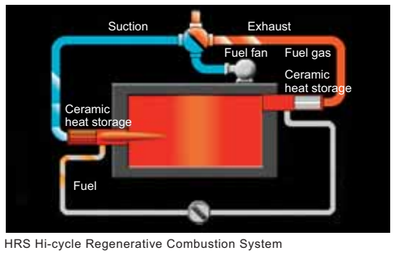


HICERAM¨, translucent alumina ceramics

High-efficiency, Energy-saving Firing with the Ability of Ceramics

HRS Hi-cycle Regenerative Combustion System

This system is an energy-saving combustion system that contains a ceramic honeycomb to exchange the heat from exhaust gas to combustion air by switching the burner operation mode. This system enables the reduction of fuel consumption and CO_2 emissions.



HRS Hi-cycle Regenerative Combustion System

Contributing to Zero Emissions

Making Use of Waste Products and By-products to Reduce Final Disposal Quantities to Zero

Utilizing the Energy of Refuse Safely and Efficiently

Fluidized-bed Gasification and Melting Systems

The thermal decomposition and gasification of refuse generates gas, which is then used to melt the refuse ash at high temperatures and turn it into slag. Gasification is conducted at comparatively low temperatures, permitting recovery of high-quality metals such as iron, copper, and aluminum. Moreover, melting is performed at high temperatures, which can help reduction of dioxin emissions. In addition, the produced slag can be reused in aggregate for construction, tiles, sound-absorbing materials, and other products. This greatly reduces the amount of by-products for final disposal, contributing to zero emissions.

Fluidized-bed gasification and melting systems

Contributing to a Recycling-based Society

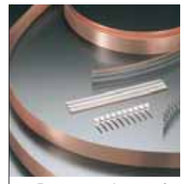
Promoting Recycling and Reuse

The Industry's First Home-use Water Purifier with a Recyclable Cartridge

The C1 Water Purifier Employing a Fine Ceramic Filter

The C1 which won the Good Design Award 2002, is a home-use water purifier developed utilizing NGK's many years of ceramics technology. The purifier employs a newly developed fine-ceramic filter that ensures 99.999% elimination of bacteria and other microorganisms, as well as removing upwards of 80% of substances that are toxic to humans, including lead, trihalomethane, and free chlorine. It is the first product of its kind in the world to be capable of recycling used water purifier cartridges. The filter can be reused in materials such as tiles and bricks, the activated charcoal can be reused in structural wall materials, and the plastic case can be reused as a raw material for flowerpots and other articles.

C1 fine-ceramics water purifier



Recovery and reuse of beryllium copper alloy products
Beryllium copper alloy products are stamped into extremely small products including electronic components, producing large amounts of stamping waste. NGK recovers stamping waste from clients and reuse nearly 100% of it.

Contributing to Conservation of Living Spaces

Protecting Comfortable Lifestyles for People

High-performance Sound-absorbing Material

HISHUT

HISHUT is a sound-absorbing material that has high sound-absorbing characteristics, protecting living spaces from noise. Thin and lightweight, it uses aluminum-fiber sound-absorbing material that offers outstanding durability.
Not only is this material impervious to deterioration from exposure to ultraviolet or the elements, its cylindrical appearance blends in well with the surroundings, earning it wide use as a sound-absorbing material along railways and highways, and at noisy facilities.

HISHUT in use as a sound-absorbing material for an expressway

Overall Perspective of Environmental Impact

In the power, ceramic products, engineering, and electronics business, NGK conducts product development and design, procuring components, raw materials, and other items, and manufacturing and selling products. The Company believes it is vital to ascertain the environmental impact and strive to alleviate it appropriately at every stage of these business activities.

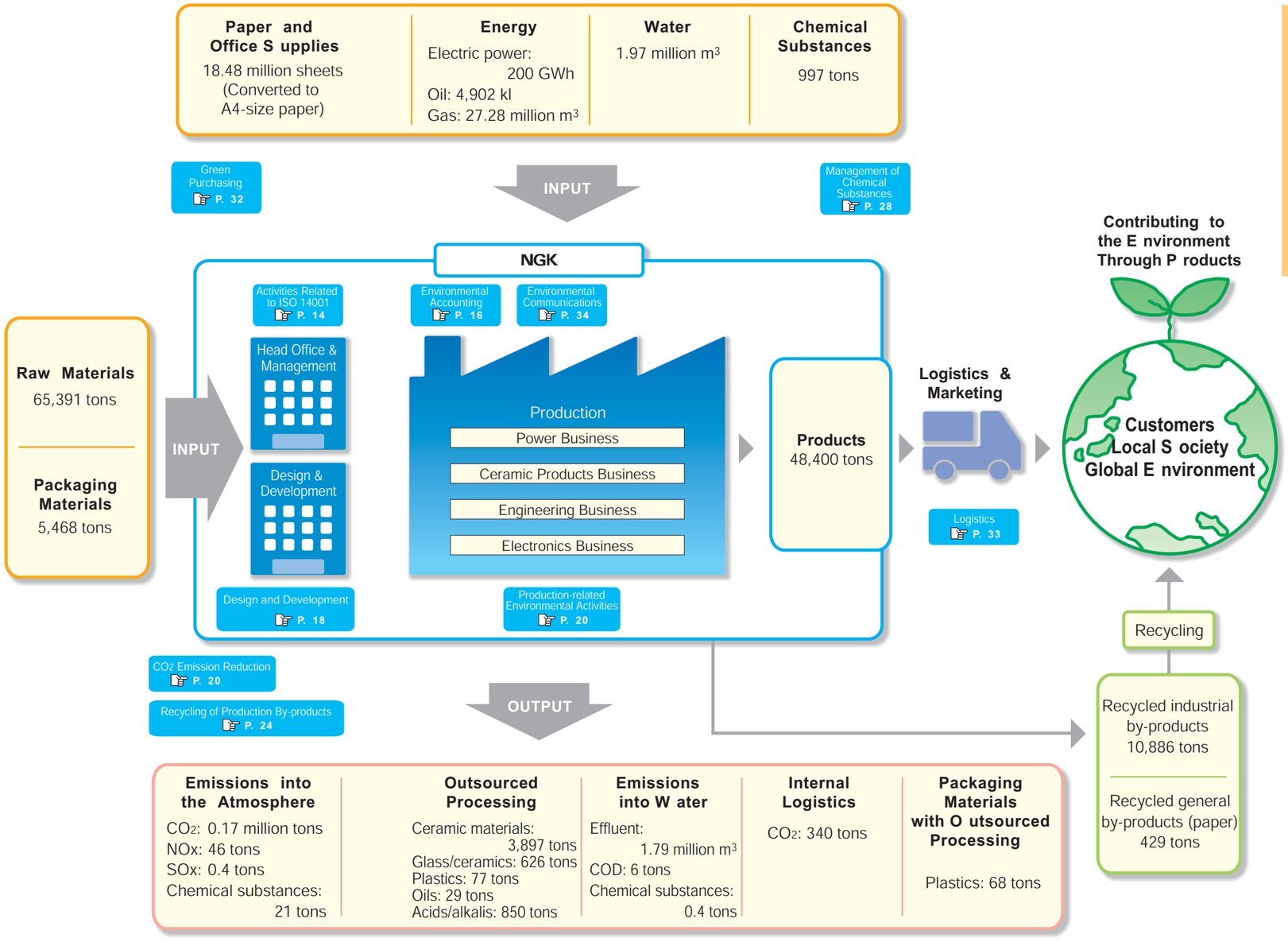
Furthermore, it is a mission of NGK to develop technologies that not only places no impact on the environment in the processes in which products are employed, but also that lessens the environmental impact for society.

The consumption of resources and energy in production activities accounts for the greater part of input. The reduction of energy used in the firing process is an important issue for NGK as a manufacturer of ceramic products. Because of its direct connection to the reduction of CO_2 emissions, as well as to help prevent global warming, the Company is actively striving to save energy in production. The Company is also working to reduce overall environmental impact by conducting proper management for the handling of chemical substances.

In the area of logistics, NGK is making efforts to lessen the impact on the environment in the usage of fossil fuels such as gasoline and diesel fuel through efficient transportation systems.

For output, measures for products and in production activities to reduce emissions of CO_2 into the atmosphere and discharge of effluent into bodies of water are a major issue. What is more, the reduction and recovery of by-products generated in the course of manufacturing are major issues in the characteristics of NGK's business operations, and the Company is committed to working to achieve zero emissions.

Moreover, NGK is conducting environmental conservation activities throughout all of the Company's business activities, including green purchasing and appropriate operation of environmental management systems in manufacturing processes and management areas.



Data from Nagoya, Chita, and Komaki plants

Environmental Management System

NGK's Core Policy on the Environment

NGK views global environmental conservation as one of the most important issues currently faced by mankind and strives to be a company in harmony with nature. In line with NGK's Core Policy on the Environment, established in April 1996, the Company will continue its business activities in the "Triple-E" business fields of Ecology, Electronics, and Energy. In addition to reducing the environmental impact of its business activities, NGK will actively contribute to a better environment through the development of products and technologies that benefit the environment.

Philosophy

NGK's positive approach to the environment begins with its basic corporate philosophy: "NGK products and technologies must create new value and contribute to the quality of life." In particular, we focus on the "Triple-E" areas of Ecology, Electronics, and Energy. Through our work in these areas, we seek to develop solutions to some of the critical challenges facing the next generation.

Action Guidelines

In the Design Review (DR) process, NGK first scientifically evaluates the impact of its production technologies, anti-pollution measures, and waste treatment systems on the environment. Based on our findings, we then take appropriate measures.

Specifically, we aim to:

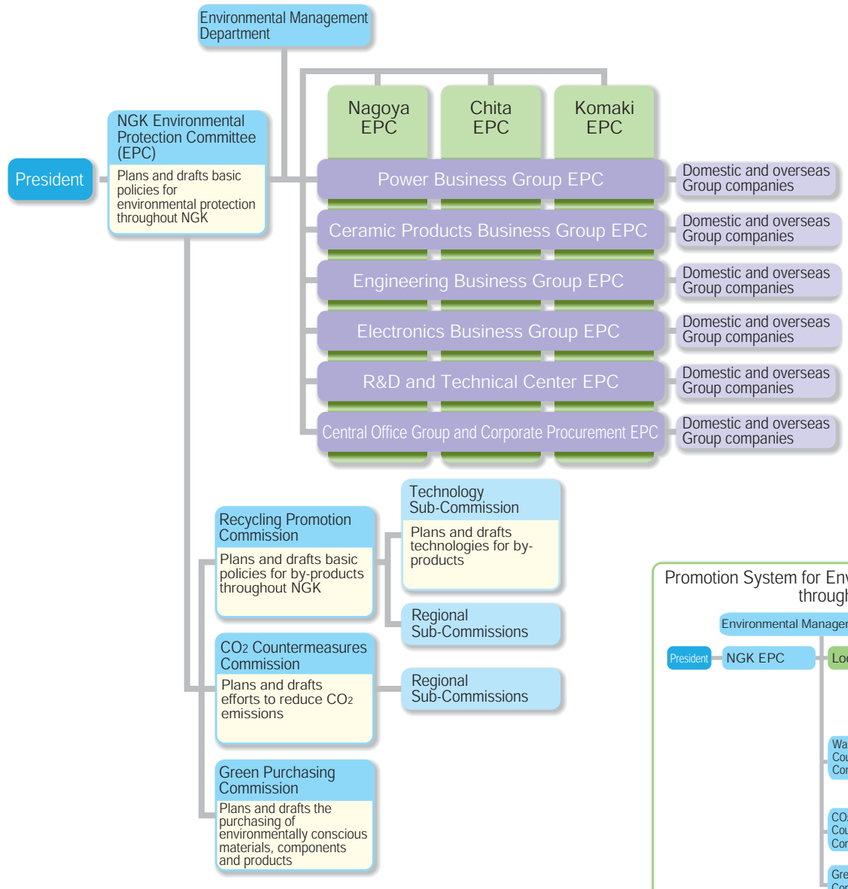
1. Improve the environmental management system;
2. Reduce industrial waste by promoting resource conservation and recycling;
3. Promote energy conservation and reduce CO_2 emissions;
4. Give preference to the purchase of environmentally friendly materials, parts, and products;
5. Improve environmental awareness among NGK employees, through educational and informational activities; and
6. Begin the Life Cycle Assessment (LCA) of products, in an effort to reduce their environmental impact.

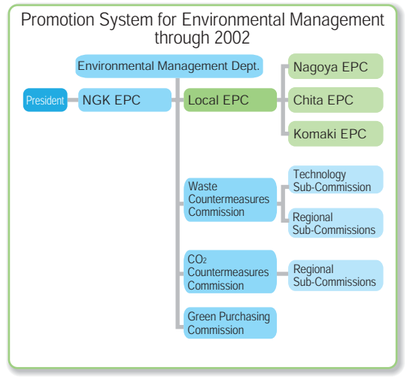
History of NGK's Commitment to Environmental Activities

Apr. 1972	Environmental Protection Committee and Environmental Preservation Office established
Jun. 1992	Waste Countermeasures Commission established
Mar. 1993	NGK's Voluntary Plan for Environmental Preservation established
Dec. 1994	Chlorofluorocarbons (CFCs) and 1,1,1-trichloroethane abolished
Feb. 1995	Internal environmental audit conducted
Mar. 1996	NGK's Core Policy on the Environment established
Dec. 1996	CO_2 Countermeasures Commission established
Mar. 1998	NGK's three production bases simultaneously received ISO 14001 certification
Mar. 1999	Environmental Report published
Apr. 1999	Environmental accounting introduced
Jun. 1999	Engineering Business Group received ISO 14001 certification
Oct. 1999	Green Purchasing Commission established
Nov. 1999	Environmental surveys of domestic group companies started
Feb. 2000	Environmental Partnership Club (EPOC) established and active participation therein begun
Oct. 2000	Chemical substance management system introduced
Mar. 2001	Five-year Environmental Action Plan established
Apr. 2001	Compilation of environmental performance data for domestic Group companies started
Oct. 2001	Operation of Recycling Yard begun
Jan. 2002	Compilation of environmental performance data for overseas Group companies started
Mar. 2002	The Electronics Business Group of NGK Insulators, Ltd., and three NGK Group companies jointly received ISO 14001 certification

Promotion System for Environmental Management

NGK has further strengthened its environmental management system (EMS) to promote even more effective responses to environmental issues.
The conventional system was organized centering on three Local Environmental Protection Committees in Nagoya, Chita and Komaki plants. The system was responsible for management relating to pollution-prevention laws and regulations at each site. From 2002, the Company has newly instituted systems organized along business-group lines, in addition to the existing system organized along plant lines. The new stance strengthens the Company's green management, making possible more proactive activities and enabling individual business groups to respond more effectively to their specific environmental issues, such as reducing CO_2 emissions, reducing or recycling by-products from manufacturing processes, and enhancing management of chemical substances. In addition to this, the environmental conservation activities at the three plants have been further augmented.





NGK's Environmental Action Plan

NGK's Voluntary Plan for Environmental Conservation was established in March 1993, and NGK's Core Policy on the Environment was established in April 1996. In addition to encouraging environment-related activities, these two plans have helped the Company address environmental issues in the "Triple-E" business fields of Ecology, Electronics, and Energy. In March 2001, NGK initiated its Five-year Environmental Action Plan, which further encourages and expands environmental activities. The NGK Group will continue to enhance its efforts to strengthen its ability to respond to environmental issues.

Self-evaluation results:
◎ Achieved target
○ Significantly exceeded target
△ Little year-to-year change
× Worse than previous year

Item			Environmental Action Plan 2001–2005	2002 Achievements: Target	2002 Achievements: Achievement	Self-Evaluation	2003 Targets	See page
Internal Environmental Activities	Environmental Management	Environmental Management	Establishment and effective operation of ISO 14001, Consolidation of environmental management for domestic and overseas Group companies	1. Establish and improve ISO 14001 2. Environmental Management System (EMS) support for domestic and overseas Group companies	1. Environmental management strengthened •Legal compliance: no violations •ISO 14001 external audits: no major faults •Made positive progress on 20 development and design themes, and 8 environmental management plan implementations •In-house education 2. Environmental survey of domestic and overseas Group companies conducted •Environmental survey (16 items) and environmental hearings at domestic Group companies, •Environmental survey (8 items) at overseas Group companies	○	1. Establish and improve ISO 14001 1) Strengthen environmental management in administrative divisions 2) Legal compliance: no violations 3) External audits: no major faults 4) Strengthen environmental impact reduction measures 5) Continue in-house environmental education, development and communication 2. Provide support for environmental management at domestic and overseas Group companies 1) Approaches to Business Group environmental management 2) Environmental performance analysis and issue definition	P.14
		Environmental Accounting (EA)	Evaluation based on cost effectiveness → Incorporation of EA into business activities, streamlining	1. Improve consistency with financial accounting 2. Introduce cost computation system linked to accounting system 3. Expand range of effect computation (domestic Group companies)	1. Acquisition cost in financial accounts entered as investment cost, and depreciation cost also entered 2. Cost computation system linked to accounting system introduced for certain expenses (general expenses, material purchases) 3. Computation and tracking of effects of environmental activity by domestic Group companies carried out	◎	1. Improve utility of EA •Calculate investments and effects on an operating division basis •Establish internal management indicators 2. Expand cost computation system (linked to accounting system)	P.16
	Life Cycle Activities	LCA	Investigation → Testing → Tool implementation	Test implementation on key products (insulators, HONEYCERAM®)	Distribution of CO2 load from in-house manufacturing process of insulators and HONEYCERAM® determined, data acquisition and analysis methods studied, and study of partial LCA data use started	○	Expand tests to other products	P.18
		CO_2	Restraining basic unit (total amount/sales) to within 1990 levels (70 tons CO_2/¥100 million)	1. Maintain the rate of emissions per unit of sales within 1990 levels Reduce emission index of four key products by 10% of 1990 levels 2. Promote energy consumption reduction at 3 plants and the Construction and Maintenance Center Reduce consumption by 2% from 2001 3. Investigate establishing a total emissions management target	1. Basic unit (total amount/sales) increased 7% over 2001, total emissions increased 2% Emissions index for 4 key products increased 5 points 2. Energy Management Standards implemented. Measures included sealing tunnel kiln, installed high-efficiency transformers, halting boiler operation when manufacturing stopped for vacations, and appropriate operation of air conditioning 3. Surveys of other companies begun, along with investigation of implementation in operating divisions	△	1. Maintain rate of emissions per unit sales at 1990 levels 2. Set total emission reductions target and develop plans 3. Promote energy conservation activity in business groups; reduce by 2% from 2002 4. Investigate processes with low environmental impact	P.20
		By-products	Reduction of outsourced processing by 50% (from 2000 levels) Promotion of recycling → Zero emissions	1. Reduce 2003 outsourced processing to 50% of 2000 levels 2. Promote conversion of outsourced processing into resources 3. Review of individual reduction plans, development of zero-emission implementation plan	1. Outsourced processing amount reduced by 2,200 tons from 2001, substantially achieving the target Total by-product production reduced by 2,000 tons, and recycling rate increased by 8% 2. Wastes positioned as by-products and enhanced recycling as resources Waste Countermeasures Commission renamed Recycling Commission 3. Investigation of conversion of high-volume ceramic materials and ceramic and glass by-products into resources	○	1. Promote conversion of ceramic materials and ceramic and glass by-products into resources •Outsourced processing amount 3,300 tons or less •Recycling rate no less than 2002 2. Promote development for conversion of by-products into resources 3. Reduce amount of acid and alkali by-products using outsourced processing by 50% from 2000	P.24
		Chemicals	Introduction and construction of management system → Elimination, use of substitute materials, reduction of emissions into environment	1. Maintain and improve chemical substance management system 2. Reduce environmental emissions of PRTR-listed solvents Reduce atmospheric emissions to less than 20% of 2000 level in 2005	1. System upgraded and computation efficiency improved 2. Atmospheric emissions of PRTR-listed solvents reduced by 32% from 2000 levels Switched to substitute substance for dichloromethane completed Atmospheric emissions of toluene and xylene reduced by 30% from 2000 levels	○	1. Strengthen management of PRTR-listed substances (Reduction to appropriate levels for amounts used, environmental emissions, and amounts of off-site transfer) 2. Streamline chemical substance management system and the Chemical Substances Safety Committee	P.28
		Green Purchasing and Logistics	Office supplies/ all-purpose equipment → Expansion to parts and materials Promotion of greening at suppliers	1. Inspect suppliers' environmental management programs 2. Develop green packaging guidelines 3. Continue Green Power purchase	1. Conducted exchange of views with 17 major suppliers regarding environmental activities 2. Developed green packaging guidelines 3. Continued Green Power purchase (2 million kWh/year)	○	1. Exchange views on environmental issues and green purchasing 2. Implement green packaging guidelines 3. Expand application of green purchasing in office supplies and all-purpose equipment	P.32
External Environmental Activities	Environmental Communication	Communication	Publication of Environmental Report, community relations activities, etc.	1. Improve Environmental Report •Earlier publication •Greater disclosure of environmental information 2. Continue dialogues between plants and surrounding communities •Hold local exchange meetings •Offer plant tours •Clean-up volunteer program	1. Environmental Report •Issued in July •Expanded range of environmental information disclosure, including for domestic and overseas Group companies 2. Dialogues between plants and surrounding communities •Local exchange meeting held (introduction of environmental activities, plant tour Summer Festival) • Offered tours of plants and recycling yards for overseas trainees •Volunteer clean-up programs for local area held 5 times/year	◎	1. Improve Environmental Report •Earlier publication •Greater disclosure of environmental information 2. Continue dialogues between plants and surrounding communities •Hold local exchange meetings and improve content •Offer plant tours	P.34
		Participation in NPO activities	Participation in the Environmental Partnership Organization Club (EPOC)	Promote activities of the Exchange Promotion Committee ①Exchange with local communities (Nagoya City, universities) ②Educational activities (exchange with overseas trainees, etc.)	1. Participated in "Clean Campaign Nagoya" held Eco-Campus Festival, educational activities to promote recycling 2. Exchange with overseas trainees and overseas tours	○	Promote the activities of the Exchange Promotion Committee ①Exchange with local community (Nagoya City, universities, etc.) ②Educational activities (support for school educational programs on the environment, exchange with overseas trainees, etc.)	P.34

Note:
NGK's independent Environmental Action Plan is centered on its three plants in Nagoya, Chita, and Komaki, but the details of the Environmental Management items shown here include domestic and overseas Group companies. Also, Environmental Accounting includes domestic Group companies.

Activities Related to ISO 14001

As part of the Company's efforts to develop long-term and Companywide environmental conservation activities in line with NGK's Core Policy on the Environment, continuing efforts are being made to acquire ISO 14001 certification. In March 1998, NGK's three main domestic production bases simultaneously received ISO 14001 certification, and by March 2003 nine business sites for domestic Group companies and five for overseas Group companies also received certification. Currently, about 60% of our consolidated business sites are ISO 14001 certified. In addition, by 2005, all Group companies are scheduled to complete certification.

Environmental Auditing

Even before ISO 14001 certification, NGK performed its own internal environmental inspections, working to improve its environmental protection activities. Today, 120 internal auditors are assigned to our various departments, performing audits once a year. The 2002 external audit showed no major faults.

External audit by JICQA

NGK Group ISO 14001 Certification (Overseas included) ●: ISO14001

			2001	2002	2003	2004	2005
Business Sites							
Domestic Group companies	NGK Insulators, Ltd.	Nagoya Plant (including Engineering Business Group and R&D section)	●	●	●	●	●
		Chita Plant	●	●	●	●	●
		Komaki Plant	●	●	●	●	●
	Power Business	Energy Support Corporation, Main Plant	●	●	●	●	●
		Akechi Insulators Co., Ltd., Akechi and Matoba plants	●	●	●	●	●
	Ceramic Products Business	Ikebukuro Horo Kogyo Co., Ltd.				●	●
		NGK Filtech, Ltd.			●	●	●
		NGK Adrec Co., Ltd.	●	●	●	●	●
		NGK Kilntech Corporation					●
		Heisei Ceramics Co., Ltd.	—	—		●	●
	Electronics Business	NGK Mettex Corporation					●
		NGK Fine Molds, Ltd.			●	●	●
		NGK Optoceramics Co., Ltd., Komaki Plant	●	●	●	●	●
		NGK Printer Ceramics Co., Ltd. Komaki Plant/Yamanashi Plant	●	●	●	●	●
		NGK Okhotsk, Ltd.	●	●	●	●	●
		Soshin Electric Co., Ltd. Asama Plant	●	●	●	●	●
		Soshin Electric Co., Ltd. Chikuma Plant	●	●	●	●	●
		Soshin Electric Co., Ltd. Miyazaki Plant	●	●	●	●	●
Overseas Group companies	Power Business	Locke Insulators, Inc.			●	●	●
		NGK-Locke Polymer Insulators, Inc.			●	●	●
		NGK Europe S.A.			●	●	●
		NGK Insulators Tangshan Co., Ltd.	●	●	●	●	●
		PT WIKA-NGK Insulators		●	●	●	●
		NGK Stanger Pty. Ltd.			●	●	●
	Ceramic Products Business	NGK Ceramics USA, Inc.	●	●	●	●	●
		NGK Ceramics Europe S.A.	●	●	●	●	●
		NGK Ceramics Suzhou Co., Ltd.	—	—			●
		Siam NGK Technocera Co., Ltd.	—	—			●
		NGK Technocera Suzhou Co., Ltd.	—	—			●
		P.T. NGK Ceramics Indonesia			●	●	●
		NGK Ceramics South Africa (Pty) Ltd.	●	●	●	●	●
	Electronics Business	NGK Metals Corporation			●	●	●
		NGK Berylco France			●	●	●
ISO 14001 and other certifications			55%	60%	79%	85%	100%

Notes:
- Heisei Ceramics became a consolidated company in 2002 and so has been added from 2003.
- Asahi Tec became a non-consolidated company from 2003 and so has been deleted.
- NGK Ceramics Suzhou, Siam NGK Technocera, and NGK Technocera Suzhou became consolidated companies in 2002 and so have been added from 2003.

Environmental Risk Management

In keeping with NGK's Core Policy on the Environment, the Company is working to upgrade its environmental management structures and prevent accidents through efforts geared toward preventing water, air, and other types of pollution. In addition, we have taken all necessary measures, including providing emergency response education and training, in preparation for the occurrence of an accident.

Pamphlet about guidelines for corporate behavior for the NGK Group

Strict Adherence to Legal Restrictions

In keeping with NGK's Core Policy on the Environment, each of our plants is working to achieve strict adherence to relevant legal restrictions as well as environmental categories agreed upon with supervising government agencies. Also, NGK forms pollution prevention agreements with local government bodies and implements independent measures to prevent pollution in accordance with autonomous standards even more stringent than legal restrictions.
In 2002, there were no instances in which NGK breached legal restrictions and standards. Also, the Company had no recorded instances of pollution-related lawsuits and received no pollution-related complaints from local communities.

Education and Training

In preparation for an emergency, each of our business sites implements education and training based on an annual plan with the aim of minimizing the spread of pollution in the event of an accident. In 2002, we carried out emergency response education and training that included training for emergency response to photochemical smog and abnormalities in water quality.

Education and Training Performance (2002)

Month Implemented	Objective	Participants	No. of people
7	Nagoya photochemical smog emergency response training	Firing kiln and safety personnel	12
8	Komaki abnormal water quality emergency response training	Water quality, construction, and safety personnel	13
8	Komaki photochemical smog emergency response training	Firing kiln, boiler, and safety personnel	12
8	Chita atmospheric emission emergency response training	Construction personnel	5
9	Nagoya abnormal water quality emergency response training	Water quality, construction, and safety personnel	8
11	Nagoya exhaust processing facility	Firing kiln, construction, and safety personnel	6
12	Chita abnormal water quality emergency response training	Water quality personnel	3

Major content:
Training in notification and communication in the event of an emergency
Acquisition of emergency response skills, and identification of problem areas through training

Employee Education and Development

To protect the Earth's environment, it is essential that each individual employee deepens his or her understanding of environmental issues and makes conscious efforts to protect the environment. One of NGK's action guidelines under its Core Policy on the Environment is to carry out educational and public affairs activities to raise environmental awareness among employees. Thus, NGK implements a wide array of environmental education and development activities.

Companywide Education

At our plants, we offer education in environmental management systems to ensure that employees understand environmental policy and work to follow it. In addition, we distribute the Environment Cards, on which environmental targets for each division are listed, and each person records environmental declarations and strives to raise his or her awareness regarding the environment.

Environment Card

Environmental Education Performance (2002)

Month Implemented	Objective	Participants	No. of people
7 - 8	Environmental management education (manual revision)	All departments	All
11	Education in environmental law and regulation	Environment managers at Group companies	15
11	Advance education for internal auditors	New internal auditors	12
12	Education in response to environmental law	Nagoya Plant	98
3 / '03	Internal auditor training program	Personnel scheduled to become environmental auditors	30

Obtaining Various Qualifications

To continually improve the content and implementation of environmental protection activity based on the environmental policy, we are focusing on cultivating staff members who possess the necessary legal qualifications - including those for pollution control manager and energy manager - for the operation of each business site. We are also providing support that enables employees to obtain such environment-related qualifications as those for environment management system auditor.

Number of Employees with Environment-Related Qualifications (as of March 31, 2003)

Qualification		No. of people
Senior pollution control manager		5
Pollution control manager	Air	65
	Water	108
	Noise	48
	Vibration	22
	Dust	4
	Dioxin	10
Specially controlled industrial waste manager		5
Energy manager		13
Environmental certified measurer		6
Heat manager		14
Intermediate waste disposal controller		6
Final waste disposal controller		4

Environmental Accounting

In 1999, NGK introduced environmental accounting as one tool for managing and ascertaining the state of its environmental protection activities. By tabulating and analyzing its environmental protection costs, NGK is striving to enhance the efficiency of its environmental protection efforts while attaining continual improvements in these activities.
In 2001 the scope of consolidation was limited to costs (for NGK and 14 domestic Group companies), but from 2002 it has been expanded to economic effects.

Analysis and Use of Tabulated Results

Environmental Costs (Non-consolidated)

In 2002, the environmental costs of three of NGK's business sites in Japan dropped approximately ´370 million from 2001, to ´2.24 billion. This figure included capital investment of ´720 million (´530 million less than in 2001) and ´1.52 billion for expenditures (´160 million more than in 2001).
Some 95% of the capital investment was used in business area costs such as pollution prevention. For expenses, 64% was used in business area costs such as pollution prevention, followed by environmental administration costs, representing a combined total of about 82%.

Environmental Conservation Effects and Economic Effects (Non-consolidated)

To determine effects, we have calculated "environmental conservation effects" and "economic effects."
NGK has satisfied all relevant pollution prevention related standards and has not been cited for any incidents of violations of standards. Total CO_2 emissions rose slightly over 2001, by 2.4%, but the amount of by-products from the manufacturing process was reduced, as was the amount of outsourced processing, and there was an increase in the recycling rate.
The direct economic effect of environmental protection measures was ´620 million, representing an increase of ´330 million over 2001.

Overview of Environmental Accounting for Domestic Group Companies

Capital investment for the NGK domestic Group companies were ´110 million, with energy conservation measures accounting for about half. Expenses were about ´650 million, with resource circulation accounting for 40% and R&D for 18%. The economic effect was ´540 million, with energy-conservation related expenses accounting for 52% and by-product sale for 22%.

Environmental Accounting Results (Non-consolidated) (´ million)

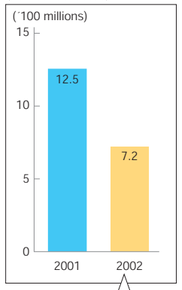
Cost		Capital Investment		Expenses		Total	
		2001	2002	2001	2002	2001	2002
Business area costs	Pollution prevention costs	563	278	348	514	912	792
	Global environment costs	605	370	17	73	622	443
	Resource circulation costs	73	31	258	381	331	411
	Total	1,241	678	623	968	1,864	1,646
Upstream and downstream costs		0	0	20	16	20	16
Administration costs		0	12	392	279	392	291
R&D costs		12	22	144	63	156	85
Community relations activity costs		0	6	174	187	174	193
Environmental damage costs		0	0	7	6	7	6
Total		1,253	717	1,360	1,520	2,612	2,237

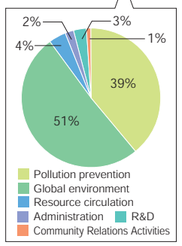
Environmental Accounting Results (Domestic Group companies) (´ million)

Cost		Capital Investment		Expenses		Total	
		2001	2002	2001	2002	2001	2002
Business area costs	Pollution prevention costs	16	26	192	91	207	116
	Global environment costs	38	55	7	63	45	118
	Resource circulation costs	6	5	258	262	264	267
	Total	60	85	458	416	518	501
Upstream and downstream costs		1	0	19	5	20	5
Administration costs		1	2	149	82	150	84
R&D costs		35	20	124	116	159	136
Community relations activity costs		0	2	46	32	46	34
Environmental damage costs		0	0	83	1	83	1
Total		97	109	879	652	977	762

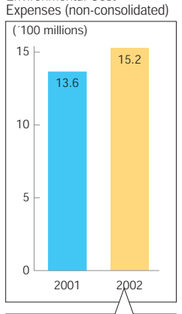
Notes:
Definition of Environmental Costs and Tabulation Methods: Environmental protection costs are categorized in accordance with guidelines*1 set by the Japan Environment Agency. For domestic Group companies, the figures for 14 manufacturers were calculated.
Expenses for the development of such environment-related products as water and sewage treatment equipment would naturally be incurred in the Company's normal business activities; these expenses are not included in the calculations.

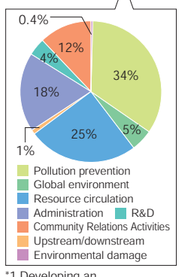
Environmental Cost Capital investment (non-consolidated)





Environmental Cost Expenses (non-consolidated)





*1 Developing an Environmental Accounting System (Year 2000 Report)

Environmental Conservation Effects (Non-consolidated)

	Category	Environment Conservation Effects 2001	Environment Conservation Effects 2002	Effects
Business area effects	Pollution prevention	Superior to standards; Number of violations: 0	Superior to standards; Number of violations: 0	—
	Volume of CO_2 emissions (tons)	162,300	166,310	Increase of 2.4% over 2001
	Basic unit (total amount/sales) (tons/´100 million)	79.2	84.6	5 tons-CO_2 increase over 2001
	Basic unit (total amount/production) (%)	92.4	98.7	—
	Volume of by-products generated (tons)	18,424	16,433	Amount generated: Decrease of 11%
	Volume of by-products recycled	10,670	10,866	Recycling rate: Increase of 8%
	Volume of outsourced disposal	7,754	5,547	Amount outsourced: Decrease of 2,207 tons
	Volume of water consumed (10,000 m^3)	198	197	Reduced consumption by implementing water leakage countermeasures and installing water conservation facilities
Other	ISO-related	Introduction of "Positive Environmental Effect Evaluation System" *2 to R&D and design divisions to promote development of processing, products, and facilities that contribute the social environment		—

Economic Effects (Non-consolidated)

Category	2001 Economic Effects (´ million)	2001 Reduction Volume	2002 Economic Effects (´ million)	2002 Reduction Volume
Energy conservation*3	46.5	1,313 tons-CO_2	103.2	3,892 tons-CO_2
Resource conservation (water)	0.7	5,000 m^3	0.27	3,000 m^3
Resource conservation (raw materials)	135.4	(Increased reuse rate for the material, improved yield, etc.)	251.5	2,008 t (Increased reuse rate for the material)
Resource conservation (packaging)*4	1.2	(Returnable pallets)	3.9	(Returnable pallets, etc.)
Reduced outsourced processing of by-products	13.1	918 tons	58.7	4,836 tons
Income from sale of by-products	89.5	—	202.1	11,231 tons
Total	286.4	—	619.6	—

Economic Effects (Domestic Group companies)

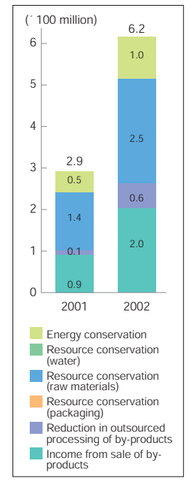
Category	2002 Economic Effects (´ million)	2002 Reduction Volume
Energy conservation	279.2	16,600 tons-CO_2
Resource conservation (water)	0.2	1,000 m^3
Resource conservation (raw materials)	68.8	1,004 tons
Resource conservation (packaging)	6.3	—
Reduced outsourced processing of by-products	66.3	5,519 tons
Income from sale of by-products	117.7	12,214 tons
Total	538.5	—

Notes:
a. Costs are calculated by the difference from 2001, achieved by progressing with activities regarding energy conservation, resource conservation, and by-product reduction.
b. Economic effects have been calculated independently.
c. The following values are used to calculate economic effects:
¥ Energy conservation: Unit price of electrical power at each business site (ex.Nagoya Plant: ´14.6/kWh, Chita Plant: ´13.8/kWh, Komaki Plant: ´17.2/kWh)
¥ Resource conservation (water): Unit price at each business site (ex. Nagoya Plant: ´605/m^3)
¥ Resource conservation (raw materials): Unit price for each raw material
¥ By-product processing costs: Processing cost for each by-product (ex.ceramic material at Nagoya Plant: ´8,500/ton)

Initiatives for the Future

Environmental accounting is an important indicator allowing NGK to better implement its Green Management as stated in its three-year management plan. In order to maximize the utility of environmental accounting, NGK is currently calculating all environment conservation costs and effects on an operating division basis. We are also promoting the establishment of internal management indicators.
To improve precision we have expanded the scope of application of the items in our cost computation system, which is linked to our accounting system. In 2002, the program covered only general expenses and material purchasing, but in 2003 we also cover repair expenses.
Environmental costs and effects were calculated for 14 domestic Group companies in 2002, but by 2005 we plan to expand the coverage of cost and effect to include overseas Group companies.

Economic effects (non-consolidated)



*2 Positive Environmental Effect Evaluation System: NGK system in which positive effects contributing to the reduction of the impact on the environment of R&D or design themes are evaluated and those which are highly evaluated are followed up on by those responsible for environmental management
*3 Reduction in CO_2 emissions (806 tons-CO_2) due to purchase of Green Power not reflected in above.
*4 Unrecorded effects of 2001 are included.

NGK's Life Cycle Activities

Design and Development

In 1998, NGK introduced the full-scale application of its Design Review (DR) process, which is aimed at minimizing the environmental impact in product design and manufacturing technologies.
We also began research into Life Cycle Assessment (LCA) to reduce the environmental impact of both manufacturing processes and products. We are continuing to reduce this environmental impact while developing business in ecology-related fields.

■ Design Review

To produce environmentally conscious products by forestalling potential problems at the design stage, all departments are involved in DR activities at each stage of development.

Under DR, assessment of such environmental aspects as reduction of CO_2 emissions and by-product processing are conducted at all stages, from product planning up through the launch of production. In addition to such conventional evaluation items as functionality, cost, and delivery date, DR activities also cover optimization of functioning along with production processes and technology, as well as selection and minimization of materials.
DR is intended to achieve environmentally aware product design and production, as well as addressing emissions of pollutants into the air and water, reduction of by-products in production processes, and recycling.

DR Flow

DR Flow	Verification items	Environmental assessment items
Product planning: DR-I	Development goals Technical issues Overall plan Cost	Identification of items affected by law and regulation
Product design: DR-II	Design specifications Package design Production technology Testing & evaluation planning	Incorporation of basic specifications in environmental measures
Production design: DR-III	Manufacturing process specifications Process FMEA* Purchasing specifications Inspection process specifications	Environmental measures in basic design and initial forecasts for environmental conservation level
Pre-production: DR-IV	Manufacturing conditions Purchasing process Inspection conditions	Initial verification of environmental conservation level
Commencement of production: DR-V	Mass production testing QC process Worker training Quality assurance	Verification

Points to be evaluated
1. Optimum functionality
2. Selection of materials
3. Minimization of volume of materials used (conservation of resources & weight reduction)
4. Optimization of production processes and technology (conservation of energy)
5. Reduction of environmental impact, and reductions and recycling methods for by-products
6. Product lifespan
7. Safety

*FMEA
Failure Mode and Effect Analysis

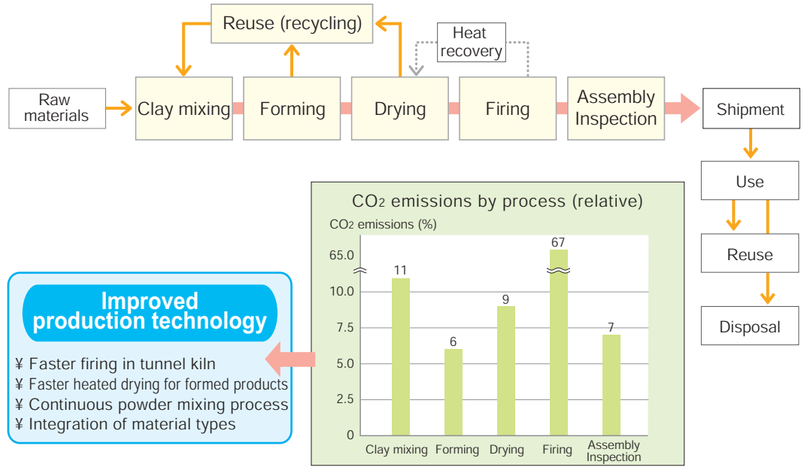
■ Life Cycle Assessment (LCA)

LCA is a method for the quantitative assessment and overall evaluation of the environmental impact predicted to occur throughout the entire life cycle of a product, from raw-material procurement to manufacturing, transport, usage, recycling, and disposal. In recent years it has undergone wide application trials as an effective assessment method that can serve as an indicator for environmental impact, and study into its adoption as a tool is proceeding.
NGK began research into LCA in 2000, based on reference data from the environmental impact, and especially CO_2 generation data, from the manufacturing processes for ceramic products. With the objective of utilizing LCA to improve internal manufacturing processes, we are trailing LCA in the manufacturing of key products, while analyzing the results and accumulating the technology. In the future we believe that LCA will make it possible to improve products and manufacturing processes through quantitative assessment.

A New Project and LCA

NGK launched a new project to improve competitiveness in the insulator business. Production technology improvement began full-scale in July 2002, and is scheduled to be completed in 2003. When completed, it is expected to be able to reduce CO_2 emissions by about 3,000 tons.
The LCA method has been employed to calculate the percentage of fossil-fuel derived CO_2 emissions in production processes extending from clay mixing to assembly and inspection. (See the graph below.) For example, CO_2 emissions generated in the firing process account for 67%. In this way the diagram clearly identifies the quantitative environmental impact. This quantitative analysis makes it possible to prioritize targets for environmental measures, providing effective technological improvements.
A similar analysis is scheduled to verify CO_2 reduction effects in the total flow of new processes for insulator manufacturing, including the results of technological improvements such as reductions in firing and drying times and the integration of material types.

Environmental impact (CO_2 emissions) analysis for bushing shell manufacturing process



A high-speed dryer roughly halves the time required for drying in the insulator manufacturing process (Chita Plant).

Production-related Environmental Activities

CO_2 Emission Reduction

NGK manufactures a range of ceramic products requiring a firing process, which is based on the combustion of carbon-rich fossil fuels such as petroleum and natural gas, and as a result cannot avoid CO_2 emissions. We are working to resolve this issue through a range of efforts including the development of technologies to lower environmental impact, improvements to the production process, and enhancement of management.

In the production process, we are developing new combustion technologies and improving existing technologies and production facilities, especially firing kilns, to conserve energy, and shifting to low-emission fuels. We are also upgrading air conditioning and lighting systems with energy-conserving models as older units are replaced. Management activities include supporting employee education and development relating to energy conservation, management in accordance with established the Energy Management Standards, and the promotion of energy conservation from all angles.

We have also begun investigation into reduction of the total CO_2 emissions for global and urban environmental conservation. Reducing total emissions will also require contribution to help society as a whole reduce environmental impact, and as part of this initiative we began purchasing Green Power from January 2002.

Data was compiled for the 14 domestic Group companies in 2001, but the range of source data was expanded in 2002 to cover 13 overseas Group companies as well.

2005 CO_2 emissions reduction targets

1) Keep basic unit (total amount/sales) within 1990 levels.

2) Reduce basic unit (total amount/production) (index)*1 by 10% in existing main products such as insulators and HONEYCERAM¨.

Long-term Schedule for CO_2 Emission Reduction

Item	2001	2002	2003	2004	2005
Kiln energy conservation (regenerative combustion)	→	→	→	→	→
Heat recovery (use of high-efficiency boilers)	→	→	→	→	→
Energy conversion (use of LNG)	→	→	→	→	→
Office energy conservation (appropriate climate control, high-efficiency lighting, promote energy-saving measures such as turning off lights)	→	→	→	→	→
Energy conserving inverters, introduction of high-efficiency devices and facilities	→	→	→	→	→
Improvement of operating procedures and energy management	→	→	→	→	→
Introduction of new types of energy (Green Power)	→	→	→	→	→
Promotion of Green Purchasing	→	→	→	→	→
Establishment of high-efficiency production system, consolidation of production sites			→	→	→
Introduction of environmental assessment methods (LCA)			→	→	→

Note:
Due to expanded production of ceramic and electronic products, which require high-energy consumption during production, CO_2 emissions have been on the increase. As a result, the Company revised its emissions reduction goals in November 2000. New targets will be established for the years up to 2005 and energy conservation activities will be stepped up to meet these targets.

*1 Basic unit (total amount/production)(index): An index based on the 1990 production amount as 100.

Change in CO_2 Emissions (Non-consolidated)

Total CO_2 emissions in 2002 reached about 166,000 tons, representing a slight (2.4%) rise over 2001. The basic unit (total amount/sales) was 84.6 tons-CO_2/´100 million, an increase of 5.4 tons-CO_2/´100 million. The main factors contributing to the increase were production adjustments in the Nagoya area due to facility upgrading at the HONEYCERAM¨ plant, and increased diesel particulate filter (DPF) production. Following the total elimination of heavy fuel oil in 2001, we reduced consumption of diesel fuel by about 1,000 tons, thereby achieving cleaner energy. CO_2 emission reduction measures implemented by the Construction and Maintenance Center included upgrading and review of equipment at all plants, with reduction performance very close to target. A management system was established based on the Energy Management Standards, as an important part of corporate efforts in 2003 and beyond to achieve our goals.

Change in CO_2 Emissions (Domestic and overseas Group companies)

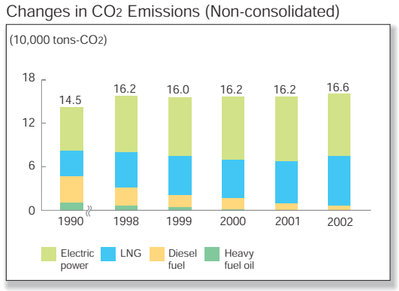
CO_2 emissions by domestic Group companies were 161,000 tons-CO_2, representing an increase of 19,000 tons-CO_2 over 2001 performance. The figure for overseas Group companies was 138,000 tons-CO_2. The total for the consolidated NGK and domestic Group companies was 327,000 tons-CO_2, an increase of 23,000 tons-CO_2 over 2001. The consolidated figures including overseas Group companies are for total CO_2 emissions of 465,000 tons-CO_2.

A breakdown of CO_2 emissions for domestic Group companies by fuel shows the largest source is electricity, following in descending order by coke, LPG, and oil. For overseas Group companies, over 90% was from electricity and gas energy, both of which offer relatively low CO_2 emissions.

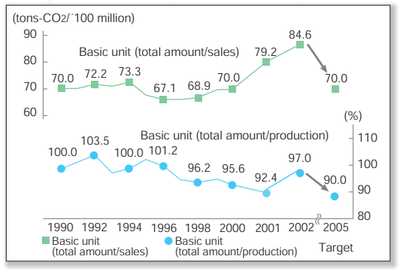
Change in Greenhouse Gas Emissions (Non-consolidated)

Of the six designated greenhouse gases*2, we began tracking emissions in 2001 for CO_2, CH_4, and N_2O from combustion, and for SF_6 insulating gas. CO_2 and SF_6 accounted for nearly 100% of total emissions of greenhouse gases. In 2002, SF_6 emissions were reduced by about 60%, following a similar reduction in 2001.

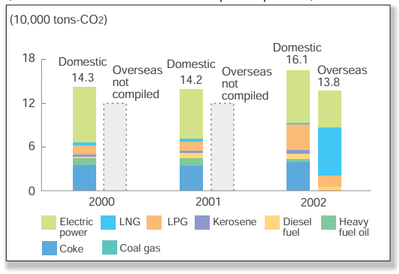
Changes in CO_2 Emissions (Non-consolidated)



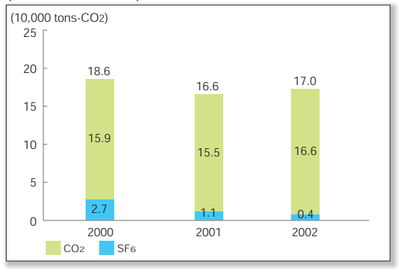
Changes in Basic Unit (Non-consolidated)



Changes in CO_2 Emissions (Domestic and overseas Group companies)



Changes in Greenhouse Gas Emissions (Non-consolidated)



*2 Greenhouse gasses: Gasses that trap thermal radiation reflected from the surface of the Earth, thus resulting in a "greenhouse effect" wherein the overall temperature of the Earth increases. Carbon dioxide (CO_2), methane (CH_4), dinitrogen monoxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6) are designated as greenhouse gasses. The greenhouse effect of SF_6 is approximately 24,000 times as strong as that of CO_2.

Environmental Activities Related to Production Process

New Installation of NSK-8 Energy-conserving Combustion System

The NSK-8 is used for high-temperature firing of the beta alumina tubes used in the solid electrolyte for NAS¨ batteries, and is the second kiln to use the Hi-cycle Regenerative Combustion System. The system contains regenerative media made of ceramics that stores heat from the exhaust gas for use in combustion.
This system is expected to improve energy utilization efficiency, and to reduce fuel consumption and CO_2 emissions to about half those of conventional kilns. The kiln is also fitted with a denitration system to break NOx down into nitrogen and water, further alleviating environmental impact.

NSK-8: Regenerative burners boost combustion efficiency by storing heat (Nagoya Plant)

Energy Conservation in Ceramic Tunnel Kilns

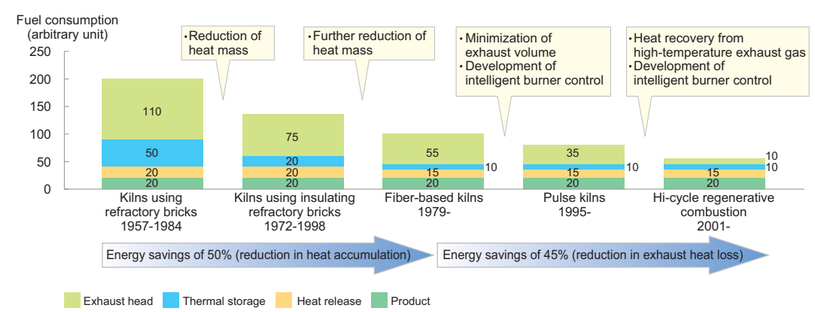
Requirements for higher quality in ceramic products have led to strong demand for complex temperature profiles and uniform temperature distribution in firing kilns. Conventional tunnel firing kilns have complex temperature profiles, requiring kiln lengths of 200 meters and degrading productivity through non-uniform internal temperature distributions.
NGK introduced zone temperature control by a regenerative burner, optimized kiln cross-sectional shape, and optimized burner flow rate and layout to achieve high-quality firing in a kiln under 100 meters long. Lighter kiln furniture and walls contributed to energy conservation, which, along with recirculation of exhaust gas and the denitration system, significantly cut NOx emissions and lowered the environmental impact of the facility in operation.

Reduction in CO_2 Emissions through Enhanced Management

Development of Energy Management Standards

After the augmentation of the Law Concerning Rational Use of Energy, NGK prepared its own manual for Energy Management Standards, designed to promote efficient utilization of existing energy facilities. By January 2003 implementation had begun at all three major plants (Nagoya, Chita, and Komaki). It has also been incorporated into the environmental management system to improve its effectiveness.

Kiln Energy Conservation Technology



Review of Air Conditioning Equipment

The R&D Division at the Nagoya Plant has a large number of clean rooms, and after a review of air conditioning chiller characteristics, optimized the number of units to achieve high efficiency in primarily high-load operation. This cut annual CO_2 emissions by 160 tons, and similar programs are scheduled for application in existing heat source equipment.

Review of Cooling Equipment

The R&D Division and HONEYCERAM¨ Plant both located at the Nagoya Plant, use low outside temperatures during the winter months to cool facility cooling water, with a new free-cooling system introduced recently. The system reduces emissions by 40 tons-CO_2 per year compared with conventional systems. In addition, since natural outside air is used, the environmental impact of refrigerants is minimized. The program is scheduled to be implemented in other structures in the near future.

Energy-Conserving Mercury-Vapor Lights

Mercury-vapor ceiling lighting in the Nagoya and Komaki plants was replaced with ceramic metal halide lamps (250 W), featuring lower power consumption, from 2001. As a result, reductions of 70 tons-CO_2 were achieved in 2002.
These metal halide lamps use NGK's HICERAM¨ translucent alumina ceramics.


Ceramic metal halide lamps (Komaki Plant)

Other

Use of Night-time Electric Power

A 500 kW NGK NAS¨ battery was installed at the Nagoya Plant. The Nagoya Plant has also installed 200 and 230 kW equivalent "Eco-Ice" ice thermal storage systems, contributing to the continuing reduction of CO_2 emissions from electricity generation by making use of night-time electric power, which uses a lower ratio of fossil fuels.

Change in Fuels

NGK plants are continuing the changeover from petroleum-based fuel (heavy fuel oil, diesel fuel and kerosene) to natural gas (LNG), which represents about 17% less CO_2 emissions. The Chita Plant completely stopped using heavy fuel oil for combustion in 1981, followed by the Nagoya Plant in 2002, and both have entirely switched over to LNG. In 2002 oil-based fuels accounted for only 7.8% of fossil-fuel derived CO_2 emissions.

Green Power Purchasing

To limit rises in CO_2 emissions that accompany increases in production, NGK turned to wind power, a renewable energy that causes emissions of very little CO_2. In September 2001 NGK signed a contract with the Japan Natural Energy Co., Ltd. for a Green Power Certification System*, and began purchasing 2 GWh of wind power from January 2002. The basic unit of CO_2 emissions from wind power is less than 10% that of power from fossil fuels. The introduction of 2 GWh of wind power will prevent the release of 806 tons-CO_2 annually.


NAS¨ battery energy storage system (Nagoya Plant)


The Noshiro Wind Power Station

Initiatives for the Future

We will continue to improve energy-conservation management for manufacturing equipment and facilities in accordance with the Law Concerning Rational Use of Energy, while working to improve energy efficiency, convert to alternative fuels, and switch to energy-conserving air conditioning and lighting to achieve our stated goal of restraining the basic unit (total amount/sales) to 1990 levels. NGK is making efforts to achieve a 2% reduction in energy over 2002 through educational activities for employees and energy-conservation activities in business-group environmental management.
For NGK, reduction of CO_2 emissions during firing is a key point, which is why we are emphasizing the development of innovative manufacturing technologies through a fundamental review of the manufacturing processes which use so much energy. We have also begun work toward establishing a total emissions target, as described in the Kyoto Protocol, and are committed to reducing CO_2 emissions globally for all domestic and overseas Group companies.

* The Green Power Certification system gives concrete form to the added environmental value such as energy conservation (reduction of fossil-fuel use) and reductions in CO_2 emissions obtained by using power generated by natural energy sources. It can be used by companies and other organizations as an independent energy-conservation or environmental measure.

Recycling of Production By-products

In the last few years, Japan has seen the enactment and implementation of several laws relating to the construction of a recycling-based society, such as the Basic Law for Establishing a Recycling-based Society. NGK is utilizing its resources more effectively than ever to help meet their social requirements in its business activities.
First, we transformed the waste-collection areas at our three major plants (Nagoya, Chita, and Komaki) into "recycling yards," reflecting our recognition that what was once waste is actually a resource. We are changing the basis of our policy from the Waste Disposal Law to the Law for Promotion of Effective Utilization of Recyclable Resources, and as a result now refer to "by-products" or "recyclable resources" rather than to "waste." NGK manufacturing activities produce a range of by-products such as ceramic materials, plastics, glass, and ceramics. We are working to minimize the amounts of such material generated, while at the same time expanding our efforts to develop technologies to reuse them as resources.
We are also enhancing our efforts to reduce by-products and promote recycling, with our aim being to achieve zero emissions globally, at not only the 14 domestic Group companies, but also the 13 overseas Group companies.

Recycling targets for by-products

2003 target: Reduce amount requiring outsourced processing by 40% compared to 2001 levels (3,300 tons)
2005 target: Zero emissions

Long-term Schedule for by-product Recycling

	Item	2001	2002	2003	2004	2005
Effective by-product utilization	Reduction targets			40% from 2001 levels (3,300 tons)		Zero emissions
	Consideration and implementation of policies by division to reduce inherent inter-Group waste					
	Consideration by technical subcommittees when technical issues arise					
Production technology	Environmentally conscious production technology designed, environmental assessment					
	Development of essential technologies					

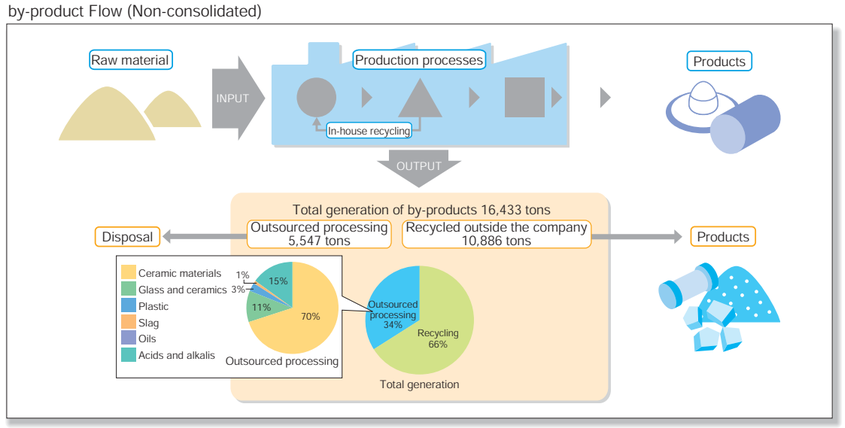
Nomenclature Changes in Response to Recycling-Based Society

To promote effective activities toward the achievement of a recycling-based society in accordance with the Law for Promotion of Effective Utilization of Recyclable Resources, the Waste Countermeasures Commission was renamed the Recycling Promotion Commission, and the "wastes" produced by corporate activity were repositioned as "by-products." Names of other by-products have been changed in accordance with this change in awareness, in an effort to clarify NGK's environmental approach and improve awareness within the company.

Former name	Current name
Waste	By-products
Sludge	Ceramic materials
Waste plastics	Plastics
Glass and ceramic scrap	Glass and ceramics
Slag	Slag
Waste oil	Oils
Waste acid	Acids
Waste alkali	Alkalis
Metallic waste	Metal
Useful and recyclable substances	Recyclable substances

*1 Zero emissions
The reduction of the volume of by-products for final disposal into landfills to 10% of 2000 levels. This will be achieved through the reuse of by-products as raw materials or fuels and the reduction of ordinary waste trough improvements in production and manufacturing processes.

by-product Flow (Non-consolidated)



By-product Generation (Non-consolidated)

In 2002, the NGK production process generated a total of 16,433 tons of by-products, representing a 1,991-ton decrease (12%) from 2001. Of this, 5,547 tons required outsourced processing, a reduction of 2,207 tons from 2001. The recycling rate rose 8 percentage points, to 66%.
The 1,991 tons of by-product reduction was due to the reduced generation of ceramic materials as well as glass and ceramic by-products from insulators and HONEYCERAM™. These items account for 60% of all by-products.
The 2,207-ton reduction in outsourced processing was due to reduced generation and efforts to improve recycling, contributing to a reduction in processing of ceramic materials, plastics, and glass and ceramics.
The amount of by-products recycled rose 216 tons over 2001. This was due to a higher recycling rate in spite of successful efforts to reduce the amounts generated.

By-product Recycling (Non-consolidated)

Many of the by-products from the NGK production processes are ceramic materials as well as glass and ceramics, which can be recycled effectively. We are working to reuse these resources in-house. Ceramic materials can be reused outside the company as raw materials for bricks, porous ceramic products and refractories, while plastics are thoroughly sorted and reused in the form of high-calorie solid fuel called RPF*2.

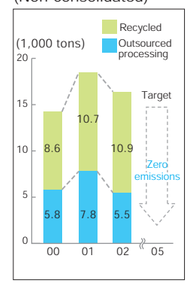
Examples of Recycling

Source material	Recycling application
Ceramic materials	Raw materials for ceramic pipe, roof tiles, and other ceramic products, kiln furniture, tiles, etc.
Plastics	RPF
Ceramics	Refractory materials
Oils	Fuel
Metal	Metal recovery

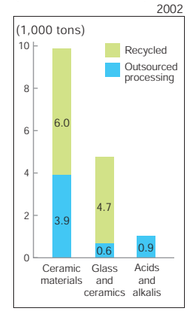
Generation and Recycling of By-products (Non-consolidated) (tons)

By-product	2001 Total generation	2001 Recycled (Recycling rate)		2001 Outsourced processing	2002 Total generation	2002 Recycled (Recycling rate)		2002 Outsourced processing
Ceramic materials	11,522	6,787	(59%)	4,735	9,882	5,985	(61%)	3,897
Plastics	272	31	(11%)	241	233	88	(38%)	145
Glass and ceramics	5,546	3,639	(66%)	1,907	5,281	4,655	(88%)	626
Slag	77	77	(100%)	0	42	42	(100%)	0
Oils	143	136	(95%)	7	145	116	(80%)	29
Acids and alkalis	864	0	(0%)	864	850	0	(0%)	850
Total	18,424	10,670	(58%)	7,754	16,433	10,886	(66%)	5,547

Trends and Targets in By-product Generation (Non-consolidated)



By-product Generation by Type (Non-consolidated)

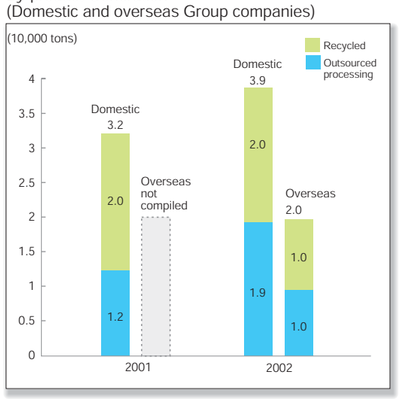


*2 RPF
Refuse paper and plastic fuel. Solid fuel made from refuse plastic and paper (magazines, etc.) which cannot be recycled.

By-product Generation and Recycling (Domestic and overseas Group companies)

In 2001 data was compiled for the 14 domestic Group companies, but the range of data was expanded in 2002 to include the 13 overseas Group companies.
Total by-products generated was 38,612 tons for the domestic Group companies and 19,604 tons for overseas Group companies, with recycling rates of 50% and 51%, respectively. A breakdown of by-product generation shows that slag accounts for the largest portion of the domestic Group's output, followed by glass and ceramics, then ceramic materials. For overseas Group companies glass and ceramics accounted for the largest portion, followed by ceramic materials.

By-product Generation
(Domestic and overseas Group companies)



Generation and Recycling of By-products (Domestic Group companies) (tons)

By-product	2001			2002		
	Total generation	Recycled (Recycling rate)	Outsourced processing	Total generation	Recycled (Recycling rate)	Outsourced processing
Ceramic materials	1,594	184 (12%)	1,410	1,081	44 (4%)	1,037
Plastics	489	65 (13%)	424	654	230 (35%)	423
Glass and ceramics	1,110	590 (53%)	520	1,550	993 (64%)	556
Slag	27,144	18,555 (68%)	8,589	34,059	17,541 (52%)	16,518
Oils	969	19 (2%)	950	792	389 (49%)	403
Acids and alkalis	690	243 (35%)	447	476	195 (41%)	281
Total	31,996	19,656 (61%)	12,340	38,612	19,393 (50%)	19,219

Generation and Recycling of By-products
(Overseas Group companies) (tons)

By-product	2002		
	Total generation	Recycled (Recycling rate)	Outsourced processing
Ceramic materials	4,754	667 (14%)	4,088
Plastics	349	13 (4%)	336
Glass and ceramics	13,998	9,333 (67%)	4,666
Slag	110	10 (9%)	100
Oils	119	61 (51%)	58
Acids and alkalis	273	0 (0%)	273
Total	19,604	10,084 (51%)	9,520

In-house Resource Recovery Activities

Working to Recycle Ceramic Materials

The Komaki Insulators Plant is in the process of recovering ceramic materials that are now subjected to landfill disposal. Installation of the processing equipment has been completed, and efforts have begun to proceed with recovery operations for recycling.

Recovery of Resources from Metal Washing Fluid

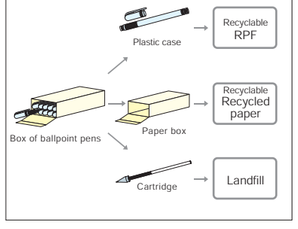
The Chita Metal Plant has implemented equipment for the recirculation and concentration of copper-containing acid washing fluid. Concentrating this acid washing fluid makes it possible to reclaim the copper contained in the fluid. In addition, the recirculation of this acid washing fluid is expected to achieve vast reductions in the amounts of acid used.

Stringent Sorting in the Recycling Yard

Reflecting our increased recycling rate achieved by thorough, sorting for not only plastics, but by-products of all types, the waste collection areas were upgraded, and renamed as "Recycling Yards." Our new By-product Sorting Manager Registration System clarifies the responsibility of the source department, and the manager is changed every six months to promote employee awareness. For further improvement in implementation, a sorting manual has been prepared to ensure thorough sorting and inspections have been strengthened.
As a result of these activities, the amount of plastics requiring outsourced processing was reduced 40% compared with 2001, and the recycling rate increased 27%.
The program also provided major gains in employee awareness of environmental conservation issues.

Recycling yard
(Chita Plant)

Example of Sorting



Inspection of sorting at recycling yard (Nagoya Plant)

Manifest Processing for Used Paper

In the past, different types of used paper were processed by different service providers under consignment agreements, and in a number of cases the processing flow was quite complex and unclear. NGK has worked to unify service providers for used paper processing, and to make the consignment system simpler and more transparent for proper management.
With this aim, we have applied a manifest system to process used paper, although the manifest system had been limited to industrial by-products in the past. Under this system we issue service providers a Control Manifest for Industrial Waste for each consignment of paper, which they return to us when processing is done, allowing us to verify proper completion. In addition to ensuring appropriate processing, this system also protects the confidential information on waste documents.

Initiatives for the Future

To achieve our goal of zero emissions by 2005, we have positioned the restraint of by-product generation and enhanced recycling as key strategies. Improved yield and expanded application for recycled materials will reduce the amount which must use outsourced processing. We are also working on acids and alkalis, and expect to achieve dramatic reductions for these substances. Technological innovation to restrain by-product generation and the development of new manufacturing technologies for recycling by-products will also help us achieve our 2005 target. For domestic and overseas Group companies, the recycling rate for ceramic materials is relatively low compared to NGK's three major plants, and raising this rate is another key objective.

Management of Chemical Substances

Chemicals are highly useful, and essential in our business activities. At the same time, though, they are substances which may damage the environment or ecological systems, and therefore must be managed appropriately.
NGK not only observes applicable laws and regulations, such as the PRTR Law*, but also works to use alternatives to harmful chemical substances, and develop technologies for stabilization and detoxification, thereby minimizing the environmental impact of its activities.
These efforts now encompass the 14 domestic Group firms as well, and we are working together under a strict substance-management stance.

Reduction Target for Chemical Substances

2005 target: Reduce atmospheric solvent emissions by 80% compared to 2000 levels

Long-term Schedule for Management of Chemical Substances

	Item	2000	2001	2002	2003	2004	2005
Construction of a management framework	Building of a unified chemical substance management system	→	→	→	→	→	→
	Chemical substance safety committee	→	→	→	→	→	→
Compliance with PRTR Law	Reduction target		80% reduction in atmospheric solvent emissions from 2000 levels in 2005				
	Careful consideration of volume used and promotion of recycling		→	→	→	→	→
	Consideration of stabilization and detoxification methods		→	→	→	→	→
Compliance with new laws	Conformance with such new laws as the Dioxin and PCB Measures Law		→	→	→	→	→

Chemical Substances Management System

To support appropriate management of risks inherent in chemical substances, the Chemical Substances Management System entered full-scale operation in October 2000, and currently more than 8,500 chemicals are registered in the system and carefully stored. The Chemical Substances Management System has been integrated with the on-line purchasing system and all raw materials, fuels, gases, oils, paints, and chemicals used by the Company are handled on an identical system and are managed by storage box in the respective divisions. When the quantities of PRTR-listed substances purchased and consumed are input, the amounts of such chemical substances transferred off-site and emitted are automatically calculated. Furthermore, prior to the purchase of additional chemicals, comprehensive safety and environmental studies are examined and approved by the Chemical Substances Safety Committee. New information is also managed and made available.
In addition to the committee's input screening, the business section strictly controls storage of the chemicals. With this two-part process, NGK improves both accident prevention and information sharing functions.

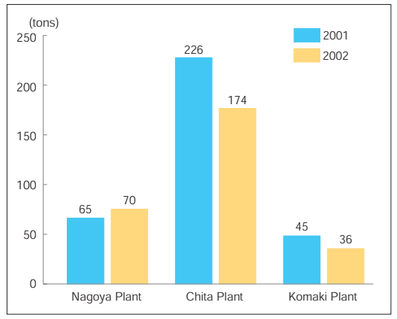
Implementation of Chemical Substances Management System (Nagoya Plant)

* PRTR Law
Law Regarding the Pollutant Release and Transfer Register

Handling of PRTR-listed Substances (Non-consolidated)

The PRTR Law, enforced in July 2000, specifies 354 Class 1 Designated chemical substances. NGK handled 58 of these substances in its companywide operations in 2002. The total volume of these substances handled was 280 tons. NGK must report to the government on 14 substances, including solvents for insulator and raw materials for metallic products. In 2001, 337 tons of 62 of such substances were handled. The change in the number and volume used was primarily due to variations in production, and to the complete abolition of three chemicals: dichloromethane, 2-amino ethanol, and 1,3,5-trimethyl benzene.
Broken down by plant, the Nagoya Plant handled approximately 70 tons of 50 substances, the Chita Plant approximately 174 tons of 39 substances, and the Komaki Plant approximately 36 tons of 24 substances.

Amounts of PRTR-listed Substances (Non-consolidated)



Amounts of PRTR-listed Substances Handled, Released, and Transferred (Non-consolidated)

(tons)

Substance		Amount handled	2002 Amount released				Amount transferred	
			Atmosphere	Water	Soil	Landfill	Sewage	Outside
Nagoya Plant	Toluene	22.41	1.31	0.00	0.00	0.00	0.00	0.07
	Acetaldehyde	6.00	0.20	0.00	0.00	0.00	0.00	0.00
	Xylene	15.11	0.16	0.00	0.00	0.00	0.00	2.92
	Formaldehyde	11.42	0.13	0.00	0.00	0.00	0.00	0.00
	Benzene	1.06	0.01	0.00	0.00	0.00	0.00	0.00
	Ethylene glycol	5.25	0.00	0.00	0.00	0.00	0.03	4.07
	Nickel compounds	0.90	0.00	0.00	0.00	0.00	0.05	0.68
	Total	70.20 (50 sub.)	5.03	0.00	0.00	0.00	0.10	8.51
Chita Plant	Beryllium and its compounds	79.66	0.00	0.00	0.00	0.00	0.00	0.10
	Nickel	48.69	0.00	0.00	0.00	0.00	0.00	0.00
	Copper water-soluble salt	18.00	0.00	0.01	0.00	0.00	0.00	17.98
	Cobalt and its compounds	12.35	0.00	0.00	0.00	0.00	0.00	0.00
	Manganese and its compounds	5.18	0.00	0.13	0.00	0.00	0.00	0.00
	Total	173.73 (39 sub.)	3.02	0.34	0.00	0.00	0.00	20.15
Komaki Plant	Toluene	6.86	6.69	0.00	0.00	0.00	0.00	0.16
	Dichloromethane	5.41	5.41	0.00	0.00	0.00	0.00	0.00
	Manganese and its compounds	6.50	0.00	0.03	0.00	0.00	0.00	0.01
	Bisphenol-A epoxy resin	8.34	0.00	0.00	0.00	0.00	0.00	0.08
	Total	36.49 (24 sub.)	12.91	0.04	0.00	0.00	0.00	0.81
	Grand total	280.42 (58 sub.)	20.97	0.38	0.00	0.00	0.10	29.46

(sub. = substances)

PRTR-Listed Substances Handling (Domestic Group companies)

In 2001 only non-consolidated data was compiled, but from 2002 the range of PRTR-listed substance data was expanded to cover 14 domestic Group companies.
As a result, the total amount of these substances handled by domestic Group companies in 2002 was 332 tons. Four companies reported to the government a total of nine PRTR-listed substances.

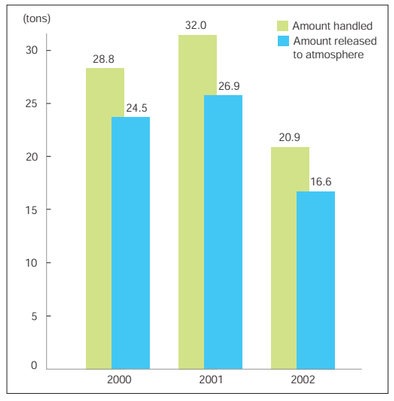
Amounts of PRTR-Listed Substances Handled, Released, and Transferred (Domestic Group companies) (tons)

Substance		2002						
		Amount handled	Amount released				Amount transferred	
			Atmosphere	Water	Soil	Landfill	Sewage	Outside
Domestic Group companies	Xylene	36.97	18.95	0.00	0.00	0.00	0.00	1.61
	Ethylbenzene	13.93	11.96	0.00	0.00	0.00	0.00	0.00
	Toluene	58.15	7.80	0.00	0.00	0.00	0.00	14.58
	Phenol	42.89	1.44	0.00	0.00	0.00	0.00	0.00
	Styrene	111.71	0.19	0.00	0.00	0.00	0.00	110.23
	Benzene	1.15	0.12	0.00	0.00	0.00	0.00	0.00
	Bisphenol-A epoxy resin	7.43	0.00	0.00	0.00	0.00	0.00	1.15
	Vanadium pentoxide	5.20	0.00	0.00	0.00	0.00	0.00	0.00
	Nickel	5.32	0.00	0.00	0.00	0.00	0.00	0.00
	Total	332.00	49.00	0.00	0.00	0.00	0.00	132.00

Response to PRTR-listed Substances

Of the PRTR-listed substances released to the environment in 2000, 97% were organic solvents*, and most were released to the atmosphere. To reduce the amount of solvent released to the atmosphere to 80% of 2000 levels by 2005, NGK is investigating the use of alternative substances and improving facilities, with the result that 2002 atmospheric solvent emissions were reduced about 32% from 2000 levels.

Changes in Solvent Emissions (Non-consolidated)

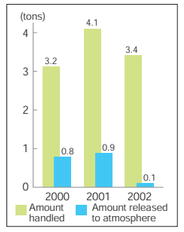


* Organic solvents
Substances including toluene, acetaldehyde, xylene, formaldehyde, benzene, ethylene glycol, and dichloromethane.

Reduction in Atmospheric Emissions of Xylene

The Nagoya Plant has installed a catalytic combustion device to render the xylene used in the manufacture of electronic components harmless through combustion, and release it to the atmosphere. This made possible a major reduction in the amount of PRTR-listed volatile solvents released to atmosphere, slashing atmospheric emissions by 88% from 2000 levels.

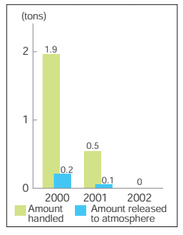
Changes in Xylene Emissions (Nagoya Plant)



Abolition of Washing Fluid Containing PRTR-listed Substances

The Chita Plant formerly used a washing fluid containing trimethylbenzene, a PRTR-listed substance, for washing ceramic components for semiconductor manufacturing equipment, but in April 2002 replaced it completely with a new washing fluid of a paraffin-based hydrocarbon solvent that contains no listed substances.

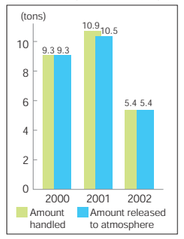
Changes in Trimethylbenzene Emissions (Chita Plant)



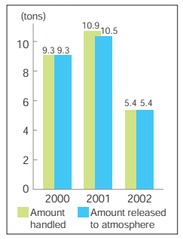
Abolition of Solvents Used in Insulator Assembly

A mixture of dichloromethane and toluene had been used at the Komaki Plant as a solvent for insulator assembly, but has been replaced by a mixture of methylcyclohexane and ethylcyclohexane, neither of which are PRTR-listed substances. As a result, dichloromethane which was used 21tons per year was totally eliminated in July 2002.

Changes in Dichloromethane Emissions (Komaki Plant)



Changes in Toluene Emissions (Komaki Plant)



Measures to Prevent Soil Contamination

With the enforcement of the Soil Contamination Countermeasures Law in February 2003, NGK realized that environmental assessment of the soil and underground water was required. Chemical substances used in the past were researched, and surveys of soil and underground water begun. Thus far there has been no evidence of any effect on the surrounding region. In the event surveys do reveal pollution, appropriate action shall be taken.

Chemical Substance Management

Dioxins

Classified as a specific facility under the Law Concerning Special Measures Against Dioxins enforced in January 2000, NGK has two small-scale incinerators for R&D and experimentation. Both are appropriately managed, and measurements are maintained within legal limits. Applicable laws and regulations are observed in industrial by-product disposal sites owned by NGK. Periodic water quality measurement also confirms that we are within legal limits.

Management of Equipment Containing PCBs

NGK completed its survey on possession, for both domestic and overseas Group companies, in 2001. Guidelines have been prepared to control equipment loss and possible external contamination, and the equipment is managed thoroughly. We are also investigating treatment to render the substance harmless.

Storage vault for equipment containing PCBs (Chita Plant)

Initiatives for the Future

We are working to further tighten management of chemical substances and reduce the release and transfer of such substances by reducing the use of volatile organic solvents, which are used in manufacturing ceramic products and released to the atmosphere. Efforts include investigation coupled with research and development of substitutes, as well as improvements in processing technology. In these ways NGK is redoubling its efforts geared toward fulfilling its mission to reduce the amounts released and transferred off-site.
The development of technologies that can benefit society, such as those for detoxification and recycling, will also continue to be positioned as a key management target.
The management system for chemical substances is being steadily strengthened, and we are making steady progress toward our target of cutting atmospheric emissions in 2005 by 80% from 2000 levels.

Procurement and Logistics

Green Purchasing

To reduce the environmental impact of NGK's business activities, including purchasing, NGK has a Green Purchasing Policy, which covers all purchased items and services, from office supplies, raw materials, and parts to manufacturing facilities.

Through preferential purchasing in line with its Green Purchasing Policy, NGK is contributing in a meaningful way to reducing environmental impact in society.

The Green Purchasing Policy

1. NGK conducts Green Purchasing of all materials, components, manufacturing equipment, office supplies, and services.
2. After considering quality, price, and delivery periods, NGK gives preference to companies that provide products and services in an environmentally friendly manner.

Long-term Schedule for Green Purchasing

Item				2001	2002	2003	2004	2005
Purchased items	Greening of office supplies	Introduction and expansion of Benrinet		100 items	Approx. 250 items	Development for indirect material application		
					Approx. 1,500 items handled by Benrinet			
	Greening of materials for production	Purchase of Green Power (Signed Sep. 2001, started Jan. 2002, 15-year contract)						
		Energy conservation measures	Office automation equipment, air conditioners, lighting, structural insulation standards, etc.					
			High-efficiency motors, transformers, etc.					
			Conversion to fiber kiln, inverter control, etc.					
	Reduction and greening of purchased packaging material	Begin with trial lines to establish procedure and technique						
		Enactment of Green Packaging Guidelines for operating divisions and suppliers			Enactment	Implementation		
Green Suppliers	Questionnaire on implementation by suppliers				200 companies			
	On-site inspections of suppliers' environmental activities							
	Guideline review and suppliers guidance							
	Explanatory meetings for suppliers							
In-house Education	Increase employee awareness with video news and company magazine							
	Explanatory meetings for Benrinet							

Expansion of Benrinet

To support the full-fledged implementation of preferential purchasing of office supplies and consumable, NGK introduced Benrinet in March 2003, along with the restructuring of NGK's internal purchasing system. By March 2003, the range of Green Products* handled had been increased to about 1,500 items, covering almost every required office supply.
We are working to introduce the system on a Group basis, providing laborsaving effects throughout the entire NGK Group. We are also investigating the expansion of the system to include indirect materials.

Green Products purchased through Benrinet

Enactment of Green Packaging Guidelines

Giving consideration to the environmental impact of the packaging for purchased articles, in March 2003 the Company enacted guidelines specifying such matters as the adoption whenever possible of returnable containers and the use of packaging materials bearing the Eco-Mark. Suppliers are also being encouraged to adhere to these guidelines beginning in 2003.

Environment Surveys for Major Suppliers

NGK has made it policy to purchase preferentially from suppliers who stress environmental protection, and in 2002, 17 major suppliers were inspected for this reason. NGK's policy and related issues were explained at meetings to ensure they fully understand the NGK approach, while a frank exchange of opinions has made possible a cooperative relationship on environmental protection issues. We are also reviewing our Green Purchasing guidelines and formulating standards for Green Suppliers.

Logistics

NGK is working to reduce the environmental impact accompanying logistics by implementing its Green Logistics policy. A variety of measures are being used, including reduction of CO_2 emissions in logistical activity and reduction of by-product generation from packaging. We are also researching efficient transportation systems and a returnable logistics system based on the use of returnable containers, and are actively continuing our existing efforts to recover pallets and shipping boxes for reuse.

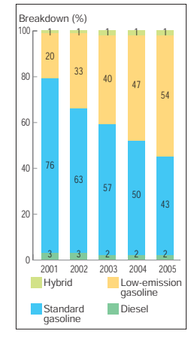
NGK's Green Logistics

Aim of Research	Concrete measures
Reduction of CO_2 emissions	Modal shift
	Use of Green Energy
	Increase in loading efficiency
Reduction of volume of packaging materials	Returnable packaging
	Improvement of packaging efficiency

Response to the Vehicle NOx/PM Law

In June 2001, the Law Concerning Special Measures for Total Emission Reduction of Nitrogen Oxides from Automobiles in Specified Areas (the so-called Vehicle NOx/PM Law) was enacted, and Aichi Prefecture was designated as an applicable region. NGK is a specific enterprise in Aichi, and under the Vehicle NOx/PM Law prepared vehicle usage and management plans and related documentation by September 2002, while introducing Low-emission gasoline vehicles.
Targets call for a reduction in NOx emissions in 2005 to be reduced by 25% from 2001 levels, and particulate matter (PM) emissions by 80%, while 50% of the NGK fleet will be low-emission gasoline vehicles. To ensure moderate driving by employees and appropriate vehicle maintenance, we have prepared driving and maintenance management manuals. Together with employee education, we are implementing Green Logistics to minimize vehicle use and reduce vehicle-related environmental impact.

Transition to Low-emission Vehicles (Non-consolidated)



* Green Products
Products with the Eco-Mark or the Green Mark, products included in the Green Purchasing Network (GPN) data book, products meeting the standards specified in the Green Purchasing Law.

Environmental Communication

Environmental Communication

NGK's environmental conservation efforts are not confined to the Company itself but extend to greater society. As a good corporate citizen, NGK is involved in a wide range of community relations activities and keeps society informed of its various activities through public relations efforts.

Environmental Report

In March 1999, the Company issued its first environmental report, summarizing its environmental conservation activities. It detailed energy-saving activities aimed at preventing global warming, recycling of production by-products, chemical substance management, Green Purchasing, and environmental accounting.

NGK's Environmental Reports

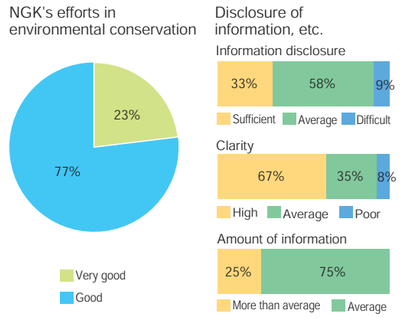
Information Disclosure on the NGK Website

With the new corporate webpage opened in March 2002, NGK has also made a large amount of environmental information available to the general public, from our Environmental Report to the latest facts. We are working to further increase our level of disclosure and provide even more information beyond what is covered in the report.

The NGK Environmental Activities Website
http://www.ngk.co.jp/english/eco/index.html

Participation via the Environmental Report Reader's Questionnaire

In response to the questionnaire provided with the Environmental Report, NGK received 13 comments from outside the corporation. Invaluable suggestions such as requests for self-evaluation of performance and detailed explanations of environmentally conscious products have been reflected as far as possible in this report. We look forward to additional comments and suggestions.



Participation in the Environmental Partnership Organization Club

The Participation in the Environmental Partnership Organization Club (EPOC) was established in February 2000 by a diverse group of corporations in the Chubu area of Japan, with the objective of working toward a recycling-based society. NGK actively supports a range of EPOC initiatives as a key member involved in exchange activities. Chairman Shibata of NGK was recently re-elected as vice chairman of EPOC. The group continues to offer a range of overseas exchange programs and other educational activities to promote recycling.

Exchange with the Association for Overseas Technical Scholarship

Participation in Expo 2005 Aichi

In 2005, Aichi Prefecture will host Expo 2005 Aichi, an international exposition taking "Nature's Wisdom" as its theme. NGK will cooperate with six other corporations to participate in the Joint Pavilion produced by The Chunichi Shimbun.
The Pavilion will offer a theme zone with exhibitions developed jointly by four firms, and an original zone with individual exhibitions by three firms. NGK is one of the firms exhibiting in the original zone, and plans to show visitors the appeal and wonder of nature and natural science, and enjoyment of making things, and the importance of interchange with other people, through its unique products and advanced technologies. With the title "Water Planet," the content is designed to stir the curiosity of children in nature and science.
NGK believes that contribution to the preservation of the global environment is a key responsibility, and this special exhibition is designed to help us fulfill that obligation.

The founding meeting of the organizing committee for the Joint Pavilion on October 1, 2002

Advertisements

NGK provides a wide variety of products that contribute to environmental conservation. The Company strives to keep the public informed regarding these products as well as NGK's environmental activities.

Community Relations Activities Pamphlet

In March 2001, we issued "NGK Is Also Here," a pamphlet that introduces NGK's community relations activities. The pamphlet gives an overview in words and photos of the activities of the NGK Foundation for International Students, which provides accommodation and scholarships for international students, as well as NGK's environmental protection activities, plant tours, support for regional events, and activities being undertaken by Group companies in Japan and abroad.

"NGK Is Also Here" introduces NGK's community relations activities.

Awards Received

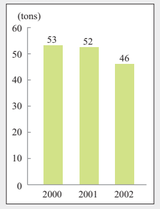
(2002)

Date	Award	Granted for
Apr.	The Electrochemical Society of Japan, 2002 Technical Development Award	NAS® battery
June	The Japan Institute of Invention and Innovation, Aichi Branch, 2002 Aichi Invention Award	HISHUT sound-absorbing material
Oct.	The Japan Industrial Design Promotion Organization, Good Design Award 2002	"C1" home-use water purifier
	The Fire and Disaster Management Agency, Excellent Disaster Prevention System	NAS® battery
Jan.	The Chunichi Shimbun, The Chunichi Industrial Technology Award	NAS® battery
Mar.	The Energy Conservation Center, Energy Management Excellent Technical Award	Construction and Maintenance Center, "Energy Conservation in Ceramic Kilns"
	The Energy Conservation Center, Chairman's Award	One member of the Energy Management Staff
	Energy Conservation Center, Tokai Hokuriku Department Chief Award	One members of the Energy Management Staff

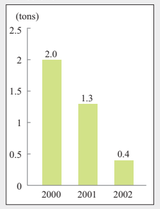
Environmental Data by Plant

Actual values for exhaust gases, noise, vibration, pumped underground water, and wastewater for all three plants met all relevant laws, regulations, and voluntary standards.

Changes in Total NOx Emissions



Changes in Total SOx Emissions



Reduction in NOx and SOx

NGK is continuing to reduce release of harmful substances into the atmosphere.
Total NOx emissions in 2002 were 46 tons, representing a 12% reduction from the 2001 level. We are promoting a switch to low-nitrogen fuel, as well as improvements in the combustion characteristics that reduce NOx generation, which inhibits high-temperature combustion. A denitration system for stack gas was mounted to help minimize NOx contained in stack gas.
Total SOx emissions in 2002 were 0.4 tons, representing a 70% reduction from the 2001 level. We have switched from heavy fuel oil and diesel fuel to LNG, which has a much lower sulfur content. We are continuing to upgrade remaining diesel fuel usage to a different supply with lower sulfur.

Standard Values (Under Law and Agreements) and Actual Values

Category	Item	Units	Nagoya Plant		Chita Plant		Komaki Plant	
			Standard	Actual Value	Standard	Actual Value	Standard	Actual Value
Exhaust gas	Sulfur produced in combustion	%	0.5*1	(Shifted to LNG)	0.5*7	(Shifted to LNG)	0.6*8	≦0.07
	SOx	Nm^3/Hr	Ñ	Ñ	Ñ	Ñ	11.7*8	≦0.05
	NOx	ppm	144*1	14 - 130	150*7	≦50	170*8	≦90
	NOx volume	g/Hr	23,456*2	20,247	Ñ	Ñ	Ñ	Ñ
	Soot and dust	g/Nm^3	0.15*2	N.D. - 0.032	0.2*7	≦0.002	0.2*8	≦0.01
	Be total plant output	g/day	Ñ	Ñ	10*7	0.119 - 0.570	Ñ	Ñ
	Be output concentration in residential areas	$\mu g/m^3$	0.01*1	0.0001 - 0.0003	0.01*7	0.00005 - 0.00016	Ñ	Ñ
	Fluorine and its compounds	mg/Nm^3	(10)*10	N.D. - 4.9	Ñ	Ñ	Ñ	≦1.8
Noise	Day	dB	70*1	51 - 68*6	65*7	45 - 62	65*5	51 - 64*11
	Night (West side of Plant)	dB	60*1	46 - 60*6	65*7 (60*7)	45 - 54	55*5	50 - 62*11
Vibration	Day	dB	70*4	30 - 54	70*7	45 max	65*5	24 - 35
	Night	dB	65*4	28 - 62	70*7	45 max	60*5	—
Pumped underground water		m^3/day	Ñ	Ñ	Ñ	Ñ	4,023*5	2,490
Effluent	pH	—	5.0 - 9.0*3	6.8 - 7.6	5.8 - 8.6*7	6.5 - 7.5	5.8 - 8.0*8	6.6 - 7.8
	SS	mg/l	600*3	6 - 150	30*7	1 - 9	80*8	1 - 8
	BOD	mg/l	600*3	1.1 - 27	Ñ	Ñ	17*8	N.D. - 7.7
	COD	mg/l	Ñ	Ñ	20	2 - 4.5	Ñ	Ñ
	Total COD emissions	kg/day	Ñ	Ñ	59.2	16.9 max	Ñ	Ñ
	Oil	mg/l	5*3	0.5 - 1.0	2*7	<0.5	2*8	N.D. - 0.9
	Copper	mg/l	3*3	N.D. - 0.01	1*7	0.02 - 0.01	3*3	N.D. - 0.02
	Zinc	mg/l	5*3	0.04 - 0.08	1*7	0.01 - 0.09	3*3	0.05 - 0.71
	Soluble iron	mg/l	10*3	N.D. - 0.2	0.5*7	<0.1	10*3	0.04 - 0.37
	Soluble manganese	mg/l	10*3	<0.1	Ñ	Ñ	10*3	0.02 - 0.05
	Cadmium	mg/l	Ñ	Ñ	0.1*3	<0.005	0.1*3	N.D.
	Cyanide	mg/l	1*3	<0.1	1*3	<0.1	1.0*3	N.D.
	Lead	mg/l	0.1*3	<0.02	0.1*3	<0.02	0.1*3	N.D.
	Hexavalent chromium	mg/l	0.5*3	<0.04	0.5*3	<0.04	0.5*3	N.D.
	Total mercury	mg/l	0.005*3	<0.0005	0.005*3	<0.0005	0.005*3	N.D.
	Total chromium	mg/l	2*3	<0.04	2*3	<0.04	2*3	N.D.
	Fluorine	mg/l	8*3	N.D. - 0.2	8*3	0.3	8*3	N.D. - 0.5
	Nitrogen content	mg/l	Ñ	Ñ	10(guideline)*5	1.2 - 7.2	10(guideline)*5	0.9 - 7.1
	Phosphorus content	mg/l	Ñ	Ñ	1(guideline)*5	0.04 - 0.14	1(guideline)*5	0.02 - 0.43
	Tri-chloroethylene	mg/l	0.3*3	<0.002	0.3*3	<0.002	0.3	N.D. - 0.004
	Tetra-chloroethylene	mg/l	0.1*3	<0.001	0.1*3	<0.001	0.1	N.D.
	1, 1, 1-tri-chloroethylene	mg/l	3*3	<0.001	3*3	<0.001	3*3	N.D.
	Nickel	mg/l	Ñ	Ñ	Ñ	<0.1	0.01*9(recommendation)	N.D.
	Antimony	mg/l	Ñ	Ñ	Ñ	Ñ	0.002*9(recommendation)	N.D. - 0.017
	Dichloromethane	mg/l	Ñ	Ñ	Ñ	<0.02	0.2*3	N.D.

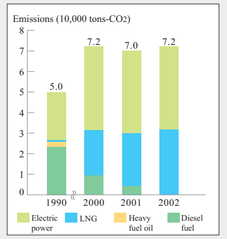
*1. Nagoya Regulations *2. Air Pollution Control Law *3. Water Pollution Control Law *4. Vibration Control Law
*5. Aichi Prefecture Regulations or Guidelines *6. Including background noise *7. Pollution control agreement with Handa
*8. Pollution control agreement with Komaki *9. (recommendation) The Basic Environment Law
*10. Self-imposed control *11. Adjacent to the road (includes background noise)
* Background noise: Total volume of noise from unverifiable sources. Because plant noise and human activity are generally lower at night, foreground noise decreases and background noise becomes more conspicuous. (Foreground noise is noise from verifiable sources.)
Be: Beryllium pH: Concentration of hydrogen ions SS: Suspended Solids
BOD: Biochemical Oxygen Demand COD: Chemical Oxygen Demand N.D.: Not Detected
・Note: Items indicated by "–" fall outside the scope of pollution control laws, pollution control agreements, and self-imposed controls.

Environmental Activities at the Nagoya Plant

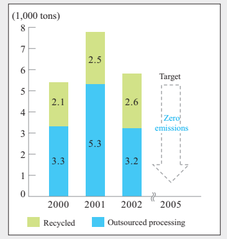
Core Policy on the Environment

1. Observe applicable laws, regulations, and agreements with government agencies.
2. Further augment environmental management systems, and continue to improve efforts to prevent pollution and to enhance the overall system.
3. Set environmental objectives and targets, and review them periodically.
4. Promote resource conservation and recycling, and reduce industrial byproducts.
5. Promote energy conservation and reduce CO_2 emissions.
6. Promote R&D activities into contributing to the social environment.
7. Enhance employee education and training and improve environmental awareness.

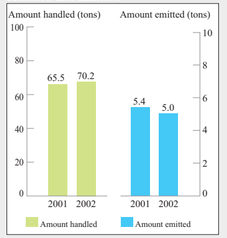
Changes in CO_2 Emissions



Changes in Byproduct Emissions



Amounts of Chemical Substances Handled and Emitted



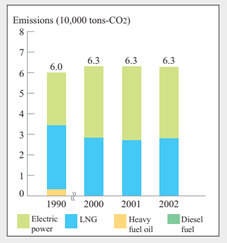
Nagoya Plant
Address:
2-56, Suda-cho, Mizuho, Nagoya
Major products:
HONEYCERAM™, NAS™ batteries, etc.

Environmental Activities at the Chita Plant

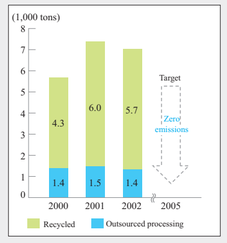
Core Policy on the Environment

1. Promote resource conservation and recycling, and reduce industrial byproducts.
2. Promote energy conservation and reduce CO_2 emissions.
3. Work to prevent atmospheric and water pollution, and observe applicable laws, regulations and agreements with government agencies.
4. Promote the development of production technologies and environmental equipment with reduced environmental impact.
5. Set environmental objectives and targets, and review them periodically.
6. Enhance employee education and training and improve environmental awareness.
7. Review the environmental management system periodically and continue improvement.

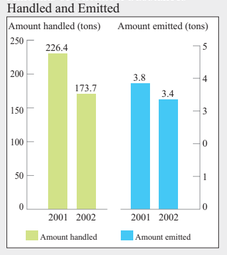
Changes in CO_2 Emissions



Changes in Byproduct Emissions



Amounts of Chemical Substances Handled and Emitted



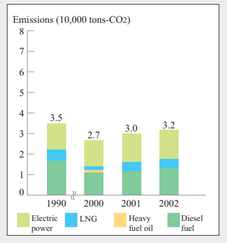
Chita Plant
Address:
1, Maegata-cho, Handa, Aichi
Major products:
Insulators, equipment for electrical transmission and distribution, ceramic products for the chemical industry, beryllium-copper strips, ceramic components for semiconductor manufacturing, etc.

Environmental Activities at the Komaki Plant

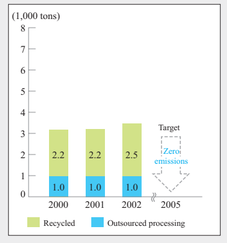
Core Policy on the Environment

1. Continue to improve the environmental management system.
   1) Set, implement, and review environmental objectives and targets.
   2) Periodically review the environmental management system.
2. Prevent environmental pollution and observe applicable laws and regulations.
   1) Observe applicable laws, regulations and agreements with government agencies.
   2) Expand and improve environmental conservation activities.
3. Promote resource conservation activities and reduction of environmental impact.
   1) Promote resource conservation and recycling, and reduce industrial byproducts.
   2) Promote energy conservation and reduce CO_2 emissions.
4. Enhance employee education and training and improve environmental awareness.

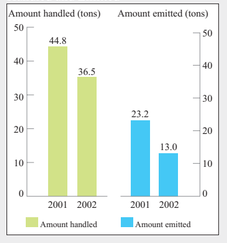
Changes in CO_2 Emissions



Changes in Byproduct Emissions



Amounts of Chemical Substances Handled and Emitted



Komaki Plant
Address:
1155, Tagami, Futaebori, Komaki, Aichi
Major Products:
Suspension insulators for electrical transmission, equipment for electrical transformation and distribution, HYCERAM™, etc.