

Creating Products that Contribute to the Environment

The NGK Group considers the provision of products and services that contribute to a better social environment to be one of its most important missions. For nearly a century since its founding, NGK has made use of accumulated technologies to develop and provide products and technologies that reduce burdens on the global environment.

Development and distribution of products contributing to environmental protection

Under the Fourth Five-Year Environmental Action Plan, initiated in fiscal 2016, NGK is committed to the development and distribution of products contributing to environmental protection as a top priority theme. We aim to achieve a growth in sales for products contributing to environmental protection of 60% compared to fiscal 2013 (and maintain the sales percentage for products contributing to environmental protection at over 50% of all products) by fiscal 2020, the final year of the Five-Year Plan. Currently, we market five products contributing to environmental protection, as detailed below, which meet internal criteria. Going forward, newly qualified products will be added to the list.

In fiscal 2016, we achieved sales growth of 26% from fiscal 2013, exceeding the annual target of 25%. In fiscal 2017, we will continue with these new development and distribution efforts to achieve the targets.

Sales growth for products contributing to environmental protection



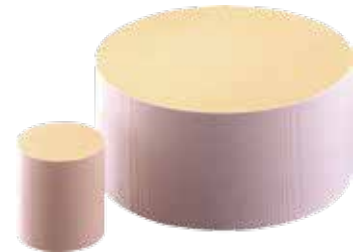
* Figures are indexed with fiscal 2013 set at 100.

Development and distribution of products contributing to environmental protection

HONEYCERAM®

HONEYCERAM is a ceramic substrate for catalytic converters to purify harmful contents in the exhaust gases of automobiles. The products' honeycomb structure is effective for carrying the catalyst to detoxify harmful substances by chemical reaction. Since the launch of its commercial production in 1976, the product has been supplied all over the world for many years as an essential component for meeting automobile exhaust gas regulations, which have become increasingly more stringent and wider in scope. Production has grown to record cumulative shipment exceeding 1.4 billion units, while manufacturing bases have expanded to a current total of eight countries in Europe, North America, Asia and Africa. HONEYCERAM is an indispensable component of clean vehicles.

NGK's HONEYCERAM production eliminates a total of four million tons of NOx per annum*1, equivalent to double the annual NOx emissions in Japan*2.



NOx elimination: **4 million tons annually**

*1 Assumption based on installation of exhaust gas system in new cars that are not equipped with such systems

*2 Source: OECD Environmental Statistics (2012)

Diesel particulate filter (DPF)

The DPF is a porous ceramics filter used worldwide in the exhaust systems of diesel vehicles. With a pore structure, the filter ensures particulate matter (PM) is captured to purify the exhaust gas emitted from diesel vehicles. NGK is the only company to produce two types of DPFs based on both cordierite and silicon carbide. NGK's ceramics technologies support further developments for diesel vehicles.

The honeycomb structure, where the inlet and outlet of the through-holes are alternately sealed, enables the thin ceramic walls to efficiently capture PM while exhaust gas passes through.



Eliminates up to **99%** of PM

NOx sensors

NGK has developed the world's first in-vehicle sensor to measure concentrations of nitrogen oxides (NOx) in exhaust gas in real time with high precision. Specifically, the sensor is capable of measuring NOx concentration at the parts per million (ppm) level and can thus detect even very small amounts of the gases. The sensor supports precise control of the exhaust purification device used in diesel vehicles, which leads to a reduction in NOx emissions and helps to promote the use of clean diesel vehicles.



NAS[®] Battery

One of the most frequent uses of the NAS battery is for stabilizing the supply of renewable energy. While electricity from renewable sources, such as wind and solar power, is clean and, in principle, unlimited, its major limitation is that its output is affected by weather conditions, resulting in supply instability. The NAS battery resolves this limitation by storing excess renewable energy when generation exceeds demand, and supplying the stored energy to the grid when renewable output is low or demand is high. NAS systems enable the global growth of stable renewable energy.



NGK was the world's first manufacturer to commercialize the NAS battery megawatt-class storage system. Featuring a large capacity, high energy density, and long life, the battery can support the reliable, long-term stable supply of electricity. Also, the NAS system allows for a more compact housing compared with conventional lead-acid batteries.

NAS systems are the world's most popular
grid-scale battery storage

Installed at over **200** locations
worldwide with a **530,000** kW capacity

(as of June 2017)

Low-level radwaste treatment system

NGK has developed a wide range of systems to safely treat low-level radioactive waste generated from nuclear facilities and has supplied these systems to nuclear power stations and related facilities across Japan. The systems are developed utilizing NGK's proprietary treatment technology and high-performance filter-based dust collection technology.

We undertake a variety of engineering projects including design, manufacturing and site construction, and also provide a long-term maintenance service to deliver stable and high-level radioactive decontamination. NGK thereby provides essential support for the safe and stable operation of nuclear facilities. In addition, we focus on the development of new systems for treating various types of radwaste expected to be generated from the decommissioning and dismantling of aging nuclear reactors.



Importance of treating radioactive waste

When treating and disposing of waste generated in radiation controlled areas, including nuclear power stations, it is critically important to prevent the spread of radioactivity via the release of radioactive matter. This requires special treatment and disposal methods that differ from those for general waste.

Biodiversity Initiatives

The NGK Group recognizes the conservation of biodiversity as an important issue for the company in achieving a sustainable society, and promotes relevant initiatives as described below.

Activities Aimed at Achieving the "Aichi Target"

The NGK Group has been pushing forward with activities pursuant to "Aichi Target" international goals for biodiversity agreed upon at the 10th Meeting of the Conference of the Parties to the Convention on Biological Diversity (COP 10). In fiscal 2016, we prioritized relevant activity areas and set two new ones: biodiversity survey of company-owned sites and cooperation with suppliers.

Aichi Target		NGK Activities
Target 1 Spread awareness	People are aware of the value of biodiversity and actions to be taken to conserve it.	Employee environmental education, next-generation education, cooperation with suppliers
Target 4 Sustainable production and consumption	Stakeholders at all levels have taken steps to achieve sustainable production and consumption.	Expanding sales of products contributing to environmental protection, CO ₂ reduction, effective use of resources, cooperation with suppliers
Target 5 Inhibit loss of all natural habitats	The rate of loss of all natural habitats, including forests, is at least halved, and degradation and fragmentation is significantly reduced.	Voluntary employee participation in forestation and other environmental conservation activities, biodiversity survey/appropriate control of company-owned sites
Target 8 Control pollution by chemical substances, etc.	Pollution from use of chemicals, including fertilizers and agrichemicals, has been brought to levels that are not detrimental to the ecosystem.	Chemical substance management, management of exhaust and wastewater, expanding sales of products that prevent air pollution, cooperation with suppliers
Target 9 Alien species	Invasive alien species are controlled or eradicated.	Biodiversity survey/appropriate control of company-owned sites
Target 11 Conserve protected areas	At least 17% of terrestrial and inland water areas and 10% of coastal and marine areas are placed under appropriate conservation management.	Voluntary employee participation in forestation and other environmental conservation activities
Target 14 Ecosystem services	Ecosystems that provide essential natural services are restored and safeguarded.	Voluntary employee participation in forestation and other environmental conservation activities, biodiversity survey/appropriate control of company-owned sites

Notes:

1. Source: "Guidelines for Action by the E&E Industries concerning Biodiversity Conservation" (The Biodiversity Working Group, The 4 Electrical and Electronic Industry Associations)
2. NGK activities commenced in fiscal 2016 are marked in red.

Cooperation with Suppliers

We have added to the CSR Procurement Guidelines items pertaining to water resources-related initiatives and biodiversity conservation initiatives. We have won the almost full agreement of our suppliers in Japan to comply with the expanded Guidelines.

Biodiversity Survey of Company-owned Sites

NGK performed a biodiversity survey of a site owned for welfare purposes in Midori-ku, Nagoya City. Major findings include the identification of 23 avian species and 80 botanical species, with no rare or non-native species requiring urgent protective or removal actions detected. This indicates that the site is appropriately managed.



Environmental Education and Communication

In accordance with NGK's Core Policy on the Environment, we conduct ongoing environmental education and awareness activities through the establishment of action guidelines for educational and publicity activities aimed at increasing employee environmental awareness. Our aim is to deepen the understanding of environmental problems among each employee to inculcate an awareness of environmental conservation activities.

We also provide on-site classes at elementary schools and conduct environmental events and provide information to a wide range of stakeholders including the next generation to increase environmental awareness.

Participating in Local Environmental Education

Offering Guest Lectures at Elementary Schools and Children's Centers

NGK sends instructors to participate in the guest lecture program for youth hosted by the Environmental Partnership Organizing Club (EPOC) every year. In fiscal 2016, the program was held at Yatomi City Tobu Children's Center (Aichi Prefecture), where our instructors offered a laboratory to teach how soil can purify water under the theme of water resources and usage. NGK provides ongoing environmental education programs, including its participation in the guest lecture program, which have been attended by a cumulative total of 2,100 participants.



Employee Volunteers Teaching Parent-Child Insect Classes

At Tsuruma Park in Nagoya's Showa Ward, NGK employees teach Summer Break Insect Observation classes for children and their parents (sponsored by the Nagoya City Greenery Association), introducing the various names and the ecosystem of insects living in the park. In August 2016, volunteer employee instructors were commended by the Nagoya Green Society for contribution to the local environmental education project, receiving a certificate of appreciation.



Raising Environmental Awareness

Environmental Education inside the Company

To familiarize employees with the aims and content of NGK's environmental policies, we conduct position-based training related to environmental management systems. We also provide two different levels of environmental training: specialized programs targeting personnel in charge of environmental management and general programs for the entire workforce.

Promoting the Acquisition of Qualifications

To continue conducting environmental conservation activities in compliance with laws and regulations, we make an effort to develop and increase the skills of legally qualified personnel through support in each department for the acquisition of environment-related legal qualifications targeting managers engaged in pollution prevention required for the management of each area.

We systematically educate Qualified Energy Managers in the Engineering Department, Special Controlled Industrial Waste Managers and others involved in waste-related activities in the Environmental Management Department and other business divisions.

Qualifications Acquired as of March 31, 2017 (NGK)

Pollution Control Managers			Qualified Energy Managers	Special Controlled Industrial Waste Managers	Waste Disposal Facility Technical Managers
Air	Water	Noise/Vibration			
71	84	27	21	14	4

Support for Acquisition of Eco Test Certification

NGK supports employees sitting for the Eco Test* in an aim to ensure each employee acquires a strong environmental awareness and a wide range of knowledge with respect to the environment. Our Board of Directors are also actively acquiring certification.

Support provided by NGK includes lending reference materials to those who require them and providing test-related expenses. To date, a total of 590 people, more than 10% of NGK (alone) employees, have passed the test. In fiscal 2016, 116 passed the test.

* The Eco test is an environmental and social certification test administered by the Tokyo Chamber of Commerce and Industry focused on a wide-range of environmental issues.

NGK Eco Point System

NGK promotes its Eco Point System in an effort to contribute to regional environmental improvement. Employees earn points for environmental behavior conducted at work and in the home, a portion of which is converted into cash and donated to local government-managed funds (environmental funds). In addition to the company's three sites in Nagoya, Komaki and Chita and the Ishikawa Plant, the System was newly introduced to the Tokyo Main Office and Osaka Branch and sales offices in fiscal 2016.

The First Recognition of Top-Ranked NGK Eco Point Collectors

The NGK Eco Points earned by individual employees through their engagement in environmental activities are aggregated on an annual basis for each site (Nagoya, Chita, Komaki, Ishikawa), and top scorers are commended every year. For earned points, employers select from two options: exchange for Eco goods or donate to local funds. The number of employees choosing donation is growing every year, indicating increasing environmental awareness.



Voice of one of the top NGK point earners

Electrical Insulator Division,
Power Business Group

Koichi Kato

I am happy to have been selected as a fiscal 2016 award recipient. My points earned for this year largely relate to privately undertaken home building, specifically, selecting energy-efficient structures and materials, employing what basically amounts to a solar-powered all-electric home system and purchasing energy-saving home appliances. In fiscal 2017, I will aim to be an award recipient again, but for less costly efforts.