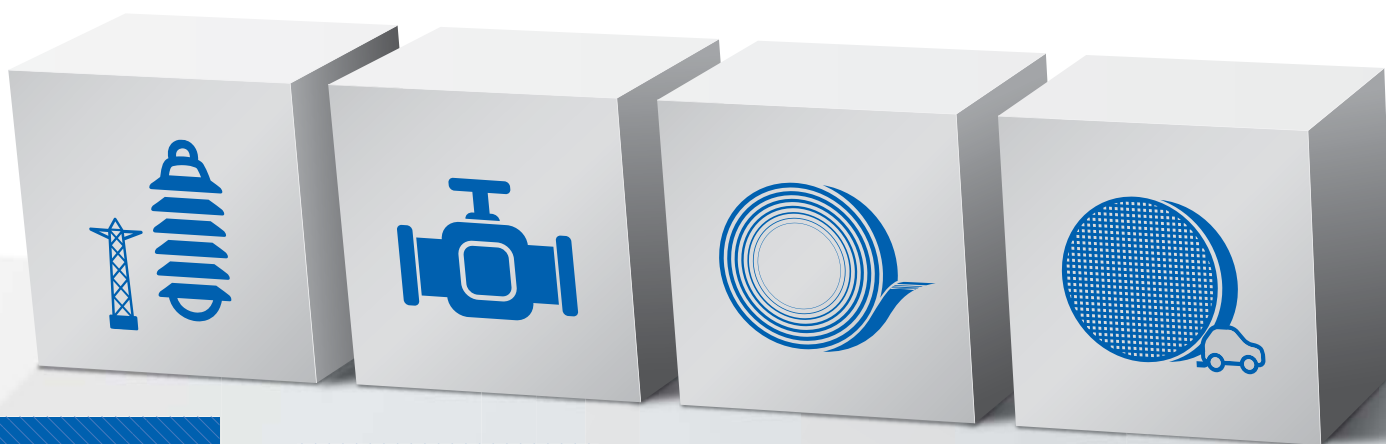


Offering Unique Ceramics Technology to Provide Society with New Value

Here at the NGK Group, we seek to harness the strengths of our core ceramic technologies to pursue opportunities in the energy, ecology, and electronics sectors. Through our activities relating to power supply, ceramics, electronics and process technology, we strive to meet the ever-changing needs of society.

Our main products



Insulators

Insulators support power transmission wires, ensuring that transmission lines and steel towers and equipment are completely isolated. Backed by uncompromising quality and advanced technology, our products continue to make power supply safe and reliable.

Industrial machinery and devices

The breadth of NGK technologies, which were honed over long years of experience in producing ceramics, allows us to provide industrial machinery and devices in a wide range of fields, from kilns to pumps and valves and even low-level radioactive waste treatment systems.

Beryllium copper

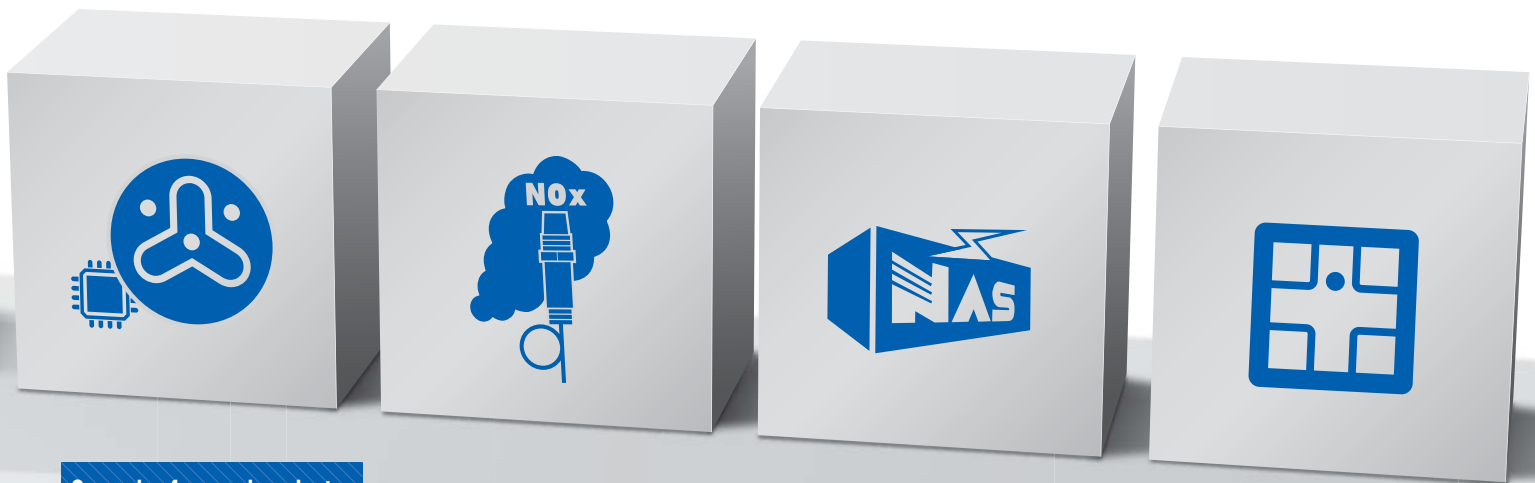
Beryllium-copper alloys, which add the strength and durability of special steel to copper's characteristic heat and electrical conductivity, are used in mobile phones, automobiles, industrial machinery, and a host of other things in order to make a major contribution to improving reliability while reducing product size and weight.

Ceramic substrates for automotive catalytic converters

Ceramic catalyst carriers neutralize the harmful substances in automotive exhaust. Their honeycomb design results in a large surface area—the area that comes in contact with the exhaust—and a very compact installation.

CONTENTS

Introduction	01	· Electronics Business	37
History of the NGK Group	03	· Process Technology Business	41
Value Creation by the NGK Group	07	CSR Management	45
Competitive Strength	09	Protecting the Global Environment	47
Message from the President	11	Coexistence with Society	51
Financial Performance of the NGK Group	17	Corporate Governance	55
At a Glance	19	Financial Data for the Past 5 Years	66
Financial and Non-Financial Highlights	21	Financial Status, Operating Results, Cash Flows	67
Special Report: 330 Billion Yen Investments	25	Consolidated Financial Statements	71
Business Overview		Corporate Outline / Organization	76
· Power Business	29	Global Network (List of Group Companies)	77
· Ceramic Products Business	33	Third-Party Opinion	78



Ceramics for semiconductor manufacturing equipment

By leveraging the features of ceramics, NGK is able to make a range of ceramic products for semiconductor manufacturing processes that are exposed to high-temperature corrosive gases and plasma.

NOx sensors

NGK has developed the world's first vehicle-mounted sensor capable of measuring the concentration of NOx (nitrogen oxide) contained in automotive exhaust at the ppm (parts per million) level.

NAS[®] battery systems

NGK manufactures megawatt-level electric power storage systems with superior features including large capacity, high energy density, and long service life. They are utilized in stabilizing output from wind and solar power generators while proving useful to the spread of renewable energies and the establishment of smart grids.

Ceramics for electric and electronic machinery

NGK contributes to the advancement of electronics through products such as composite wafers that enable higher quality and higher speeds in communication, and piezoelectric micro-actuators that enable hard disk drives with higher capacity and greater reliability.

Editorial Policy

The publication of the NGK Report 2018 is carried out with the intent of communicating to our stakeholders what strengths the NGK Group has to offer, how we are creating value, how we plan to grow further, and how we are contributing to sustainable development of society and the entire world. This report has been prepared and edited in line with the International Integrated Reporting Framework of the International Integrated Reporting Council (IIRC). Detailed ESG information can be found in the NGK Sustainability Data Book 2018.

Target Organization Indicated along with each article and data report included in this report.

Target Period April 1, 2017 to March 31, 2018

Forward-Looking Statements

This report includes forward-looking statements, such as business forecasts, concerning the NGK Group. Such statements are based on currently available information and reasonable assumptions and projections. However, please note that these assumptions and projections may be affected by various future factors, causing actual results to differ from the presented statements.

Using Unique Technological Strengths Cultivated in Insulator Manufacturing to Build a Diverse Portfolio of Industries

NGK was founded in 1919 as a manufacturer of porcelain insulators, a key component in the modernization of Japan. Now, 99 years later, our insulators are helping support the electrical power infrastructure of the entire world. Not only that, we have capitalized on—and continue to capitalize on—the ceramics technology, which we cultivated over many years of insulator manufacturing, adapting it to the production of a vast array of products that have made NGK a prominent contributor in a diverse range of industries.

1919 High-voltage insulators

Electrification gradually began to gain traction at the end of the 19th century. At the time, Japan relied on imports for high-voltage insulators. “To make a contribution to the country, and not merely for our own profit, we must provide Japan with its own, domestically manufactured insulators.” (Kazuchika Okura, founding president of NGK) With this sense of mission, NGK managed to get hold of a piece of an American-made insulator, which it began studying in order to develop its own high-voltage insulators. The desire to contribute to people’s lives and the development of industry was integral to our founding and continues to be the cornerstone of our corporate philosophy.



Electric energy storage system

NAS[®] battery systems

A product of NGK's proprietary advanced ceramic technologies, the NAS battery was the world's first commercialized battery system capable of megawatt-level electric power storage. It is increasingly being utilized in stabilizing output from wind and solar power generators while proving useful to the spread of renewable energies and the establishment of smart grids.



2018



Ceramic substrates for automotive catalytic converters

HONEYCERAM[®]

Ceramic catalyst carriers neutralize the harmful substances in automotive exhaust. For maximum exhaust cleaning efficiency, HONEYCERAM was designed with minimum weight and wall thickness: the 0.05 mm walls minimize loss of engine power.

World's first vehicle-mounted

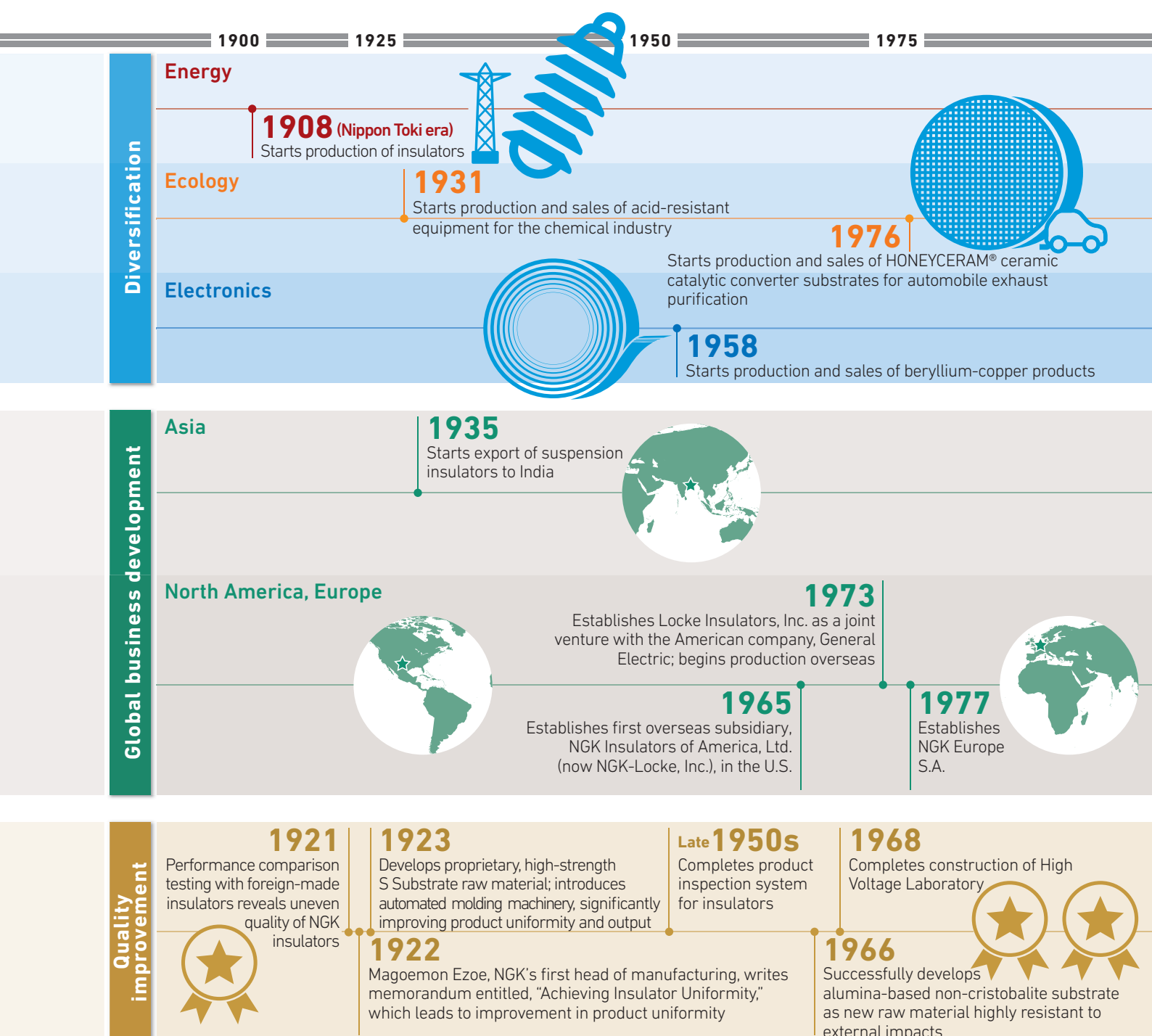
NO_x sensors

This sensor is able to measure the concentration of NO_x (nitrogen oxide) contained in automotive exhaust at the ppm (parts per million) level. Measuring real-time NO_x concentrations and feeding back that information to the engine controls enables precise control of the exhaust purification system to reduce NO_x emissions.

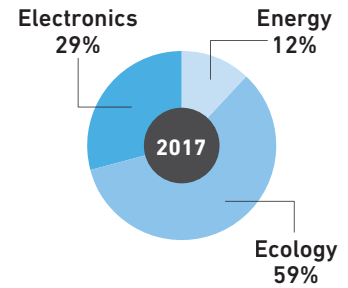
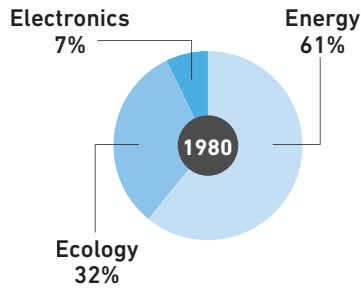
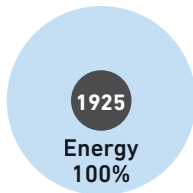


Preserving the Founding Principles of NGK Business Diversification, Global Business Development, Quality Improvement

Since its founding, NGK has offered products boasting the highest quality and reliability thanks to the incorporation of exceptionally refined ceramics technology. At the same time, NGK has actively sought opportunities for business diversification and global development. This tradition of exploring new fields and seeking new challenges remains alive and well at NGK as we continue to pursue sustainable business growth.



■ Expansion into Diverse Business Sectors
(in terms of sales amount)



1985

2000

2010

2015

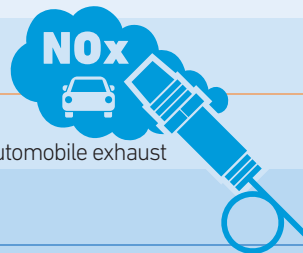
2003

Starts mass production of NAS[®] batteries



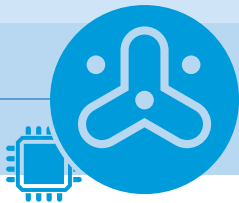
1989

Starts production of diesel particulate filters (DPFs)



1996

Starts production of NOx sensors for automobile exhaust



1996

Starts mass production of ceramics for semiconductor manufacturing equipment



1996

Establishes NGK Insulators Tangshan Co., Ltd. for insulator production in China

1996

Establishes P.T. NGK Ceramics Indonesia for HONEYCERAM production in Indonesia

2015

Establishes NGK Ceramics (Thailand) Co., Ltd. for HONEYCERAM and DPF production in Thailand



1985

Establishes NGK Ceramics Europe S.A. in Belgium; begins local production of HONEYCERAM



1988

Establishes NGK Ceramics USA, Inc. in the U.S.; begins local production of HONEYCERAM

2003

Establishes NGK Ceramics Polska Sp. z o.o. for DPF production in Poland



1982

NGK's AC Plant becomes first Japanese manufacturer to receive Ford Motor Company's QI Award

1999

High Voltage Laboratory becomes first internationally accredited high-voltage testing laboratory in Japan

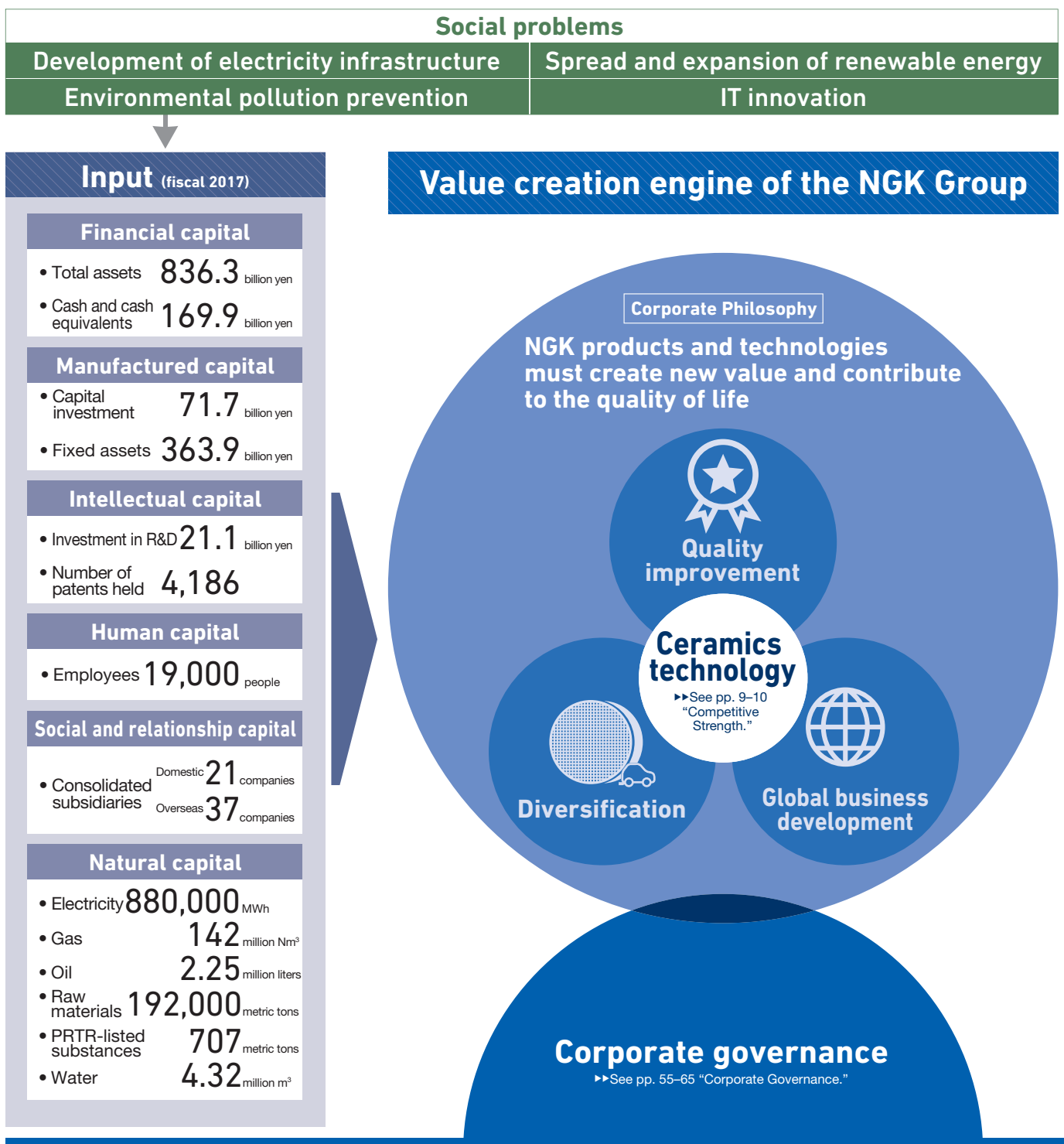
2009

Implements Reformed Manufacturing Structures; production systems, design, manufacturing equipment, etc., are revised from square one



Using Advanced Technology to Power a Unique “Value Creation Engine”

Thanks to the unique ceramics technology it has cultivated over many years, the NGK Group is able to develop a wide variety of high-quality products that it seeks to offer in a growing range of overseas markets. As a result, the NGK Group creates diverse value, which helps to address social problems.



Output

Power business



Insulators



NAS[®] batteries

Ceramic products business



Ceramics for purifying automobile exhaust



NOx sensors

Electronics business



Ceramics for electronic and electrical devices



Beryllium-copper products

Process technology business



Ceramics for semiconductor manufacturing equipment



Industrial machinery and devices

Results

(fiscal 2017)

Consolidated net sales

451.1 billion yen

Profit attributable to owners of parent

45.8 billion yen

ROE

10.4%

Total sales of products contributing to environmental protection

245.6 billion yen

Social contribution spending

0.3 billion yen

Avoided NOx emissions

4 million metric tons per year

Note: Assumes exhaust systems are equipped on new automobiles that do not have equivalent systems.

Values provided by the NGK Group

Ensure access to affordable, reliable, sustainable, and modern energy for all



- Insulators are indispensable to stable power supply
- NAS batteries allow stable supply of renewable energy
- Ceramics for purifying automobile exhaust make exhaust gas clean, thus enabling clean usage of fossil fuels

Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation



- Ceramics used in electronics make ICT cheap and ubiquitous
- Ceramics used in semiconductor manufacturing equipment let the semiconductor industry be the foundation for modern daily life
- Metal products are widely used in mobile phones, automobiles, industrial equipment, and other devices that undergird modern life

Take urgent action to combat climate change and its impacts



- NAS batteries aid in the fight against climate change by allowing stable supply of renewable energy

Make cities and human settlements inclusive, safe, resilient, and sustainable



- NAS batteries enable innovation in urban energy management for the creation of sustainable cities

Ensure healthy lives and promote well-being for all at all ages



- Ceramics for purifying automobile exhaust make exhaust gas clean

Conserve and sustainably use the oceans, seas, and marine resources for sustainable development



- Ceramic membrane filters purify wastewater to prevent marine pollution

Ensure availability and sustainable management of water and sanitation for all



- Ceramic membrane filters provide highly safe water
- Ceramic membrane filters purify wastewater

Competitive Strength Built on the Relentless Pursuit of Ceramics Manufacturing Optimization

From its very beginning, the NGK Group has sought to reexamine conventional ceramics manufacturing practices in light of the latest science and technology in order to help it identify the optimal combination of process conditions for each of its products. And after nearly 100 years, this pursuit of optimization has accrued a wealth of technology and expertise from which the NGK Group draws its competitive strength.

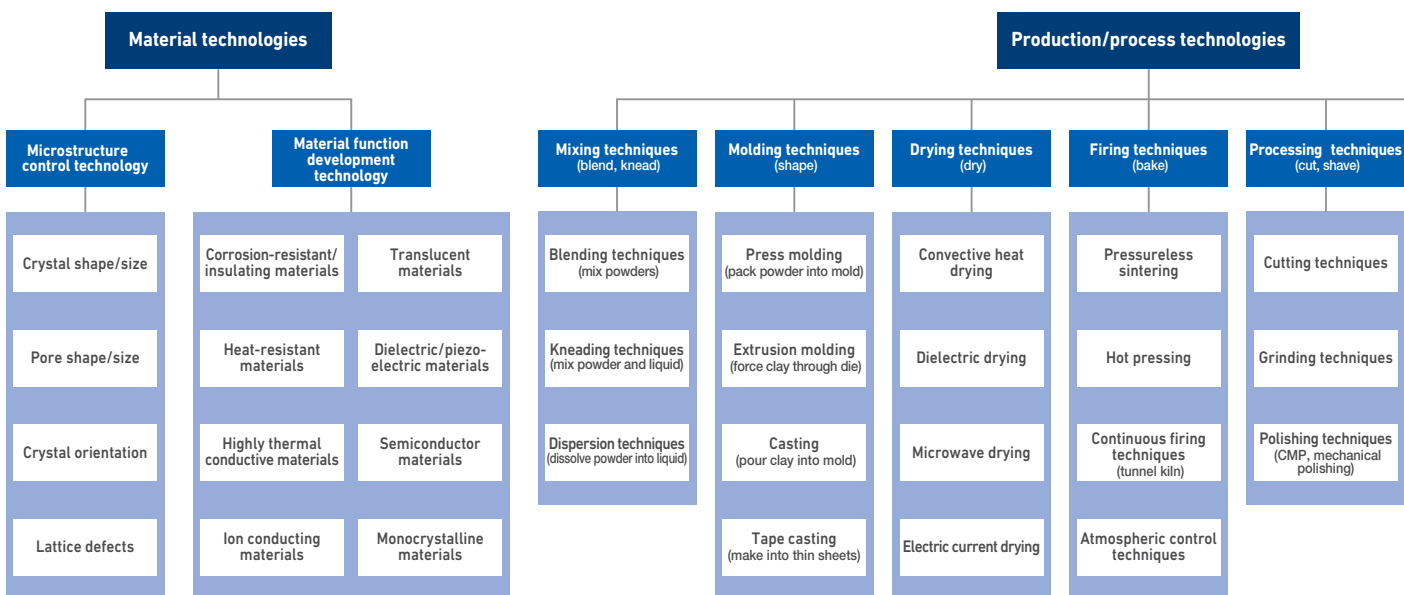
Mixing, molding, and firing. A puzzle with endless combinations.

Ceramics manufacturing is patient, methodical work, which requires you to blow life into inanimate material that is hard and brittle. You start by choosing from among tens of thousands of raw ingredients that will provide the best combination suited to your needs, and then you mix them. After you have calculated what shape your product needs to have after firing, you mold

it. Finally, you perform firing to achieve the optimal microstructure and component structure in your product.

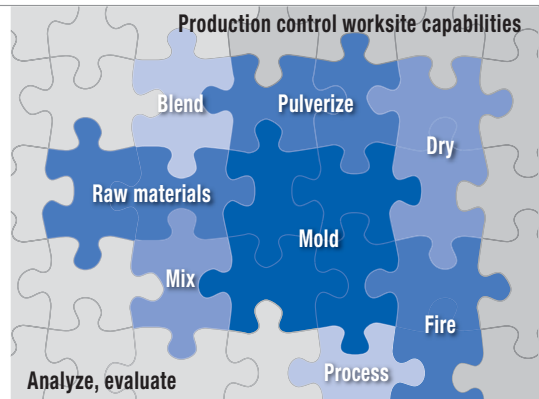
This interconnected series of processes involves an almost unlimited number of parameter combinations. Each product is like its own, complex jigsaw puzzle, and every piece is essential.

■ NGK Core Technologies



Key technology in the manufacture of the HONEYCERAM® ceramic catalytic converter substrate for automobile exhaust purification

In order to ensure product uniformity, it is essential that we perform on-site analysis, evaluation, production control, and other measures that allow us to control the production process in line with the slight variations in raw materials characteristics of each lot.

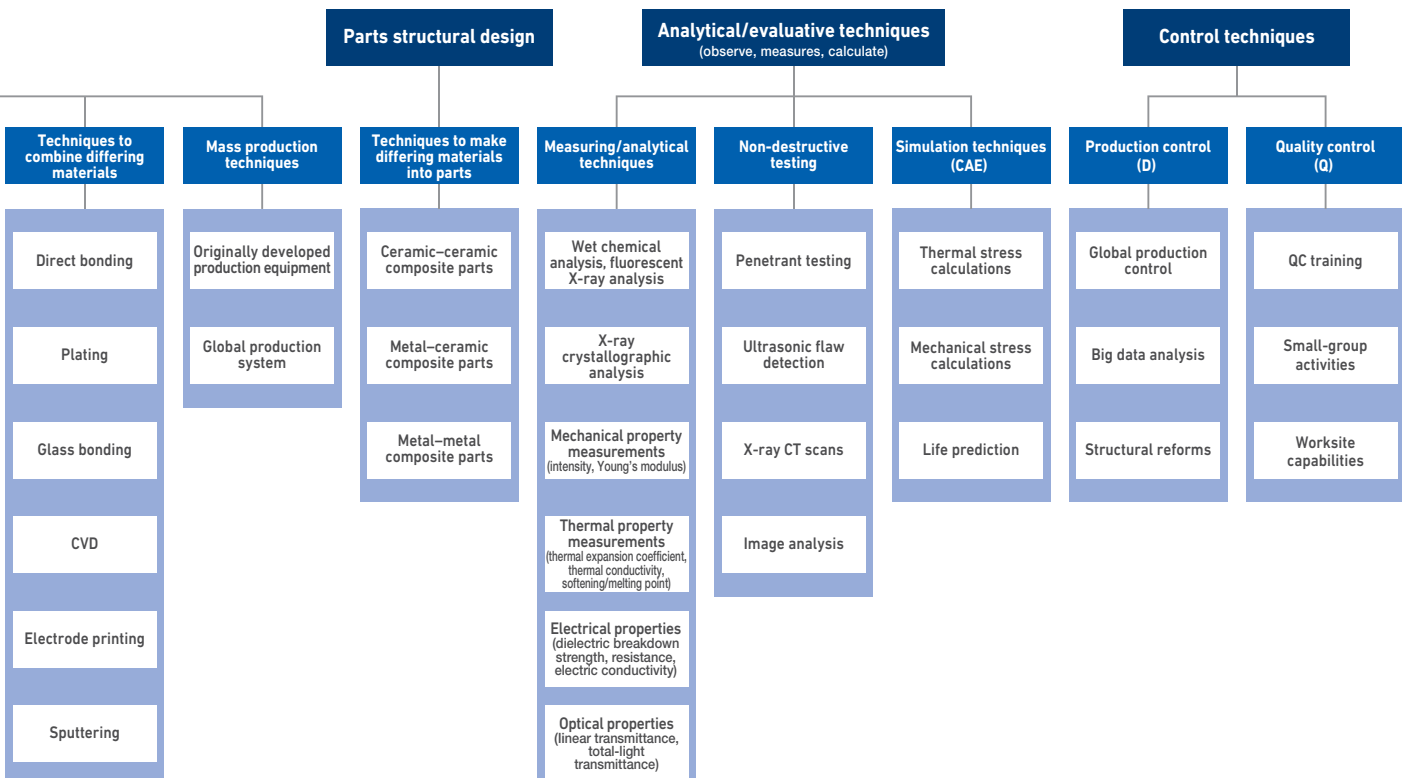


Achieving uniformity in mass production can take 10 years or more

Uniformity, i.e., little to no variation, is essential for industrial products. This is particularly true for insulators, which the NGK Group has been manufacturing since its founding. A single broken insulator will knock out the entire power transmission line; thus, strict quality control has always been necessary. As a result, the pursuit of uniformity has become embedded in the very corporate DNA of the NGK Group.

We methodically search for the optimal and most cost-efficient combination of parameters to use in the mixing, molding, firing, and other processes, and then

we steadily work to improve these to achieve uniformity in mass production. Finalizing each process takes a great deal of time; with difficult products it can take 10 years or more. At NGK, our starting point is, and has always been, an uncompromising management policy combined with methodical diligence on the job. This is the reason why NGK products—from insulators to HONEYCERAM, NOx sensors, NAS® batteries, and semiconductor manufacturing equipment products—are so far beyond anything our competitors have to offer.



Approaching the 100th Anniversary of NGK's Founding **Unique and Unrivaled Ceramics Technology—Our Wellspring of Growth**

May 2019 will mark the 100th anniversary of NGK's founding. Beginning with insulator manufacturing, we have steadily expanded our specialist fields to include automotive components, electronics, semiconductor manufacturing equipment, and others. All the while, we have maintained a single-minded commitment to continually develop and perfect diverse ceramics technologies. Thus, the history of NGK is also a history of technology.

To meet growing needs and to cultivate new business opportunities, we are undertaking the largest investments made since NGK was founded. For fiscal 2018—our 99th year as a company—the shared goal of everyone in NGK is to do what we must do to deliver an expanded range of products that take advantage of our unique technologies to even more people and to achieve even greater growth.



NGK Insulators, Ltd.
President

Takahashi Oshima

Cultivating legacy of material and production technologies that sets us apart

Since its founding, NGK has consistently focused on cultivating ceramics technology—particularly, material technology. As our most important strength, material technology involves the precise control of crystal sizes, shapes, and other characteristics. The growth of our company has always been driven by the immense legacy of technological knowledge and expertise that we have accumulated over our many years of operation.

In addition, we need to develop our unique production technologies to make full use of these technologies. It is by using these technologies together hand in glove that we have produced all of current NGK's core products. What sets NGK apart is our capacity to come up with products made by hand, develop optimized techniques for commercially mass-producing them, and then refine these to a point beyond the ability of other companies to imitate. This is the strength that we have been cultivating and that has become our wellspring of growth.

We are also known for our tenacity and perseverance when it comes to technological development. The demand for NOx sensors first took off in 2010, when new U.S. regulations came into full effect. However, by that point, NGK had already been at work for more than 15 years developing these sensors. We also spent over 10 years developing our gallium nitride

wafers, which are used to produce laser light and which are installed in projectors and other equipment.

Just because we create a technology doesn't mean there's an immediate demand for it. And, we, as a company, need to make a profit. It is difficult to manage, but NGK has a mission to devote time and patient effort to cultivating technologies that society will truly need at some point in the future.

We use new technology to grow our profits, which we then invest in the development of new products. We used our profits from insulators to develop automotive-related products. Now, our automotive-related profits have become a foundation for growing our semiconductor-related products. Maintaining this cycle is absolutely crucial to keeping the company on a growth track.

Thus, we created the company-wide "2017 Challenge 30" initiative, which sets a five-year goal of increasing the share of new products to 30% of total sales by fiscal 2017. We achieved our target percentage in fiscal 2017 and are now working to maintain it with the "Keep up 30" initiative. As sales revenues grow, it becomes harder to maintain this percentage. There may be some products the market will not be receptive to; nevertheless, our commitment to new product development remains undaunted.

An investment of over 300 billion yen Undertaking large-scale capital investment in seven sites globally to expand automotive and semiconductor manufacturing equipment-related production

NGK is currently undertaking a three-year, over-300-billion-yen investment plan, which began in the previous fiscal year to connect the company's technological strengths with growth.

Nearly half of this investment is for automotive-related products, and we build new plants in Japan and overseas, and extend facilities at existing ones. Approximately 50 billion yen is for semiconductor manufacturing equipment-related products. The remainder is being invested in the development of new products, such as ceramic batteries, and the expansion

of existing production lines for new products.

In Europe, NGK Ceramics Polska has begun expanding its production facilities and equipment, and is already boosting its production capacity, while NGK Ceramics Suzhou in China is scheduled to bring its No. 2 Plant on line in December 2019. In Thailand, NGK Ceramics (Thailand) began operations at its new plant this spring. This automotive-related plant produces, among other products, ceramics for purifying automobile exhaust. In Japan, we are investing in NOx sensor production at the NGK Ceramic Device Ishikawa

Message from the President

Major Capital Investments in Fiscal 2017

NGK Ceramics Polska

Products:
NOx sensors (assembly), diesel particulate filters



NGK Ceramics Suzhou

Products:
Diesel particulate filters



Komaki Site, NGK Insulators

Products:
Ceramics for semiconductor manufacturing equipment



Chita Site, NGK Insulators

Products:
Ceramics for semiconductor manufacturing equipment



NGK Ceramics (Thailand)

Products:
Honeyceram



Ishikawa Plant, NGK Ceramic Device

Products: NOx sensor components



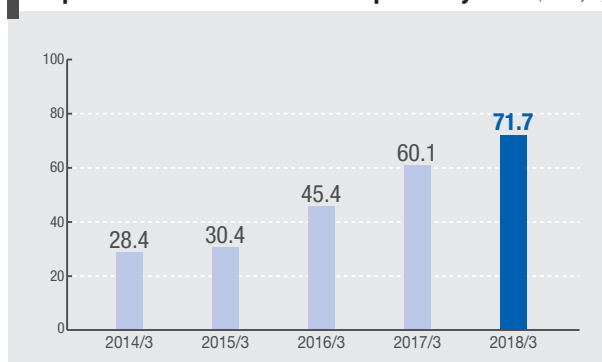
Tajimi Plant, NGK Ceramic Device

Products: Ceramics for semiconductor manufacturing equipment

Plant in Nomi, Ishikawa Prefecture with the aim of starting expanded production in January 2019.

Additionally, as we are currently under-supply capability to respond to rapidly growing demands for semiconductor manufacturing equipment-related products, we are working to increase our production capacity by accelerating construction of a new production site in Tajimi, Gifu Prefecture as well as undertaking capital investment in our existing Komaki and Chita sites.

Capital investment for the past 5 years (Billion yen)



New product development

Commercialization of three types of ceramic batteries and two optical components

In the area of new product development, NGK is creating product applications to commercialize three types of ceramic batteries. One is a chip-type ceramic secondary battery. It is as small as a postage stamp and has an ultra-thin, 0.4 mm body, while the incorporation of our unique crystalline orientation technology achieves high energy density. Anticipated applications for this battery include ultra-compact wireless IoT modules equipped with sensors, and next-generation credit cards with highly secure fingerprint authentication.

We are also developing a zinc secondary battery. Although zinc itself is widely used for the electrodes in primary batteries, its propensity to cause short-circuiting when repeatedly charged has prevented it from being used in (rechargeable) secondary batteries. At NGK, we have successfully realized a zinc secondary battery through the development of our proprietary hydroxide ion-conducting ceramics. Besides offering a large

capacity, this battery, uses an aqueous electrolyte unlike lithium-ion types of batteries, and thus offers a high level of safety, which makes it suitable for indoor applications.

Third one is a solid oxide fuel cell (SOFC) module, which uses hydrogen from city gas to generate power. Our unique, all-ceramic design makes the battery durable while still allowing for high generating efficiency.

Additionally, the development planning we have undertaken as part of our Optical Component Project has resulted in two new products that we released in fiscal 2017.

One is a gallium nitride wafer, which can replace conventional mercury lamps in the design of base substrates to make projector light sources with an unprecedented, ultra-high brightness. The other is a micro-lens for UV LED lights, which can be used to improve the sterilization efficiency of UV LED lights by narrowing their irradiation area.

Business outlook

Satisfying market demand in an unprecedented growth period while developing new products and technologies

Now that the demand for automotive-related products and semiconductor manufacturing equipment-related products is exploding, NGK is undertaking the largest level of capital investments in its history. On top of this, technology developments such as AI and autonomous vehicles continue to create entirely new areas of business. NGK is in an unprecedented period of growth,

and therefore we need to be improving productivity and expanding production in our existing businesses to generate solid profits that can then be applied to new product development.

We need to remain alert and attentive to growing trends and the emerging needs of changing times for sowing seeds for business. In the case of new business

Message from the President



Ishikawa Plant, NGK Ceramic Device

areas, as mentioned earlier, one area we are focusing on is base substrates for control circuit formation in IT. Our research and development in this area is quite active, and we are also evaluating a variety of ideas related to ceramics.

In 2017, the EU and China announced a policy change aimed at promoting the widespread adoption of electric vehicles (EV), but at NGK we are anticipating that the demand for gasoline and diesel-powered vehicles will be still increasing up through the mid-2020s, creating a bigger demand, which our supply capacity will need to expand in order to meet.

Even if you just look into battery issues, it is figured out that EVs have a number of hurdles to overcome before widespread adoption can be achieved. The lithium-ion secondary batteries currently used for EVs are not sufficiently durable and have issues in raw material procurement. Also, although a number of companies are trying to develop an all-solid-state battery, which would be superior in terms of safety and

performance, there would still be a variety of challenges left, such as improving thermal durability. Because it takes time to go from the development phase to the evaluation phase, even if the all-solid state type of battery is developed by 2020, achieving practical application would take until at least the mid-2020s. This is why we believe that the demand for gasoline and diesel vehicles will continue to grow up through the mid-2020s.

In fact, because of this likely continued growth in demand, it makes research into cleaner exhaust technologies all that much more essential. Towards this end, we are currently working on improving vehicle cold starts, which involves a large amount of exhaust material being expelled when the engine is turned on. If the catalyst in the vehicle is preheated electrically before the engine starts, this will reduce the amount of exhaust material expelled during a cold start. This is the sort of area into which we can expand our business and find a good deal of room for growth.

Foundation for value creation

Encouraging employee spontaneity through systemic reform

For the NGK Group, having a system in place for developing our human resources is essential to our future corporate growth as well. That is why, in April 2017, we undertook the first reform of our personnel system in 25 years. Major aspects of this reform included incorporating a system for more rapid promotion of younger employees to positions of responsibility, expanding female representation in more

job categories, shifting the salary scale for younger employees, and raising the mandatory retirement age to 65. Our goal is to create an environment which motivates and challenges employees.

Towards that end, it is important not only to put various systems in place but also to foster greater initiative-taking among employees. We want to be able to give employees an area to focus on and then leave it

up to them to independently and proactively pursue the important challenges that arise from it.

I always tell employees that safety, the environment, quality, and CSR are all fundamental parts of their job that need to be addressed. Both in Japan and overseas, safety has been an extremely important focus for NGK. We are also steadily addressing environmental preservation-related issues, such as CO₂ reduction. Our policy moving forward includes expanding a lineup of environmentally friendly products.

With regard to corporate governance, in 2015, we established committees such as the Nomination and Compensation Advisory Committee and Business Ethics Committee. In June 2017, we appointed a female outside director. Furthermore, we conducted a survey regarding the effectiveness of our Board of Directors, and the issues identified from this have led to active and vital discussion by the Board.

Unfortunately, however, it has come to light that in January 2018 a shipment of our insulators and other products from the Power Business Group did not undergo delivery tests as per the agreement with customers. Although these products all passed pre-shipment tests performed as per in-house regulations, the delivery tests that were required to be conducted in accordance with agreement with customers were not carried out appropriately. I offer my deepest apologies to our customers and all other affected parties for the great inconvenience and concern which this caused.

We used the annual corporate reorganization carried out in April 2018 to perform a systemic review to ensure this sort of incident never happens again. In order to strengthen our quality management and quality compliance foundations, we are rolling out quality-focused activities for work quality as well as for product quality; we are building a quality compliance program led by top management and carrying out thorough audit; I myself provide direct guidance at a Quality Committee that heads quality-focused activities company-wide; and we are working to strengthen the quality assurance departments in our business divisions.

Furthermore, we are developing rules, strengthening management and encouraging management to demonstrate their commitment at every chance they get in order to establish a corporate climate which is uncompromising with regard to compliance.

Looking ahead to the next 100 years **What needs to be done is clear. The question is how we accomplish.**

We are in a period of rapid growth without precedent, and there are still so many factors and opportunities which the NGK Group can capitalize upon for even greater growth. We must not squander these opportunities; rather, our mastery of them will determine the course of NGK's next 100 years.

I tell everyone in NGK that the key word for this year is "completion." By that, I mean we must be thorough in completing our preparations this year for the coming centenary.

We will carry through capital investments. We will meet the needs of the market. Although it will be challenging, what needs to be done is clear. My hope is that this spirit of "completion" will drive us to tackle each of the challenges facing NGK and help us cultivate a foundation for sustainable growth that will take us through the next 100 years.



Results for the Financial Period Ending March 2018

The total consolidated net sales for the fiscal year ended March 2018 increased by 12.4% year on year to 451,125 million yen. In addition to the volume of automotive ceramics increasing mainly due to an increase in sales of trucks in the Chinese market and tighter emissions regulations in Europe, the quantities of beryllium copper products and components for semiconductor manufacturing equipment rose.

In terms of earnings, despite increases in costs for items such as depreciation and research and development, operating income increased by 10.8% year on year to 70,027 million yen and ordinary income increased by 9.4% to 70,615 million yen as a result of factors such as increased consolidated net sales and a weakened yen. With respect to extraordinary income and loss, while posting an impairment loss totaling 3,768 million yen under extraordinary loss, a gain on sale of investment securities of 1,286 million yen was recorded as extraordinary income. In addition to these, in the previous period, the fiscal year ended March 31, 2017, 11,213 million yen was posted for income taxes for prior periods. As a result of the above, profit attributable to owners of parent increased by 25.9% to total 45,814 million yen.

	2014/3	2015/3	2016/3	2017/3	2018/3	Year-on-year
Net sales	308.7	378.7	435.8	401.3	451.1	12.4%
Operating income	44.3	61.6	80.9	63.2	70.0	10.8%
Profit attributable to owners of parent	27.0	41.5	53.3	36.4	45.8	25.9%

Target Management Indicators

The NGK Group seeks to apply a brand of management that focuses on its shareholders, with return on equity (ROE) as the key management indicator. While focusing on an ROE level of 10% or more from the medium- to long-term perspective through efficient investment of business resources to expand core current businesses, launch new businesses, and in other ways improve its earning capacity, the NGK Group will seek to achieve further improvements in capital efficiency.

Capital Policy

The NGK Group implements its capital policy from the perspective of contributing to sustained enhancement of its corporate value based on communication with its shareholders and investors. The NGK Group will work to realize both financial soundness and securing of profitability that surpasses capital cost, while actively returning profits to shareholders from the medium- to long-term perspective. With items such as ROE, dividend payout ratio, and dividend on equity ratio as important indicators, the NGK Group will aim to maintain profit margin, capital turnover, and financial leverage at sound levels in accordance with business strategies.

Measures for Returning Profits to Shareholders

NGK views the return of profits to shareholders as one of its most important management policies.

As a basic policy, we strive for shareholder-oriented management that emphasizes ROE, and distribute the benefits of successful management with a medium-term target consolidated payout ratio of approximately 30% after consideration of a comprehensive range of factors, including business performance, financial position, and future business development. Meanwhile, NGK plans to utilize retained funds primarily to extend its existing core business and capital investments in new business projects, with a view to enhancing its corporate value.

Cash Flows

Net cash provided by operating activities for the current consolidated accounting year was 50,554 million yen.

Net cash used in investing activities totaled 49,414 million yen. This was mainly due to capital investment of 71,714 million yen (up 19.3% from the previous period) spent mainly on automotive-related ceramics production facilities and semiconductor manufacturing equipment-related production facilities; and cash inflow from the sale and redemption of marketable securities.

Net cash provided by financing activities totaled 22,546 million yen. This was mainly due to proceeds from long-term borrowings and issuance of bonds payable bringing in 42,444 million yen, despite cash outflows due to cash dividends paid and repayment of long-term borrowings.

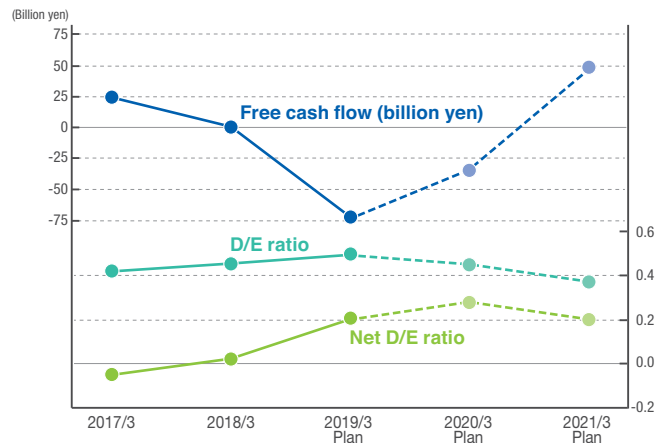
Altogether, the final balance for cash and cash equivalents was 169,918 million yen (up 25,225 million yen from the previous period).

	2017/3	2018/3	2019/3 Plan
Cash flows from operating activities	80.2	50.6	66.0
Cash flows from investing activities	(56.5)	(49.4)	(141.0)
Cash flows from financing activities	(13.0) New loan 30.1 Repayment (19.2) Stock repurchase (11.2)	22.5 New loan 42.4 Repayment (6.8)	22.0 New loan 47.0 Repayment (10.0)
Foreign currency translation adjustments on cash and cash equivalents	(2.1)	1.5	(2.0)
Net increase (decrease) in cash and cash equivalents	8.6	25.2	(55.0)
Cash and cash equivalents at end of year	144.7	169.9	114.9

Free Cash Flow and Financial Composition

With capital expenditure preceding, free cash flow is expected to turn negative during the financial periods ending March 2019 and March 2020; thus, interest-bearing liabilities will exceed outstanding funds for a while. Free cash flow is forecast to turn positive in the fiscal year ending March 2021.

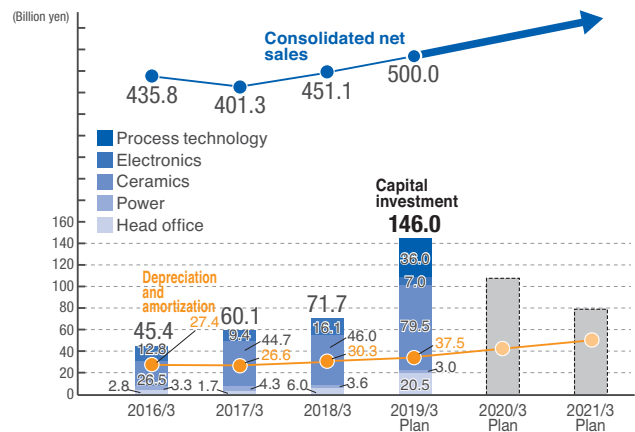
With regard to financial composition, an equity ratio of 50% or higher and a D/E ratio of around 0.4 will be maintained while seeking to find opportunities for financial leverage, such as through the procurement of necessary capital via interest-bearing debts.



Capital Expenditure and Depreciation Costs

NGK is planning capital investment of about 300 billion yen over a three-year period in order to increase production of automotive-related and SPE products and to invest in the mass production of new products.

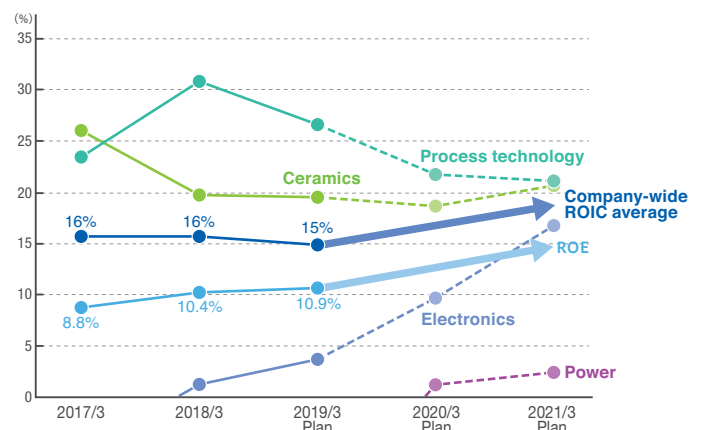
The main capital investments are 22 billion yen for the second automotive-related plant in Poland, 50 billion yen for the plant in Thailand, 33 billion yen for the second plant in China, 14 billion yen for increased production of NOx sensors, and 40 billion yen collectively for semiconductor manufacturing equipment-related plants in Komaki, Chita, and Tajimi.



Return on Invested Capital (ROIC)

NGK-version ROIC is calculated based on business assets (sales receivables + inventories + fixed assets) that can be managed by business departments rather than capital and liabilities, while pre-tax operating income is used in place of operating profit after tax as the numerator.

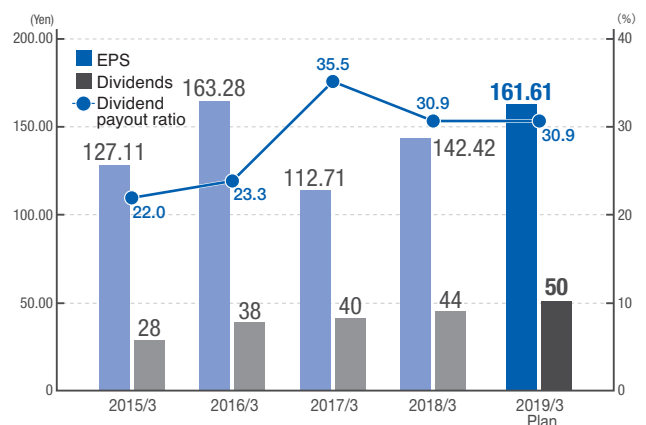
ROIC for fiscal 2017 produced a company-wide average of 15%, which is a one-point decrease from the previous period. We are aiming to improve ROIC with targets for each product group by improving profitability, prioritizing investments, and reducing inventories.



EPS, Dividends

Net income per share for fiscal 2017 was 142.42 yen, which is a four yen increase over the previous period and resulted in annual dividends of 44 yen being paid.

Net income per share for fiscal 2018 is expected to be 161.61 yen, which would yield annual dividends of 50 yen.



■ Global Production Bases

Consolidated net sales
451.1 billion yen
 (up 12.4% year-on-year)

Number of employees
18,783
 Note: Full-time regular employees. (up 7.2% year-on-year)

America



● FM Industries

● NGK-Locke Polymer Insulators
 ● NGK Metals ● NGK Ceramics USA

● NGK Ceramics Mexico



Net sales by region



Number of employees by region

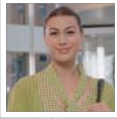
Note: Full-time regular employees.



Tangible fixed assets by region



Europe



Asia



Africa

Oceania

- NGK Berylco UK
- NGK Ceramics Polska
- NGK Ceramics Europe
- NGK Berylco France

- NGK Insulators Tangshan
- NGK Ceramics Suzhou
- NGK Technocera Suzhou
- NGK Insulators

- Siam NGK Technocera
- NGK Ceramics (Thailand)

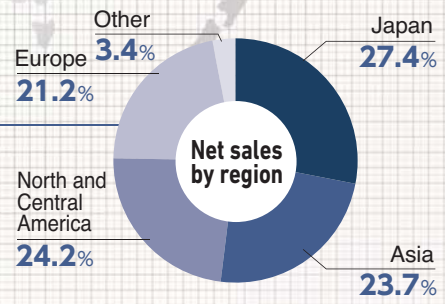
- NGK Ceramics Indonesia

- NGK Ceramics South Africa

- NGK Stanger

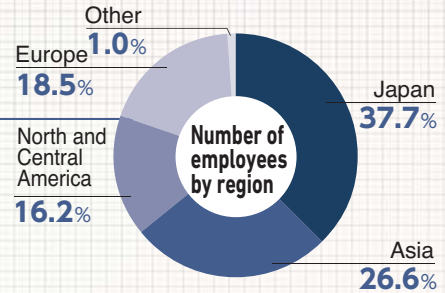
Asia **106.9 billion yen**
(up 11.0% year-on-year)

Other **15.4 billion yen**
(up 33.5% year-on-year)



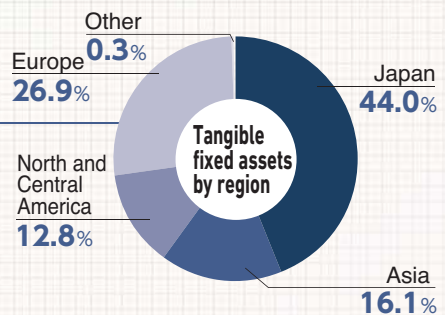
Asia **5,003**
(up 0.0% year-on-year)

Other **183**
(down 1.6% year-on-year)



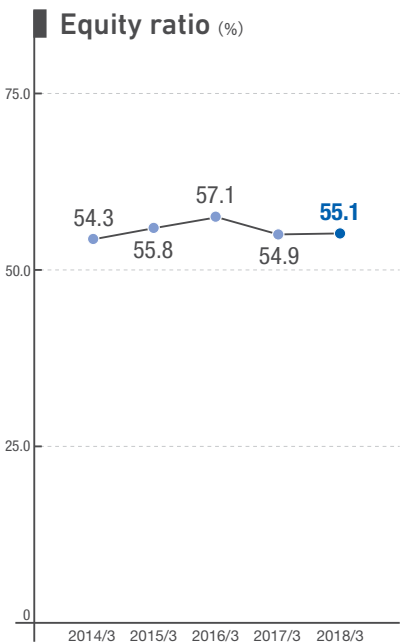
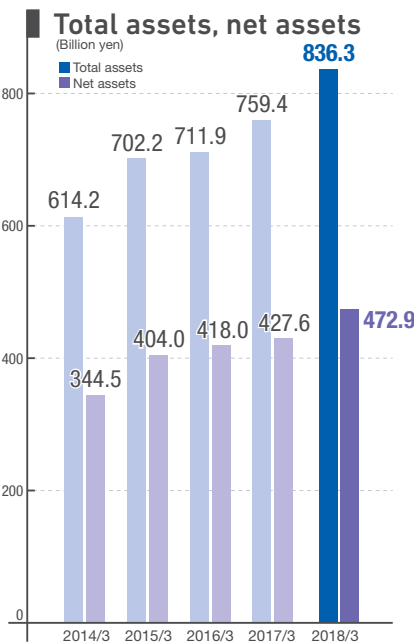
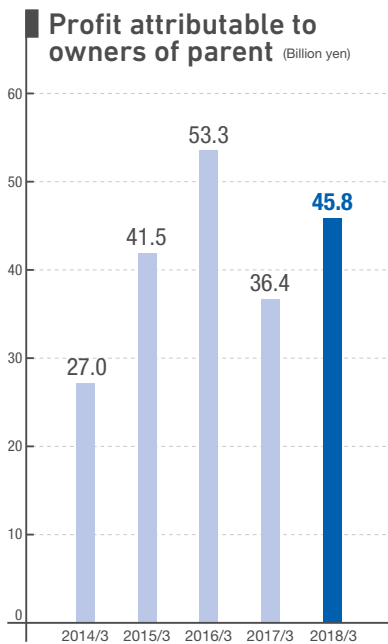
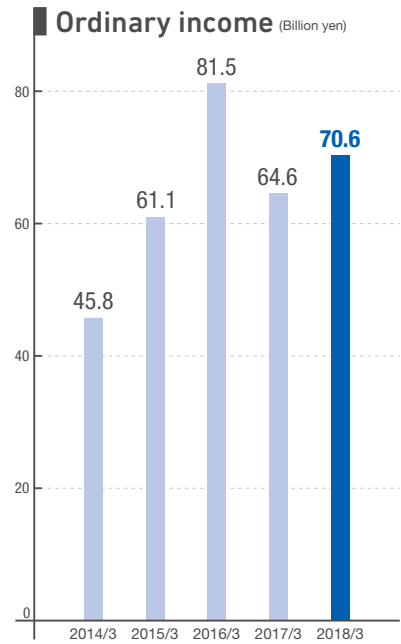
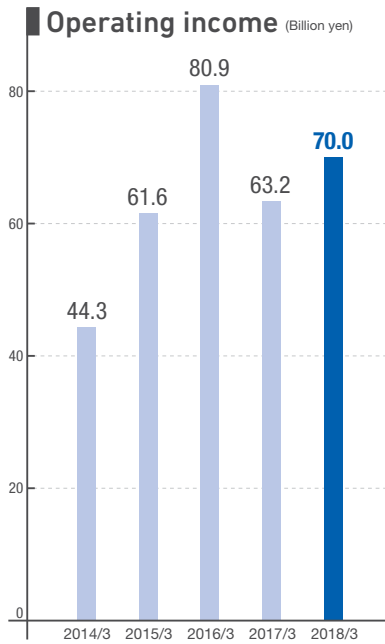
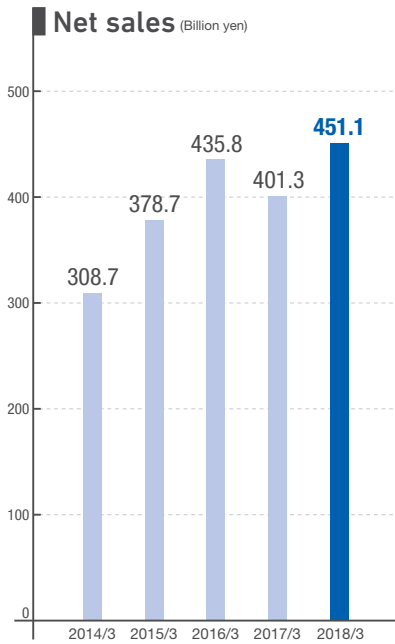
Asia **43.6 billion yen**
(up 37.1% year-on-year)

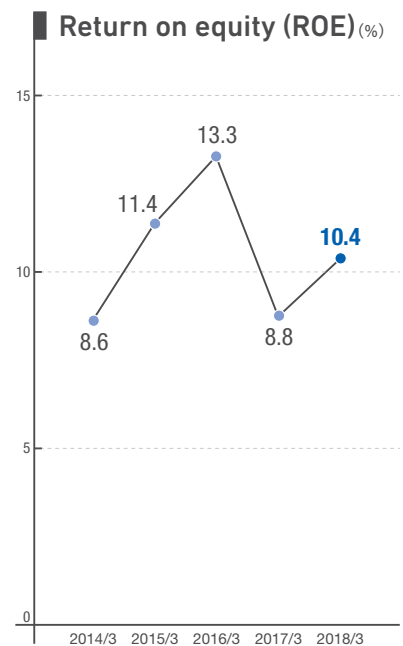
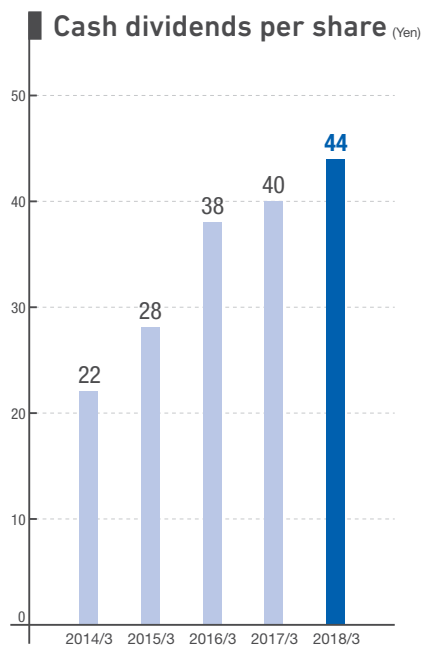
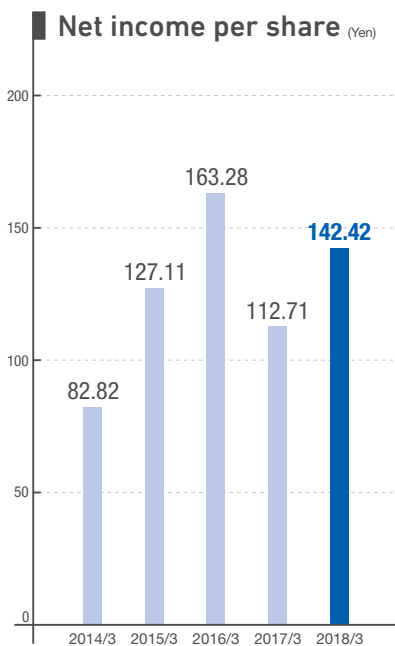
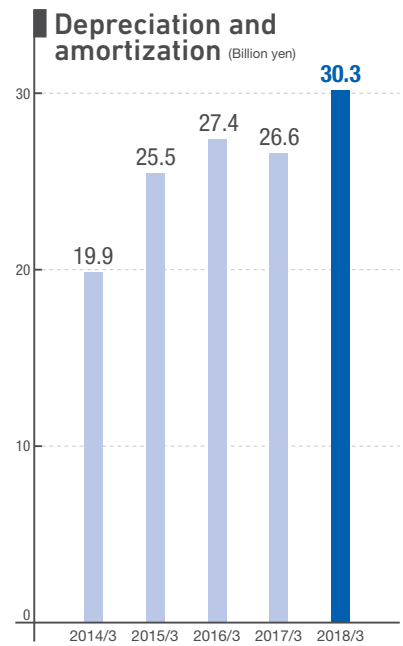
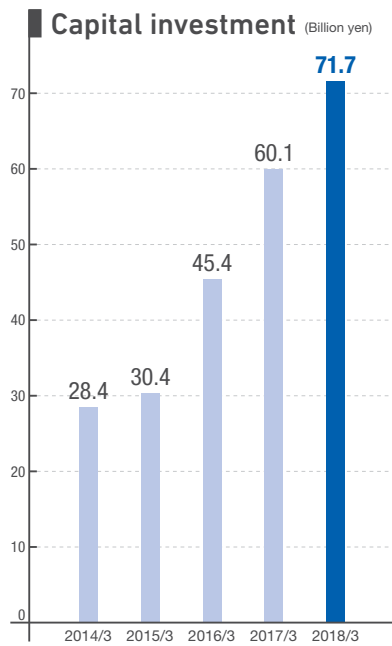
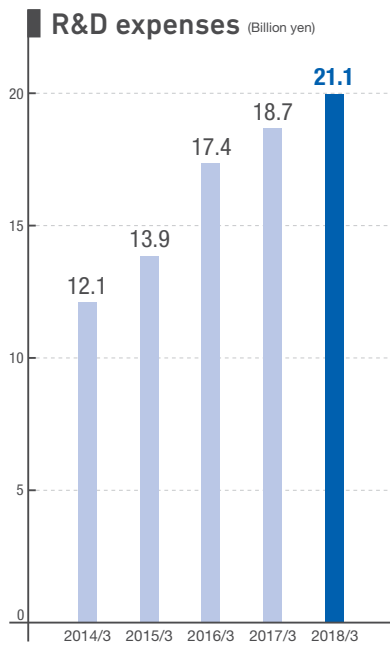
Other **0.8 billion yen**
(up 20.5% year-on-year)



Financial and Non-Financial Highlights

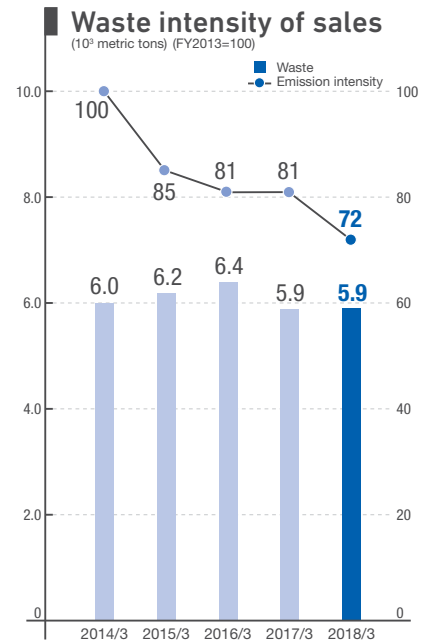
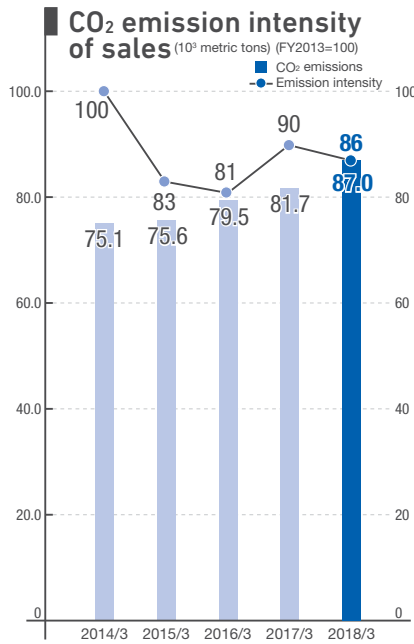
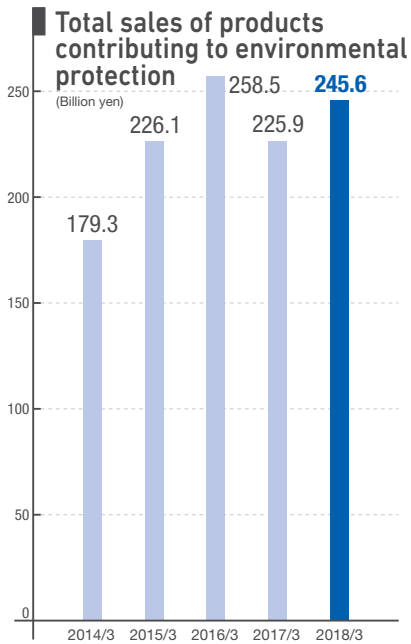
Financial indicators





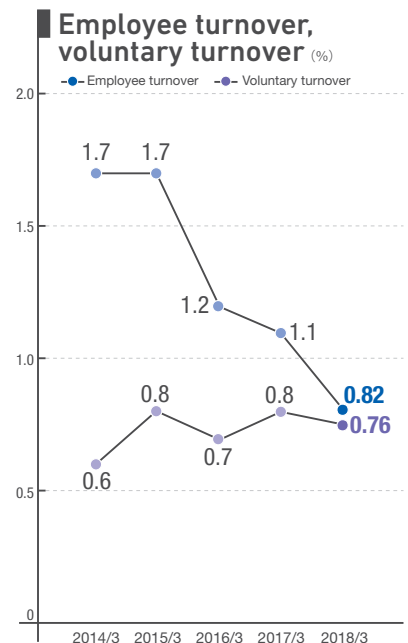
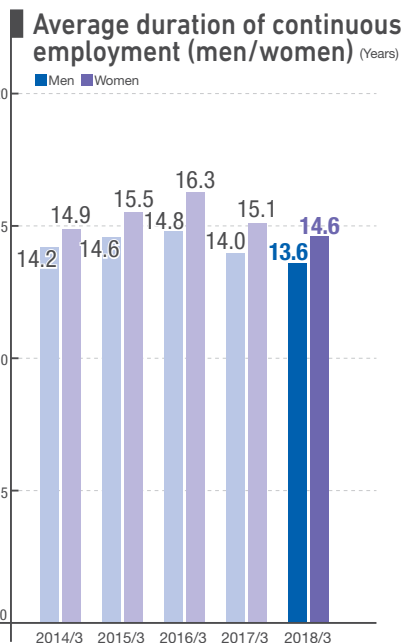
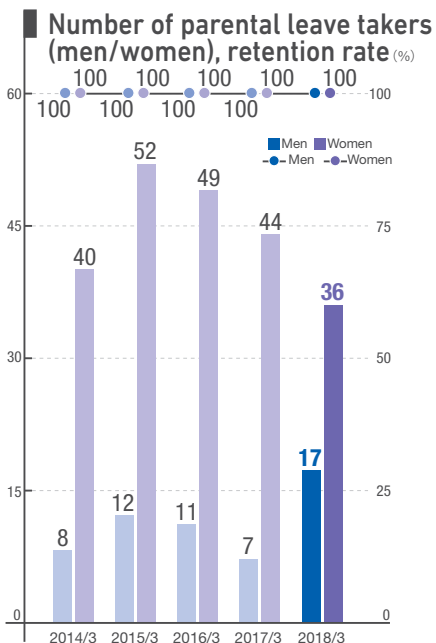
Financial and Non-Financial Highlights

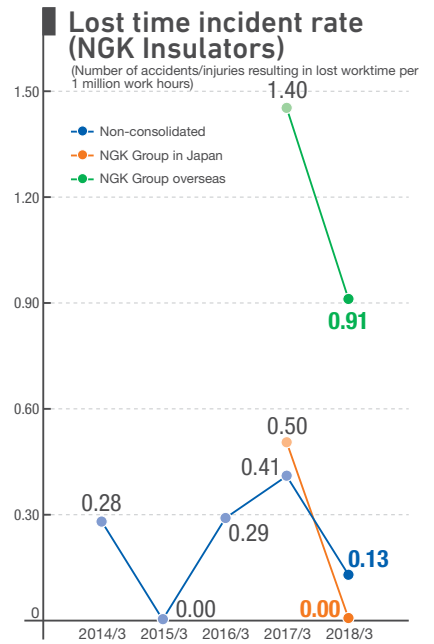
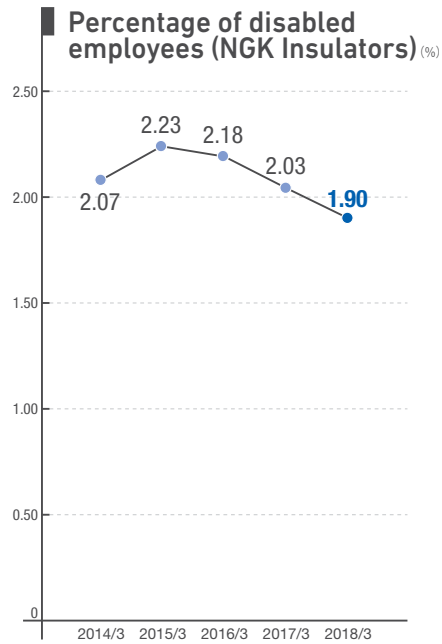
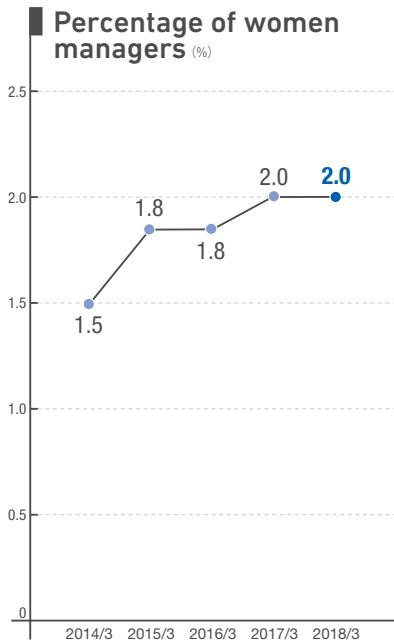
Environmental



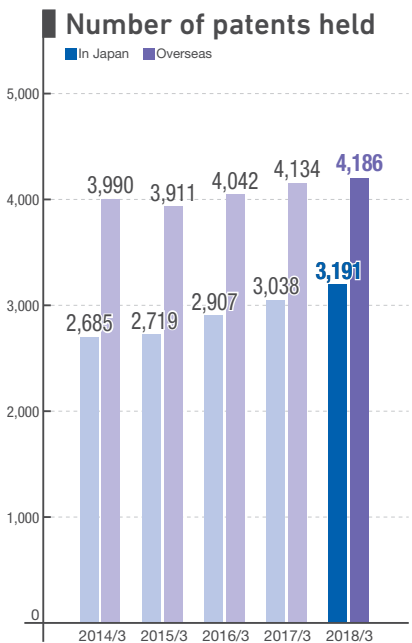
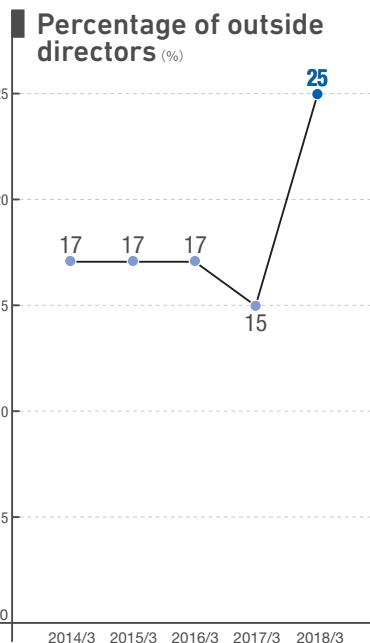
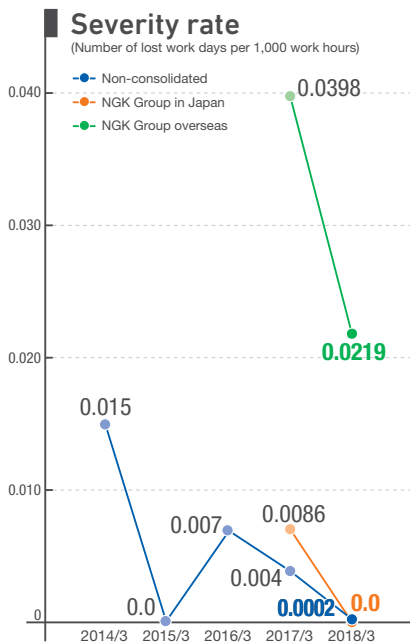
See p. 49 "Development and Distribution of Products Contributing to Environmental Protection."

Social





Governance



From the site of 300 billion yen in investment

A Central Hub for Mass Production of NOx Sensor Core Technology

Ishikawa Plant, NGK Ceramic Device

The NGK Group is currently working on enhancing the production capacity of its state-of-the-art NGK Ceramic Device Ishikawa Plant (referred to hereinafter as the NCDK Ishikawa Plant). The plant, which manufactures the ceramic elements that represent the core technology of NOx (nitrogen oxide) sensors, went on line in April 2017 and is currently being ramped up to its maximum production capacity. Last year the NGK Group began implementation of a planned 300 billion yen in capital investment over three years, and the NCDK Ishikawa Plant is a key, early priority of this plan.

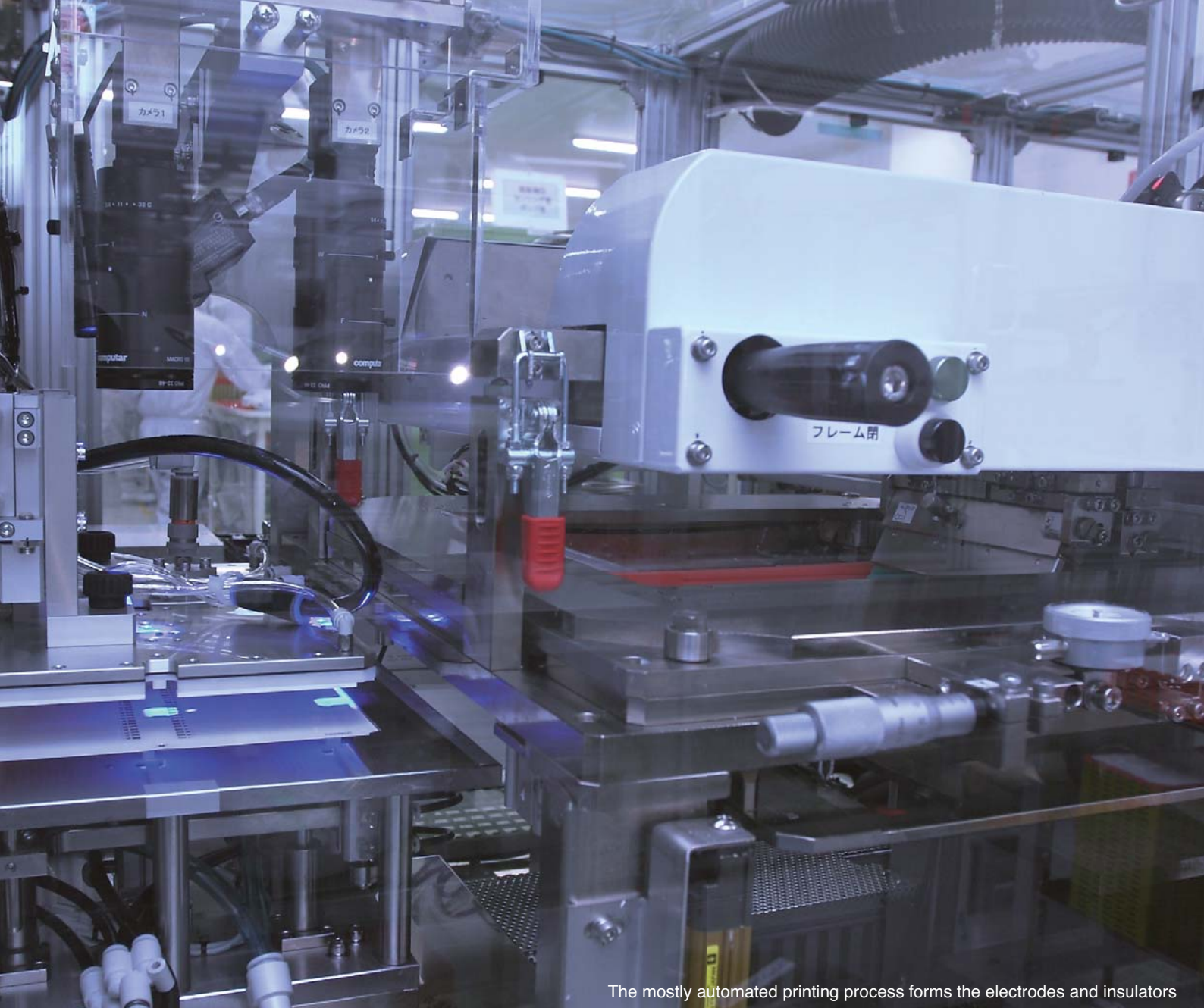


Manufacturing state-of-the-art ceramics via an automated production process

The NCDK Ishikawa Plant occupies 32,100 m². It is comprised of two buildings: a Tape Building and an Element Building. The plant manufactures ceramic elements (shown at right) which detect NOx concentration in automobile exhaust. A ceramic material primarily comprised of zirconia is created into long thin rods by bake-hardening, and then equipped with multiple exhaust-absorbing cavities and various electrodes. Voltage is applied to the electrodes to break the NOx into N₂ and O₂, and the oxygen concentration is then



Ishikawa Plant, NGK Ceramic Device



The mostly automated printing process forms the electrodes and insulators

measured according to the principles used for oxygen sensors, thus allowing the volume of NOx in exhaust to be ascertained in real time.

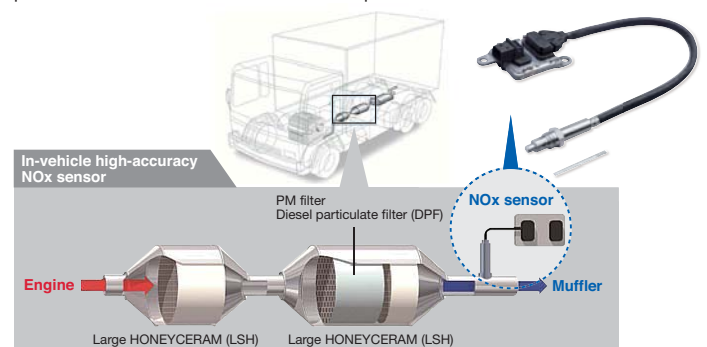
Element production begins by stretching out a zirconia slurry into tape form. This is done in the Tape Building. A multitude of automated production machines work to produce this zirconia tape. Each part of this process requires an advanced level of expertise in order to ensure uniform thickness is achieved.

The finished tape is then sent to the Element Building where it undergoes a printing process which incorporates electrodes and insulators onto its surface. This process is also automated. Given the sheer number of times the electrode-forming paste must be printed onto the tape and dried, such automation is of great benefit as it enables a higher level of productivity.

Next, a laminating process is performed to create the element shape. This is done by layering and

pressing the tape. Due to the thin, pliable nature of the tape, and the fact that even the slightest misalignment is unacceptable, this is an extremely difficult process.

After this is done, the laminated sheet is cut and fired at least 1,000°C, its electrical characteristics and other properties are checked, and then it is packaged up and sent to another plant where assembly is performed to create the finished product.





Kilns for high-temperature firing of ceramic laminates



Careful inspection prior to firing

Addressing the need for personnel and creating leaders from locally hired employees

Plant Manager, NGK Ceramic Device Ishikawa Plant **Kazuhiro Hasegawa**

The biggest difference between the NCDK Ishikawa Plant and conventional plants is the degree to which we incorporate automation. By introducing state-of-the-art automation equipment, we are able to achieve vastly improved productivity with high cost efficiency.



Our biggest struggle thus far has been with time constraints. In order to ensure the plant went on line by the scheduled date, members from engineering departments, quality assurance departments, and other departments met together daily for regular meetings and, somehow, we all managed to fulfill the plan without any delays.

Also, as we were completely unfamiliar with this area, we reached out to the local residents and government to engage in real communication that helped us integrate the Ishikawa Plant into the community. The plant is situated within a rural environment, so any discoloration in our wastewater or change in a nearby spring would be immediately noticeable. This keeps us particularly attentive to the environmental aspects of the plant.

Our primary goal is establishing mass production and supply stability. The idea from day one has been for the NCDK Komaki Plant, which is situated close to the head office in Nagoya, to serve as a research and development hub, while the NCDK Ishikawa Plant serves as a BCP (business continuity planning) and

production hub. We plan to more than double our current production volume to overtake the Komaki Plant in 2019, becoming the largest mass-production site for elements.

The biggest challenge we face in achieving this is securing the necessary personnel. Thus far we have been proceeding according to schedule; however, we will need to double our current number of employees if we are going to take the plant to full operation. We are considering a number of options, including financially compensating employees who commute via the expressway, providing support with accommodations,

expanding the size of our recruitment area, and even outsourcing some processes to contractors.

My hope is that, in time, we will be able to run the plant with locally recruited personnel. We will choose 15 members out of the initial hiring group and carefully train and equip them with the expertise to make ceramic electrode components as well as provide them with a deep understanding about the manufacturing process. Once they have this, we will work on training them as leaders who can steadily rise up through management. I can envision all of this taking about 10 years to achieve.

Talking with Key Team Members

Ishikawa Plant

Growing production capacity and reaching even higher levels of productivity

I was assigned to the Ishikawa Plant when it was built in July 2016. I have had a hand in everything from starting up production equipment to overseeing mass production operations and handling quality-related issues. From the planning phase to the design and selection of equipment, as well as contributing to decisions about machinery numbers and installation, I have an intimate knowledge of the entire Ishikawa Plant.

As we are a fully integrated production plant for ceramic elements, my focus has been on tailoring the floor layout and production flow to optimize element production. For example, I have sought to increase productivity by taking three processes that have traditionally been distinct from one another and combining them into one.

Start-up was a challenge due to the particularly tight time frame we had to work with. We had very little time from when the building went up until when we had to start manufacturing elements. All of the arrangements associated with the equipment and facilities kept me racing against the clock as I hurried to coordinate the installation of machinery and perform

countless other tasks within the short deadlines provided.

Now I am helping with the additional investments that are being made into the plant. My current goal is to enable the Ishikawa Plant to handle greater production volume and achieve even higher levels of productivity. By the time we begin our expanded production in January 2019, I want to see the same buildings housing even more equipment, which all run smoothly.



Element Engineering Group Ishikawa Team,
Process Engineering Department,
Sensor Division, NGK Insulators

Kota Iwasawa

Improving product quality through the work I do

I grew up in Ishikawa, went to university in Ishikawa, and now I am employed at the Ishikawa Plant. I joined the company in the spring of 2017 and, since October, have been responsible for analysis operations. My job is to check product quality by examining cross-sections of element test products under a microscope.

I use a digital microscope which allows me to enlarge and examine the internal structure of elements. Sometimes I also use an electron microscope. Through experience, I am learning more and more about this internal structure.

I get a great sense of satisfaction from the fact that I am improving product quality through my work.

I am keen to think up new analysis approaches and, in time, handle the same quality control duties as the senior analysts in my group.



Product Quality Management Group,
Ishikawa Plant
Sensor Element Manufacturing Department,
NGK Ceramic Device

Hajime Yoshida

Promoting Streamlining to Improve Profits and Losses

Fiscal 2017 results		Fiscal 2018 outlook	
Net sales	Operating income (loss)	Net sales	Operating income (loss)
54.4 billion yen	(4.7) billion yen	56.0 billion yen	(4.0) billion yen

Results for fiscal 2017 showed net sales of 54.4 billion yen while, with regard to profits and losses, various factors such as the continued streamlining of production systems contributed to a reduced deficit margin with operating losses of 4.7 billion yen.

Business in insulators was sluggish as a result of Japanese electric power companies reducing capital investment. With regard to NAS[®] battery business, 1.2-megawatt NAS batteries were delivered to Dubai to help in meeting the time-shift power consumption needs of large-scale solar power plants being constructed in the Middle East; however, due to a lull in construction activity, no other major shipments were made.

In fiscal 2018, net sales are projected to be 56.0 billion yen with operating losses of 4.0 billion yen, meaning a continuation of deficits despite a slight increase in revenues compared with the previous period.

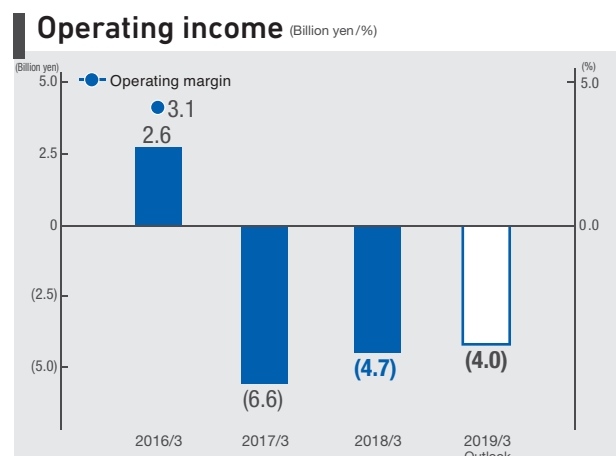
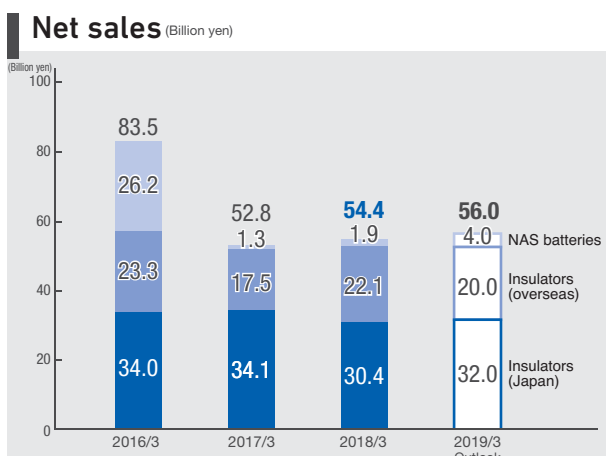
For insulator business, demand within Japan is expected to continue its sluggish trend, while overseas demand in the Middle East and North America is expected to be slow as well.

With regard to NAS battery business, while demand will increase mainly for users in Japan to meet the rapidly spreading adoption of renewable energy, the total number of shipments remains low and figures will remain in the red.



Senior Vice President; Group Executive, Power Business Group **Shigeru Kobayashi**

Financial results



Power business

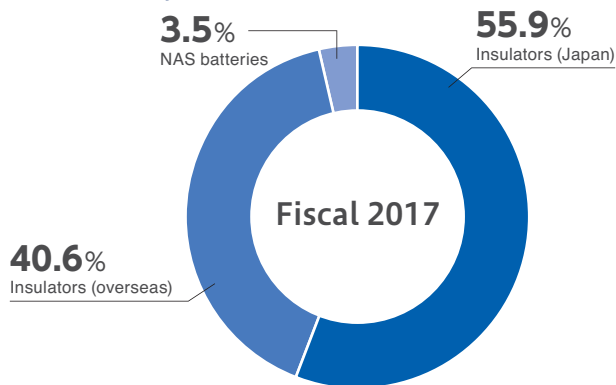
Insulators

Ceramic insulators play a role in insulating power transmission lines and steel towers. Ceramic insulators are an indispensable part in ensuring stable energy lifelines and were the NGK Group's founding products. As a top insulator manufacturer, NGK manufactures and provides high-quality and highly reliable insulators and equipment for power transmission, substations, and distribution, both in Japan and overseas.

NAS batteries

NGK manufactures and sells NAS batteries capable of ensuring power supply stability over the long term and with an array of superior features, including large capacity, high energy density, and long service life. NAS battery systems also contribute to peak power reduction by leveling out the power load, help stabilize renewable energy, act as countermeasures against surplus power, and facilitate power savings and cost cutting.

Sales ratio by business



Manufacturing sites



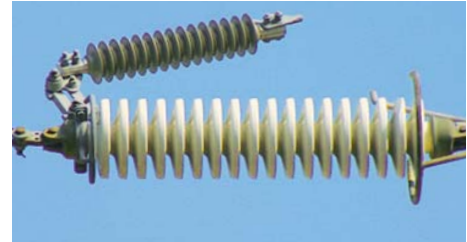
Insulators for power transmission

We constantly seek to innovate, and have succeeded in making our insulators more compact without compromising strength or isolation capacity. Thus, our suspension insulators for UHV power transmission are only 41 cm in diameter but can withstand a load of 84 tons.



Insulators and equipment for substations

These insulators are used to isolate power lines from equipment and the transformer building. In fact, our technological capabilities enabled us to make UHV gas bushings some 11.5 meters long—the largest porcelain products in the world.



Equipment for power transmission

We manufacture devices to prevent power outages when something happens to transmission lines. In particular, our line arresters, which have built-in functional ceramic (zinc oxide elements), make a huge contribution to blackout prevention by selectively discharging the large fluxes in current caused by lightning strikes.

Aiming for Growth in NAS[®] Batteries amidst Business Restructuring

Future outlook

With regard to insulator business, due to the expansion of energy saving in Japan, electric demand is expected continuing decline, in addition, the continued constriction of capital investment among Japanese power companies, which will last until 2020 when legal separation of power generation, transmission and distribution starts, the demand of insulator for transmission and distribution will be sluggish for the time being.

For overseas markets, the continued stagnation in oil prices is prolonging austerity measures in the Middle East, while in North America investment is shifting towards IT measures and distribution area; thus, overall market conditions are expected to remain harsh.

Amidst all of this, in fiscal 2017 the NGK Group began restructuring North American business and scaling down the production system at the Komaki Plant, while in fiscal 2018 this scaling down will be extended to the Chita Plant, which will move to single-shift operation. Despite ongoing, positive results, such as securing OEM* status for some NGK products aimed at the North American market, the market conditions are more severe than were anticipated, and supplemental initiatives are being discussed.

In January 2018 we confirmed that, in some cases, insulators and related products did not undergo appropriate tests in accordance with agreements with customers. Upon taking steps to verify the quality of the concerned products, we have been working with customers to provide detailed explanations. We will work further to strengthen our quality control structures and make all members of the group aware of the importance of compliance in order to prevent reoccurrence.

Demand for insulators is not going to disappear. Our aim is to continue restructuring our business to put it in the black while also enhancing the quality of our products further to satisfy the trust that we have built up with our customers.

It will take time for full-scale demand for NAS batteries to be realized; however, we believe that latent need continues to rise.

In the Middle East, plans to introduce large-scale solar power plants are being implemented as part of efforts to meet the 2030 greenhouse gas reduction targets of the Paris Agreement. Also, in Europe there is a push to revise the 2030 renewable energy ratio targets upward. In Japan, as well, the push to avoid enhancing the transmission network and the push to use solar power generation for shifting peak power consumption times are fostering greater

need for energy storage system offering long-term stability, which we foresee creating a surge in demand starting around 2020.

The power industry is entering an era of revolutionary change. Up until now, thermal and nuclear power were the base load power sources; however, as part of the fight against global warming we are increasingly moving away from coal-fired thermal power and shifting the base load more towards natural gas and renewable energy. One of the needs that is becoming more acute as a result of this transition is the need to shift the large amounts of solar power and other power generated during the day to the peak consumption periods during the night. Energy storage systems like NAS batteries are essential to achieving this.

Insulators have been the foundation of NGK business for 100 years, but NAS batteries will be what carries it through the next 100 years. Although the immediate future looks difficult, we are pushing ahead towards the flood in demand that is coming.

Another trend we are anticipating is the continued shift towards “local production for local consumption” for electricity as communities seek to reduce the distribution costs, which comprise so much of their power production and supply costs. With the ongoing decline in Japan’s population, it is unrealistic to expect underpopulated areas to be able to maintain large-scale power distribution networks. For such areas, the zinc secondary batteries that we are currently developing would be a more suitable option at the power distribution level.

Our work on NAS batteries has revealed a host of new opportunities in business areas where batteries are needed, such as in remote surveillance and maintenance. By such means as partnering with companies that already provide established services in these areas, we can create new business while also contributing to reduced environmental impact through more efficient energy usage.



NAS[®] battery systems

NGK developed the world’s first commercialized battery system capable of storing hours of electricity. These systems, which enable a high output of electric power for long periods of time, have been installed in around 200 locations worldwide.

*Outsourcing to another manufacturer the production of products and components sold under your company’s brand.

TOPICS 1

Delivering 1.2-megawatt (1,200 kilowatt) NAS batteries to Dubai

In March 2018, NGK delivered 1.2-megawatt NAS batteries to Dubai, one of the emirates of the United Arab Emirates (UAE), to be used in its energy storage technology demonstration project. The utility and long-term performance of NAS batteries in stabilizing output from solar power generation will be investigated.

The UAE is undertaking large-scale investment in solar power generation with the aim of increasing the percentage of renewable energy it utilizes from 1% currently to 25% (10 gigawatts or more) by 2030.

NGK has also provided the Emirate of Abu Dhabi in the UAE with NAS batteries totaling 108 megawatts of power, as well as a central control system offering integrated management of this stored power as a virtual power plant. Full operation of this system will begin this summer.

Our aim is to secure large-scale orders from Dubai as well, following success of the demonstration project there.



NAS batteries installed in Dubai

Order for large-scale, 1100kV direct current system in China

In January 2017, the State Grid Corporation of China tendered bids for a 1100kV direct current system, which would be the highest voltage system used anywhere in the world.

This project was incorporated into the Chinese government's 13th five-year plan (elimination of thermal power plants near major cities and construction of 17 long-distance power transmission systems). NGK Insulators Tangshan received an order for approximately 180,000 insulators, including around 50,000 insulators with the world's highest strength rating of 840 kN (full delivery of this order was completed in fiscal 2017). Excellent results from the specified vibration fatigue testing demonstrated the insulators' long-term reliability and helped secure the order.



Insulators offering the world's highest strength rating of 840 kN (shown at right)

TOPICS 2

Stronger Exhaust Regulations Create Strong Growth for Core Products

Fiscal 2018 outlook

Net sales **240.7** billion yen
Operating income **56.7** billion yen

Fiscal 2017 results

Net sales **267.0** billion yen
Operating income **60.0** billion yen



In fiscal 2017, increased truck sales on the Chinese market and the impact of the more stringent exhaust regulations in the EU contributed to strong growth in NOx sensors and other automotive products. On the other hand, however, increased amortization and development expenses, combined with temporary expense increases such as new plant startup costs, contributed to an anticipated increase in revenue but decrease in profits, with net sales of 240.7 billion yen and operating income of 56.7 billion yen. Please note that, from April 2018, industrial process business has been transferred to the newly established Process Technology Business Group, and the above results represent a new segment base.

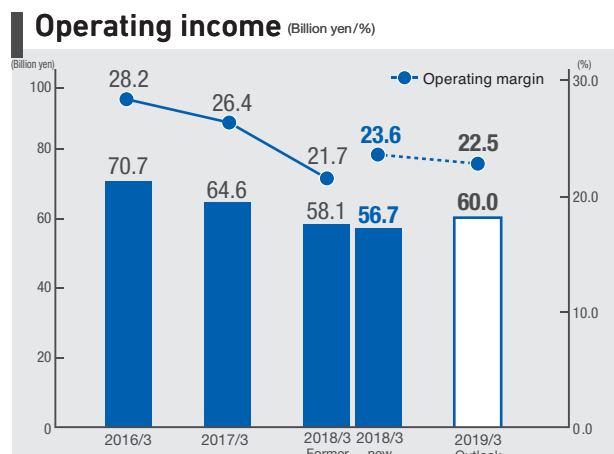
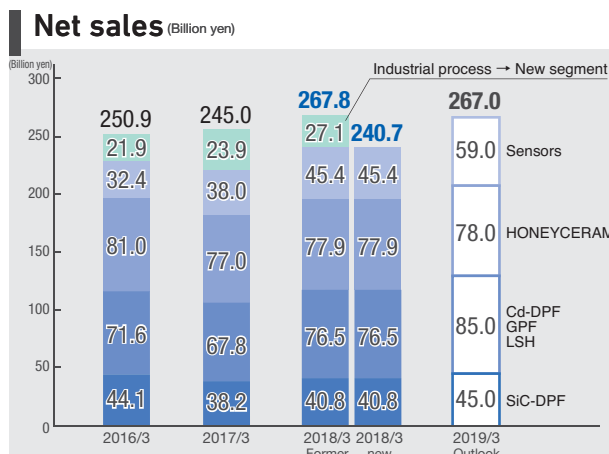
Projections for this new segment base in fiscal 2018 anticipate increased revenues and profits compared to the previous period, with net sales of 267 billion yen and operating income of 60 billion yen.

Sales of passenger vehicles in China and Asia's emerging markets and trucks in the US market are increasing, while exhaust regulations in Europe are getting more stringent. As a result of these trends, shipments of HONEYCERAM® to China and Asia's emerging markets are expected to increase, and demand for gasoline particulate filters (GPFs) for passenger vehicles in Europe is expected to ramp up significantly.

Because of further market share held by silicon carbide diesel particulate filters (SiC-DPFs), and because the number of NOx sensors per vehicle will increase, revenue is expected to increase for each.

Director and Senior Vice President; Group Executive, Ceramic Products Business Group **Atushi Matsuda**

Financial results

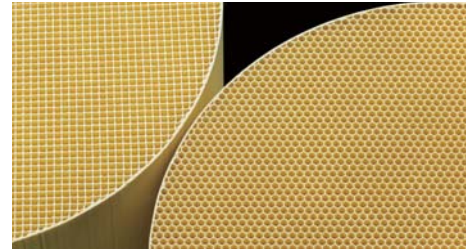


Ceramic products business

Automotive-related products

The HONEYCERAM® ceramic substrates for automotive catalytic converters are indispensable in cleaning vehicle exhaust. They have been adopted by automakers around the world and are manufactured by plants in Japan, Europe, America, Indonesia, Thailand, South Africa, and China.

NGK offers a range of other environmentally friendly and energy-efficient products, including diesel particulate filters (DPFs) and gasoline particulate filters (GPFs) which remove particulate material (PM), and NOx sensors which measure nitrogen oxide (NOx) concentration in automobile exhaust.



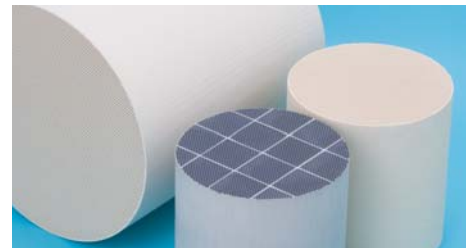
HONEYCERAM®

With a choice of square or hexagonal cell configurations (the latter being highly effective in conserving the volume of catalyst used), HONEYCERAM is used by auto manufacturers worldwide. Total production of HONEYCERAM recently exceeded 1.5 billion units.



In-vehicle high-precision NOx sensors

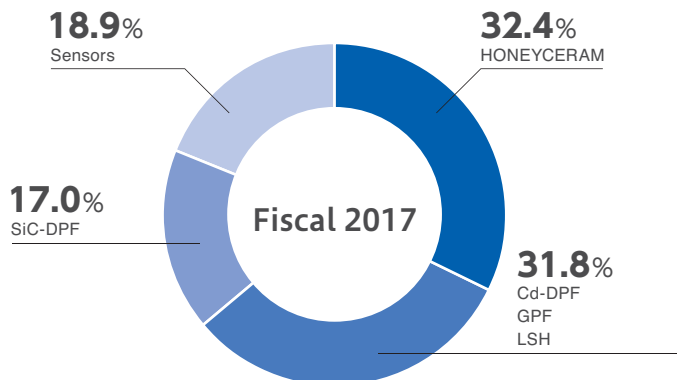
These sensors contain elements that utilize zirconia's oxygen pump function. They are now incorporated in clean diesel vehicles around the world because of their superior detection capabilities and greater durability.



Diesel particulate filters (DPFs)

These remove up to 99% of particulate matter. Featuring superior heat resistance, silicon carbide filters (center of photo) are used in passenger cars, while lightweight cordierite filters are used mainly in heavy-duty vehicles.

Sales ratio by product



Manufacturing sites



● **Automotive-related products:** Japan, US, Mexico, Poland, China, Belgium, Indonesia, South Africa, Thailand

Steadily Investing in Production Facilities while Developing Products for a New Era

Future outlook

First, let us begin with an overview of NGK's core automotive-related products. For HONEYCERAM®, despite the fact that their total demand is generally tied with the sales volume for passenger vehicles (new automobiles) worldwide, the trend of replacing them with GPFs is causing their demand to somewhat fall below overall passenger vehicle sales.

Demand for DPFs for diesel vehicles is expected to grow as exhaust regulations for trucks and off-road vehicles become increasingly stringent in China, India, and other emerging markets and demand for trucks in China, in particular, looks to keep expanding. For large HONEYCERAM as well, the increasing sales volume for trucks in the Chinese market and stronger exhaust regulations in emerging markets are projected to increase the demand.

For GPFs, product shipments in the EU are expected to ramp up fully in fiscal 2018, while demand is expected to grow in China from next fiscal year onward.

Demand for NOx sensors is expected to increase significantly as a result of more stringent exhaust regulations in Europe, which necessitate the incorporation of more sensors per diesel passenger vehicle.

All of these are internal-combustion engine-related products; however, in recent years electric vehicles (EVs) are becoming the focus of more and more governments and automakers, and the media continues to report on the decline in diesel vehicles as a percentage of the European automotive market. Nevertheless, we project that the number of internal-combustion engine passenger vehicles will continue to increase until around 2025, and that the percentage of EVs and other non-internal-combustion engine passenger vehicles will hover between 6%–12% for the 2025–2030 period.

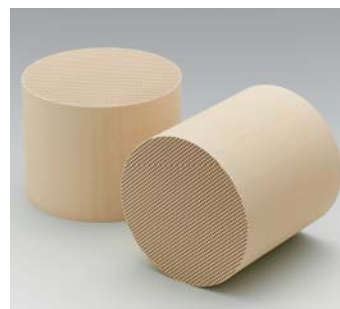
We expect diesel vehicles to be almost nonexistent among small motor vehicles by about 2025, but diesel vehicles will still be around for among large passenger vehicles and commercial vehicles that require torque.

Based on these assumptions, NGK is currently undertaking capital investment aimed at increasing SiC-DPF production at the No. 2 Plant in Poland. Our plan moving forward is to progressively decommission the aging No. 1 Plant and shift production to new lines in the highly cost-competitive No. 2 Plant in response to carefully monitored demand trends.

Observers are saying that the automotive industry is undergoing a once-in-a-century period of innovation. In such times, it is essential that we go back to basics. We will do what we are uniquely equipped to do, which is proactively pursue solutions to customer needs before they manifest themselves in the market, all while maintaining our commitment to the core aspects of our business: safety, the environment, quality, and CSR.

For example, the growth in hybrid automobiles on the market has seen a rise in the incidence of delayed catalyst activation due to insufficiently hot exhaust produced by engines that have been dormant for an extended period. To address this problem, we are currently developing a new product that will electrically heat catalysts to improve their purifying performance.

Such a product, however, is nowhere near ready to be added to our business group's product lineup. It will take at least five to six years, with 10 years even being possible. Instead of short-cuts and clever schemes, for our quest to discover and develop products that meet the needs of the new era, we prefer a straightforward approach that relies upon on the strengths that the NGK Group achieves through its fusion of unique material technologies and production technologies.



Gasoline particulate filters (GPFs)

These particulate filters for gasoline-powered vehicles are used in direct-injection gasoline engines that provide high horsepower and excellent fuel economy.



Large-size HONEYCERAM (LSH)

Designed for large vehicles, this model of HONEYCERAM catalyst carrier removes hydrocarbons (HC), carbon monoxide (CO), and nitrogen oxide (NOx) contained in diesel exhaust gas.

TOPICS 1

Large-scale capital investment for even greater revenue

For three years from fiscal 2017 to fiscal 2019, our business group is undertaking the largest capital investment in its history. By increasing spending on production across nearly all of our product areas, we aim to achieve even greater revenues over the following three years.

This investment is primarily aimed at the NGK Ceramic Device Ishikawa Plant, NGK Ceramics (Thailand), NGK Ceramics Polska (Poland), and NGK Ceramics Suzhou. The product areas targeted span everything from ceramic catalytic converter substrates

for automobile exhaust purification to NOx sensors. All of the products our business group manufactures are connected with cleaning automobile exhaust; hence, as more and more countries adopt stronger environmental regulations, demand for our products increases.

This investment will not only allow our business group to ensure production can meet demand, it will also allow us to introduce cutting-edge production lines that will improve production efficiency to reduce costs and guarantee profitability.



Ishikawa Plant, NGK Ceramic Device

NGK Ceramics (Thailand)

NGK Ceramics Suzhou

NGK Ceramics Polska

Solidly executing the fundamentals of business; tenaciously pursuing the essence of business

The principle which our business group, as well as the President of NGK, advocates and seeks to implement is to make sure we solidly execute the fundamentals (safety, the environment, quality, and CSR) of our business while tenaciously pursuing the essence of what that business is.

As part of ensuring that we are thorough about the fundamentals of our business, we are working to cultivate workplace and organizational openness, where even bad news is reported straight away without hesitation, by reorganizing and streamlining our business meeting structure to create the business group capable of frank and earnest exchanges of opinion.

As part of tenaciously pursuing the essence of what our business is, we are working to improve the efficiency of our sales departments via systematization of the process for relaying product ordering information to our plants, moving it beyond mere information transcription to a fully standardized operation. We are

also introducing system management for samples requested by customers. In addition, we are introducing automated aggregation systems into our budget formulation operations in order to reduce the number of man-hours spent on these tasks.

Moving forward, we will incorporate automation wherever we can so that we can concentrate our human resources in the communication-related and creative jobs that only humans can perform.



TOPICS 2

Meeting Robust Demand with Timely Enhancements to Production Capacity and Expansion of New Product Sales

Fiscal 2017 results		Fiscal 2018 outlook	
Net sales	Operating income	Net sales	Operating income
61.3 billion yen	0.9 billion yen	67.0 billion yen	2.0 billion yen



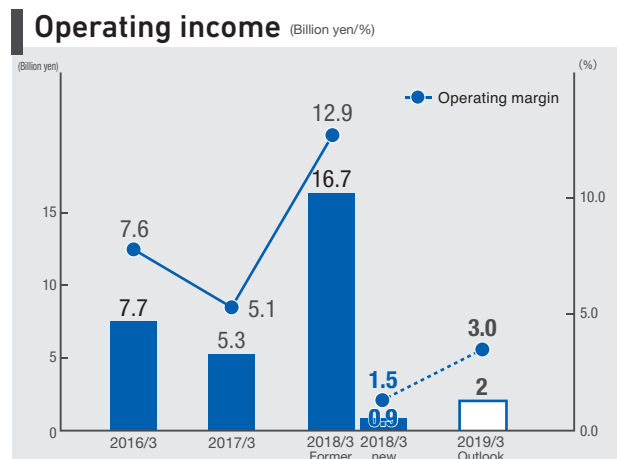
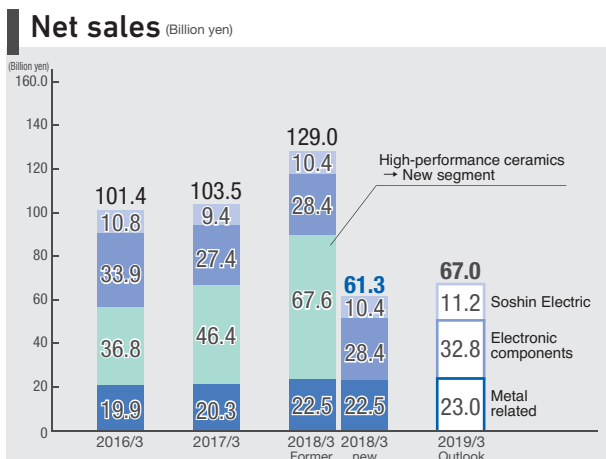
Director and Senior Vice President; Group Executive, Electronics Business Group **Shuhei Ishikawa**

Results for fiscal 2017 show net sales of 61.3 billion yen and operating income of 0.9 billion yen, which represents an increase in both revenues and profits compared to the previous period. The shipment of metals, such as beryllium copper products, rose primarily for industrial equipment in the Chinese market. With regard to electronic components, since their release on the market starting in fiscal 2014, the sales volume of electronic components such as bonded wafers for mobile communications and piezoelectric micro-actuators for hard disk drives (HDDs) increased; however, demand for ceramic packages declined. Also, income for NGK's consolidated subsidiary Soshin Electric increased thanks to solid growth in demand for products aimed at industrial equipment and devices.

Please note that, from April 2018, semiconductor manufacturing equipment-related ceramics business has been transferred to the newly established Process Technology Business Group, and the above results represent a new segment base.

For fiscal 2018 we are aiming for 67 billion yen in net sales and 2 billion yen in operating income, which would represent a continued increase in revenues and profits from the previous period. For metal-related products, we expect a high level of demand to continue, primarily in the Chinese market. We will maintain our proactive marketing approach to expand sales of beryllium-copper products and new material copper-nickel-tin alloy products. For electronic components, we are expanding production capacity to meet the growing demand for HDD piezoelectric micro-actuators and bonded wafers, and for package products, we are concentrating on improving revenues for existing products while expanding our range of new products for next-generation telecommunications applications. Soshin Electric will stay focused on the steadily growing demand for industrial equipment and devices, working actively to develop markets for its core noise reduction-related products. It will also bring to market thick-film printed circuit boards for use in automobiles and multi-layered dielectric filters for use in wireless LANs conforming to new standards.

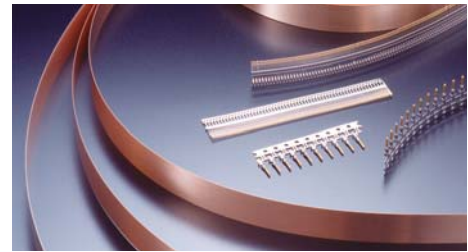
Financial results



Electronics business

Metal-related products

Beryllium copper, which is made by adding a small percentage of beryllium to copper, is resistant to fatigue and has a long service life, making it the ideal material for reliable conductive springs and contact points in a broad range of applications. The manufacture and sale of beryllium copper is the primary business of NGK's metal-related product business. Since 2016, copper-nickel-tin alloy has been added to the product lineup as a non-beryllium copper product.



Beryllium copper alloy

We can provide the right alloy mix to suit your needs. Beryllium copper alloys offer high strength, high conductivity, fatigue resistance, high temperature properties, workability, and corrosion resistance.

Electronic components

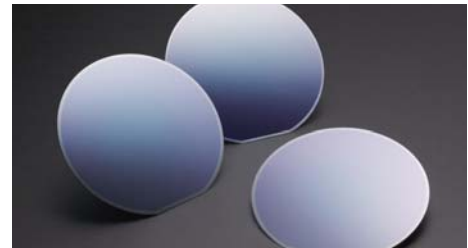
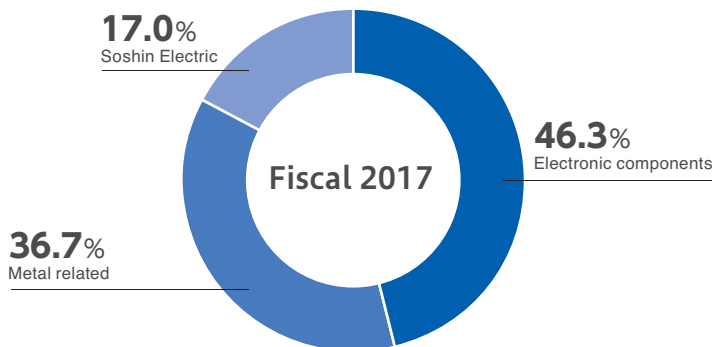
In addition to HDD piezoelectric micro-actuators, bonded wafers for electronic devices, and other products developed using the proprietary ceramics technology which NGK has cultivated over the years, our product lineup includes Soshin Electric's components for telecommunications devices and NGK Electronics Devices' ceramic packages for high-frequency devices.



Piezoelectric micro-actuators

Micro-actuators are indispensable for performing precise control of magnetic heads in HDDs. Our ultra-compact micro-actuators are used in data centers throughout the world.

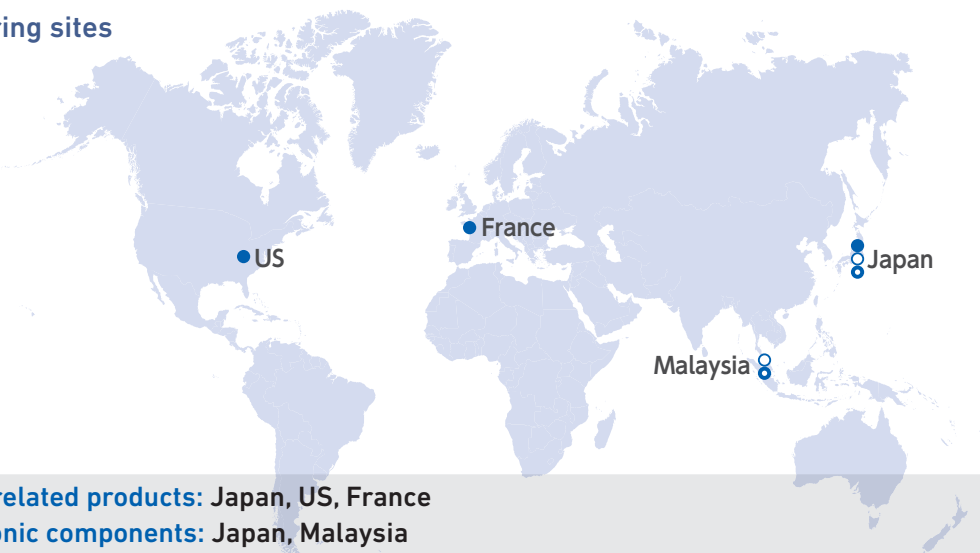
Sales ratio by business



Bonded wafers

These wafers make the advanced communication transmission quality of smartphones and other devices possible. Combining different materials enables bonded wafers to deliver performance and functionality that cannot be achieved with wafers made from a single material.

Manufacturing sites



- Metal-related products: Japan, US, France
- Electronic components: Japan, Malaysia
- Soshin Electric: Japan, Malaysia

Anticipating Technological Innovation and Connecting It with New Product Creation

Future outlook

The arrival of the IoT and AI age will spur innovation in a range of technologies needed to address the explosion in next-generation data transmission volume and speed.

The products of our business group are developed in anticipation of this innovation, thus allowing for new products or expansions of existing products to be developed at the right time.

With regard to NGK's electronic components business, the strong growth in HDD piezoelectric micro-actuators is projected to continue. The rapid increase taking place in digital data volume is driving an expansion in demand for large-capacity, inexpensive HDDs aimed at data center backup servers. In order to capture this growing demand, we are working to bolster our production capacity and expand our lineup of customer program-compatible development products. Also, the proliferation of technologies which allow for ever faster mobile communication speeds is helping expand the market for advanced SAW filters, which utilize NGK bonded wafers. We are also developing technology to further enhance voice quality, which is receiving progressively better assessments from customers. Moving forward, we are prioritizing production capacity enhancements in preparation for a rapid growth in demand.

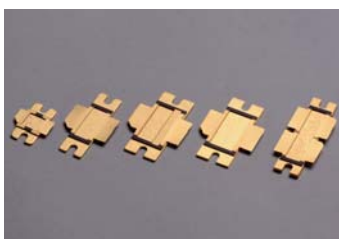
With regard to ceramic packages, the increase in infrastructure investment focused on the establishment of 5G next-generation high-speed communication standards is projected to foster an increase in demand for next-generation high-frequency packages for communication base station power semiconductors. With regard to metal-related products, apart from our beryllium copper, which is our core focus, we introduced a new copper-nickel-tin alloy material to the market in 2016. As a material used for high-performance conductive springs incorporated into smartphones, various automotive sensors, and many other devices, this product has a vast array of applications in the IT and

electronics industries. For the future, we are working on enhancing its formability in order to expand its applications and marketability and, thus, sales.

In addition to IoT and AI, another global trend taking place is the adoption of electromotors in the automotive industry in response to environmental regulations. This trend is also helping drive more widespread adoption of hybrid automobiles. This increasing adoption of electromotors is fueling demand for automobile on-board power modules, which we are using to expand the scope of sales for our insulated circuit boards. We are also looking ahead to the widespread proliferation of power charging infrastructure and are working to expand sales channels for beryllium copper used in charging outlets.

In April 2018, our business group took over the theretofore company-wide projects to develop micro-lenses for UV LEDs*¹ and gallium nitride (GaN) wafers*² and moved these into commercial production. Demand for these products is predicted to ramp up from 2020 onward as alternatives to ultra-high-pressure mercury lamps in response to the Minamata Convention on Mercury, which went into effect in August 2017. We are working to meet this demand by getting the products into mass production early.

Over the course of its history, NGK has been a company which produces long-lasting products and which cultivates business in areas with comparatively long-term, predictable demand; however, our business group is a bit different. Our focus is on figuring out how to address the shifting needs of the electronics industry, which can and do change significantly in only a short period of time. When some new need explodes onto the scene, we must be ready to meet it straight away or else risk missing the opportunity entirely; thus, as a matter of course we actively develop our business in directions that entail a certain amount of risk. As we move forward, we will continue creating new products that help ensure the ongoing growth of our business enterprise.



Ceramic packages

We offer a variety of ceramic electronic components, such as our high-frequency device packages which have earned the top share of the global market.



Electronic components for communication devices

By combining multilayer technology and high-frequency circuit design technology, we provide multilayer dielectric filters and couplers that are used in increasingly diversified base stations for mobile communications.

*1: Micro-lenses for UV LEDs: These lenses can be used to improve the sterilization efficiency of UV LEDs, which are seen as a replacement for mercury lamps as a sterilization light source, by narrowing their irradiation area. These lenses are made from quartz, which is known to be difficult to work but with which we are able to create complex shapes thanks to the use of our proprietary technology.
*2: GaN wafers: Used as a substrate for ultra-bright lasers and LEDs. Expected applications include projector and stadium light sources.

TOPICS 1

Launching new business promotion project

Fiscal 2018 saw the start of commercial production for micro-lenses for UV LEDs and for GaN wafers. Both of these new products were developed as, and had their commercial potential cultivated by, new product promotion projects within the Electronics Business Group.

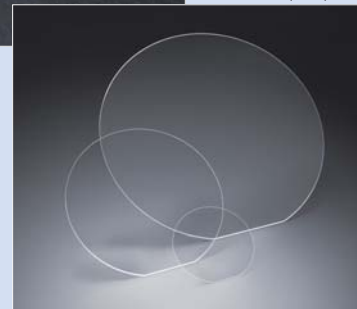
Micro-lenses for UV LEDs are made from transparent quartz glass and are used to improve the sterilization efficiency of UV LEDs, which can be used in place of mercury lamps as a sterilization light source, by effectively narrowing their irradiation area. GaN wafers are used in light sources for lasers and LEDs, and offer low defect density across the entire wafer thanks to the use of proprietary NGK monocrystalline growth technology, giving them the ability to achieve unprecedented ultra-bright luminosity.

Marketing, pilot line creation, and performance/mass production testing is moving forward to ensure we are able to meet the full-scale market demand projected to appear around 2020.



Micro-lenses for ultraviolet LEDs

Gallium nitride (GaN) wafers



Expanding copper-nickel-tin alloy sales channels

The Electronics Business Group began mass production of copper-nickel-tin alloy in 2016 as a new, non-beryllium copper alloy.

This copper-nickel-tin alloy combines copper with 9%–21% nickel and 5%–6% tin. As a material used for high-performance conductive springs, this alloy has a wide range of potential applications, including connectors and switches. Unlike competitors' copper alloys, this alloy from NGK offers superior thermal resistance and abrasion resistance. This material is currently being used primarily with sliding brush-type contact points for timepiece gears and automobile on-board sensors. We are working to improve its formability as part of an active effort to expand its marketability to other applications, such as automobile on-board electronics and smartphone connector terminals.



Copper-nickel-tin alloy products

TOPICS 2

Driving Greater Growth with the First New Business Group in a Quarter Century

Fiscal 2017 results		Fiscal 2018 outlook	
Net sales	Operating income	Net sales	Operating income
94.7 billion yen	17.1 billion yen	110.0 billion yen	19.0 billion yen



Director and Senior Vice President; Group Executive, Process Technology Business Group **Ryohei Iwasaki**

Newly established in April 2018, our business group features the combination of the HPC-related (ceramics for semiconductor manufacturing equipment) business previously handled by the Electronics Business Group and the industrial process business previously handled by the Ceramic Products Business Group. For the first time in a quarter century, NGK group started up a new business group.

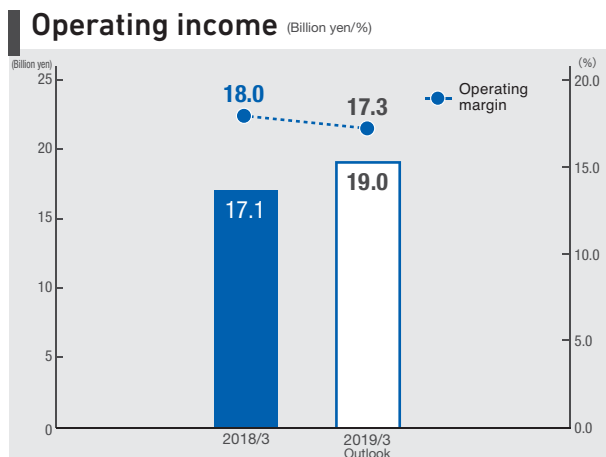
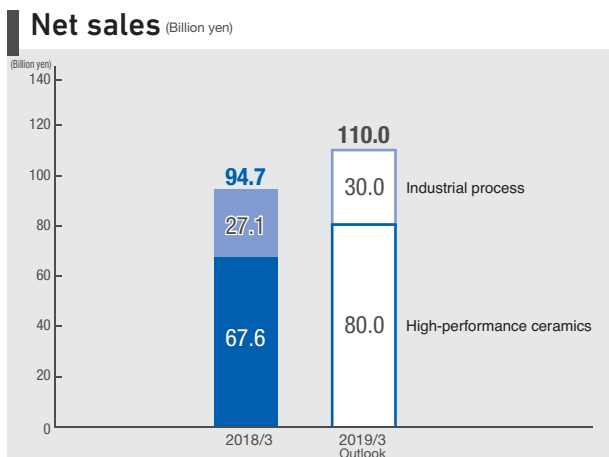
Our aim is to realize further growth of the rapidly growing HPC-related business, which is becoming the second backbone after the automotive-business group, and the industrial process business, which has the high potential of business development in a wide range of fields.

From the strong growth of the HPC-related business, the results for fiscal 2017 based on new segment were promising, achieving net sales of 94.7 billion yen and operating income of 17.1 billion yen.

In fiscal 2018, we expect the increase in revenues and profits compared to the previous fiscal year, with net sales of 110 billion yen and operating income of 19 billion yen.

Revenues and profits for the HPC-related business are expected to increase as a result of increase in capital investment by semiconductor manufacturers. Industrial process business is also expected to see increase in revenues led by the continuous investment in lithium-ion batteries on Chinese automobiles and the installation of low-level radioactive waste treatment equipment used to process logging trees for the Fukushima Daiichi Nuclear Power Station.

Financial results



Process technology business

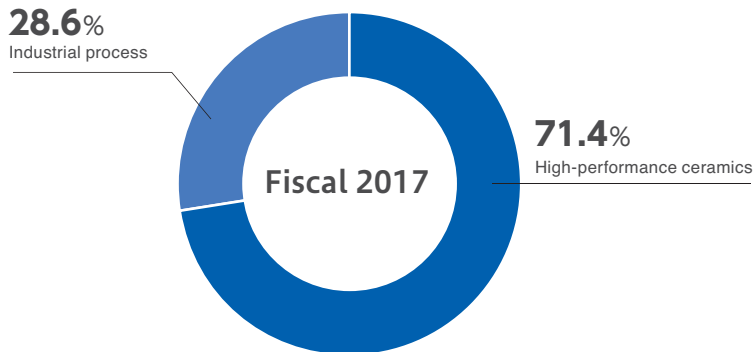
High-performance ceramics (ceramics for semiconductor manufacturing equipment)

We provide chamber components and ceramic functional components (susceptors) that support silicon wafers as a semiconductor material inside semiconductor manufacturing equipment. In the face of the increasing integration of semiconductors, our products respond to increasing demand for memory as well as miniaturization and energy conservation needs for electronic components.

Industrial process products

We offer a lineup of ceramic products—including heating devices, kilns, refractories, ceramic membranes, separators, corrosion-resistant equipment, and low-level radioactive waste treatment systems—that serves a broad range of industries and provides smart solutions for environmental protection and energy conservation.

Sales ratio by business



Manufacturing sites



● High-performance ceramics: Japan, US ○ Industrial process products: Japan, China, Thailand



Ceramic heaters

These are used to keep the temperature of silicon wafers constant during the membrane formation process. Our unique heater structure sees a shaft attached to the underside of the heated stage on which wafers are placed. This way, we can protect terminals and conducting wires from halogen gas.



Low-level radioactive waste treatment systems

Our treatment systems are used at nuclear facilities throughout Japan, and are rated highly for their outstanding dust removal performance and steadfast safety. What's more, they make a real contribution to waste reduction.



Wavelength-control drying systems

By selectively irradiating light at specific wavelengths, the unit can dry at low temperatures (approximately 40°C) while limiting thermal damage to products, helping to enhance product quality, and improving productivity.

Creating Synergy from the Fusion of Two Businesses

Future outlook

Capital investment in semiconductors is expected to increase further, driven by the demand for 3D-NAND flash*1 and DRAM*2 memory. Our HPC-related business sells heaters, electrostatic chucks, as well as aluminum chamber components. Susceptors are produced in Japan, while chamber components are produced in the US. Demand for both product groups is growing; therefore, we are conducting production investment and expanding domestic susceptor production on the Tajimi Plant, and chamber component production in the US.

In industrial process division, we are expanding sales of kilns for cathode materials used in lithium-ion batteries to meet the rapidly growing demand in China, refractories used for the manufacture of numerous electronic components in smartphones and other devices, and a new drying furnace that can selectively irradiate light at specific wavelength. In addition, we are also continuing to focus on engineering business such as waste treatment systems capable of processing low-level radioactive materials from nuclear power plants.

Our future goal is to create synergy between HPC-related and industrial process businesses. HPC-related business was originally generated from industrial process business. Although it has grown considerably on its own since then, we hope to maximize the synergies of the both by taking advantage of our

compatibility now that we have the opportunity to work together again.

The value of our business group is to find solutions for customers by providing technologies that only NGK can offer. Therefore, we are not only promoting the fusion of highly specialized technology from HPC-related business and potentials of the product development in a wide range of fields from industrial process business, but also working on development themes from the New Business Planning Office and Corporate R&D. We believe that enhancing this value will contribute to stronger and more diverse business foundations.

The Process Technology Business Group is still young but is already an important driver for the future growth of NGK. We want to foster an open and voluntary mind respecting culture that regards maintaining the status quo as risks and challenging new things without being afraid of failures.



Electrostatic chucks

These are used in etching and other processes for the adsorptive immobilization of silicon wafers. We are able to adapt electrostatic chucks to suit their intended use to exponentially improve the semiconductor production process. For instance, we can integrate them with high-precision heaters and attach cooling plates.

*1: Memory cells are stacked vertically in multiple layers to create highly integrated NAND flash memory.
*2: A type of readable/writable semiconductor memory.



Refractory products

Firing jigs are indispensable in firing electronic components and ceramic products. Our incredibly thin and lightweight refractories help to improve productivity and save energy.

TOPICS 1

Enhancing production capacity for products used in semiconductor manufacturing equipment

Our business group is undertaking additional investment of 20 billion yen in three HPC (high-performance ceramics for semiconductor manufacturing equipment) business sites in Japan with the aim to increase the production capacity by 1.5 times compared to the original plan by 2020. Also, the new plant under construction in Tajimi, City, Gifu Prefecture will start production ahead of schedule in October 2019, which was originally planned in April 2020.

The semiconductor market is continuing to grow due to the increase in data volume and other factors led by the spread of IoT and AI. Each semiconductor

manufacturer is expected to continue capital investment at a high level. From this reason, there is a strong demand for our susceptors (ceramic functional components that support silicon wafers); however, the production capacity is not catching up.

While implementing the production equipment up to the maximum capacity into the No.1 Building of the new plant in Tajimi, we will maintain manufacturing areas and add facilities in Chita and Komaki plants in Aichi Prefecture. By implementing these additional plans, we will respond to the expanding demand and aim for further growth of our business.



New Tajimi Plant, NCDK



Responding to the growth of the Chinese market for cathode materials used in lithium-ion batteries

In 2019, the Chinese government will enforce a law that mandates automobile manufacturers to manufacture and sell a certain percentage of new energy vehicles (NEV). In order to comply with the law, the demand for cathode materials used in lithium-ion batteries is rapidly expanding.

Our business group has been engaged in the business of kilns for cathode materials (roller hearth kiln), and our group company in China, NGK Technocera Suzhou, manufactures and sells these kilns, maintaining No.1 market share in China.

In order to respond to the demand expansion, we are working on developing and manufacturing a kiln offering greater productivity, as well as on securing

external assembly plants and making the other necessary preparations to expand our production capacity.

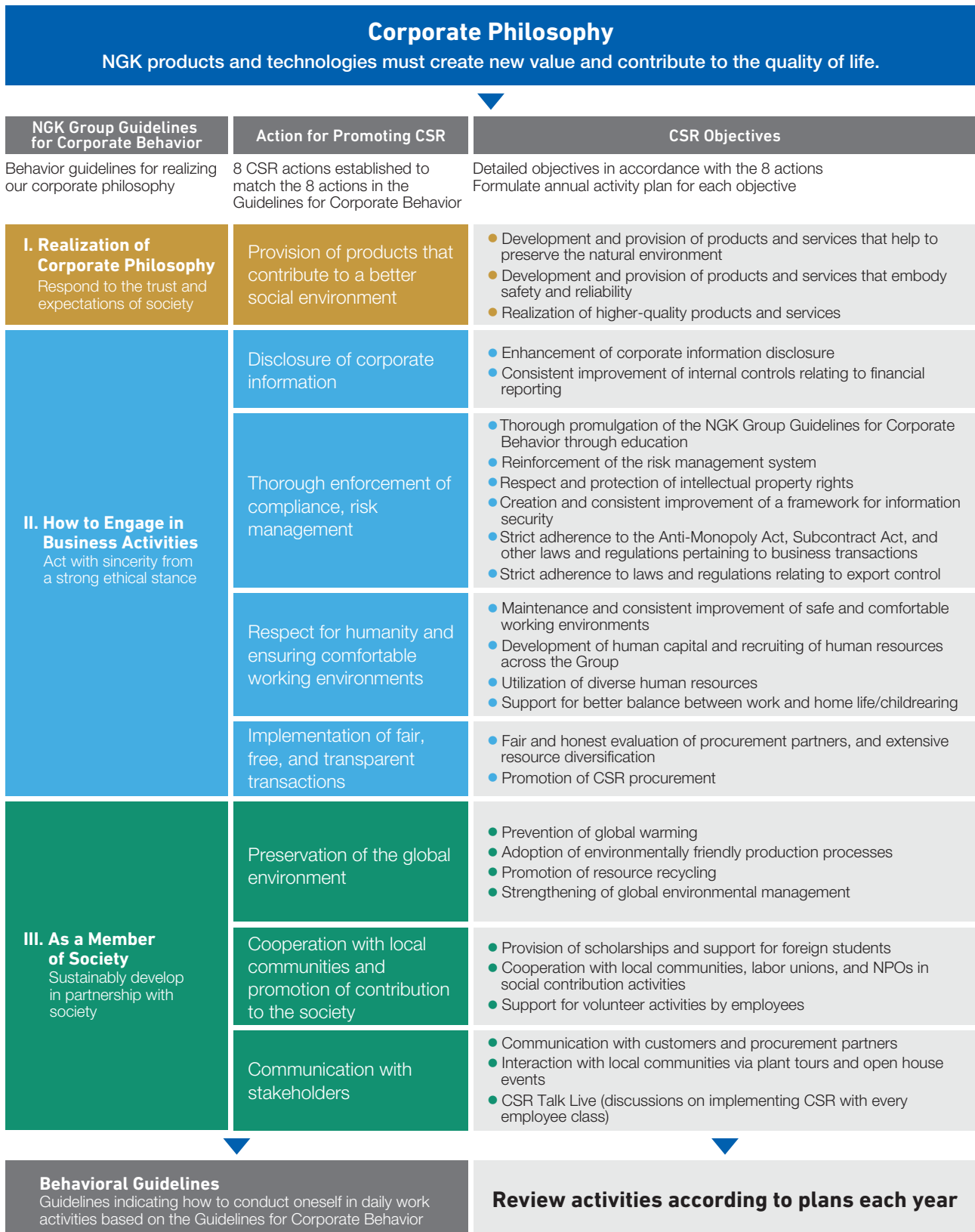


Roller hearth kilns

TOPICS 2

CSR Activities Concepts and Systems

Through its products and services, the NGK Group works to create new value that will improve the social environment and fulfill corporate social responsibilities while also earning the hope and trust of everyone in society. Towards this end, CSR promotion items are established according to the NGK Group Guidelines for Corporate Behavior, and, on top of this, each year CSR objectives are drawn up.



Establishing CSR Promotion Items (Materiality)

Aiming to develop a sustainable society and in consideration of a variety of stakeholder demands, the NGK Group established eight items from the NGK Group Guidelines for Corporate Behavior as CSR promotion items determining the specific objectives and achievements for each item. Each year, we verify the achievement status of each objective in an attempt to continuously improve these efforts.

Process for Identifying Materiality

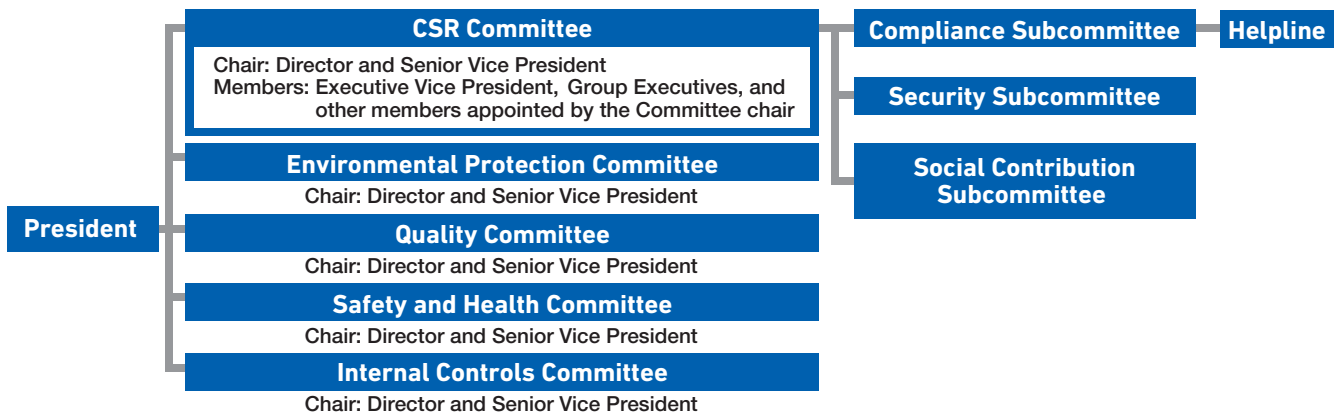
In establishing the CSR promotion items that constitute an integral part of our core values and principles along with the Corporate Philosophy and the Guidelines for Corporate Behavior, we took social trends and needs into consideration and developed systems for information disclosure and promotion.

In line with this policy, we will address the needs of the times appropriately, based on feedback from our stakeholders.

CSR Promotion Framework

To promote CSR activities, the NGK Group has established the CSR Committee, the Environmental Protection Committee, the Quality Committee, the Safety and Health Committee, and the Internal Controls Committee.

In terms of legal and corporate ethics compliance activities, the CSR Committee discusses items necessary to assist decision-making by the president and CSR Committee chair. It also conducts a wide range of activities, including providing support in matters determined to potentially have a substantial impact on the company, reviewing and evaluating the promotion plans of each subcommittee, and deliberating CSR-related items, determined to be important by the Committee chair.



Position on SDGs

The NGK Group is a signatory to the United Nations Global Compact, which advocates for independent action on the part of companies. We believe that addressing a broad range of social problems through our business activities, while measuring progress against indicators such as the Sustainable Development Goals (SDGs) adopted by the UN, is an important corporate social responsibility.

Human Rights Initiatives

Having established respect for humanity in its Guidelines for Corporate Behavior, the NGK Group uses its intranet, which is available to all domestic Group company employees, to promulgate the United Nations “Universal Declaration of Human Rights” and “Guiding Principles on Business and Human Rights.” NGK also actively spreads awareness for protecting human rights by holding seminars on the subject.

Procuring Resources and Raw Materials Responsibly

The NGK Group conducts procurement activities that consider impacts on regional communities stemming from the use of raw materials (e.g. conflict minerals*) with the potential to cause social issues such as human rights violations and poverty, and takes steps to avoid using such materials when there is risk of adverse impact.

*Minerals including tin, tantalum, tungsten, and gold produced in the Democratic Republic of the Congo and surrounding countries, and used as a source of funding for armed conflict in the area.

NGK's Core Policy on the Environment

Recognizing that protecting the environment is a vital issue that all of humanity must face, the NGK Group formulated its Core Policy on the Environment in April 1996 based on Environmental Philosophy and Environmental Action Guidelines in order to bring its corporate activities into harmony with the environment. On the basis of this policy, the NGK Group works to reduce the environmental impact of business activities, and actively strives to help protect the environment by developing products and technologies to that end.

Environmental Philosophy

Given its corporate philosophy—“NGK products and technologies must create new value and contribute to the quality of life”—NGK will contribute to tackling environmental issues through its “Triple-E” business segments of ecology, electronics, and energy to create a comfortable environment for future generations.

Visit this page for details on NGK's Core Policy on the Environment.

<https://www.ngk-insulators.com/en/sustainability/environment.html>

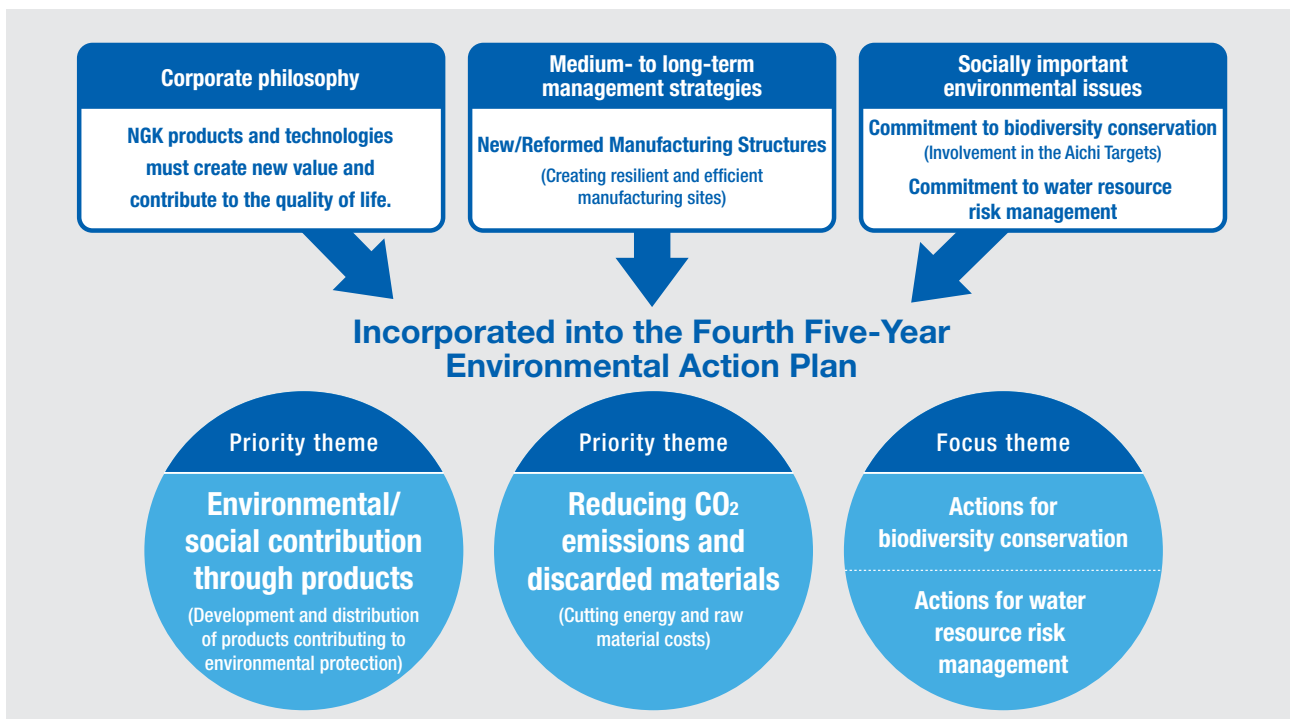
Five-Year Environmental Action Plan

The NGK Group has established the Fourth Five-Year Environmental Action Plan (2016–2020). To achieve the goals of the Plan, we are promoting environmental activities, setting annual targets.

Outline of the Fourth Five-Year Environmental Action Plan (2016–2020)

The NGK Group organizes environmental initiatives by creating five-year action plans. The Fourth Five-Year Environmental Action Plan, initiated in fiscal 2016, has been formulated to broadly encompass major global environmental challenges that businesses are expected to take, and to select two key issues each for two groups of themes, namely, priority themes and focus themes.

The two priority themes are: environmental/social contribution through products; and reducing CO₂ emissions and discarded materials. The first priority theme directly reflects the core concept of the corporate philosophy, while the other theme closely relates to NGK's medium- to long-term initiative of New/Reformed Manufacturing Structures for increasing competitiveness. For focus themes, we have also set two issues: biodiversity conservation and water resource risk management/response, both being major challenges for which socially responsible corporate action is required with greater urgency.



Five-Year Environmental Action Plan Progress Report

The initiatives planned under the Fourth Action Plan and their progress (targets and results for fiscal 2017; targets for fiscal 2018 and 2020, the final year) are summarized in the table below.

In fiscal 2017, the annual goals for nearly all of the cumulative quantitative goals were achieved, while progress on other items proceeded according to the plan established at the start of the period. In particular, the efforts undertaken by NGK's business groups produced results for basic unit per net sales for discarded materials that significantly exceeded the annual goal. Progress on the current five-year plan is proceeding steadily at a pace above that anticipated at the time of the plan's creation. Notably, the target reduction rate against BAU for CO₂ and discarded materials was achieved ahead of schedule and was, therefore, adjusted upwards. For fiscal 2018, as well, the NGK Group is working in concert to undertake environmental activities that will enable target goals to be met.

Category	Item	KPI	Fiscal 2017			Fiscal 2018	Fiscal 2020	
			Target	Result	Self-evaluation ^{*1}	Target	Target	
Environmental/social contribution	 Environmental/social contribution through products	Develop and distribute products contributing to environmental protection	Sales growth (%) (consolidated)	Increase by 30% from fiscal 2013	Increased by 37% from fiscal 2013	○	Increase by at least 43% from fiscal 2013	Increase by at least 60% from fiscal 2013
		Promote green procurement	Plan progress (%)	At least 99% of NGK's suppliers in Japan agree to comply with the CSR Procurement Guidelines	99.9% agreed (100% including suppliers who partially agreed)	○	At least 99% of NGK's suppliers in Japan agree to comply with the CSR Procurement Guidelines	Maintain in Japan, expand overseas
	 Promotion of environmental communication	Contribute to local communities	Plan progress (%)	Send instructors to guest lecture programs, participate in local environmental protection activities	Sent instructors to local children's centers, participated in local environmental protection activities	○	Send instructors to guest lecture programs, participate in local environmental protection activities	Continually enhance actions partnering with communities
		Raise environmental awareness	Plan progress (%)	Provide environmental education for employees, establish employee communication on environmental themes, encourage participation in environmental events	Provided training programs by job grade, organized CSR Talk Live, installed "green curtains"	○	Provide environmental education for employees, establish employee communication on environmental themes, encourage participation in environmental events	Continually enhance environmental training and information disclosure
	 Conservation of biodiversity	Promote actions based on biodiversity conservation guidelines	Plan progress (%)	Continue biodiversity survey at company-owned site, promote employee participation in My Action Declaration project	Exhibited survey results on-site, 4300 employees participated in My Action Declaration project	○	Extend My Action Declaration project to domestic Group companies	Expand and enhance content of Aichi Targets actions
		 Prevention of global warming	Reduce CO ₂ emitted from manufacturing	Basic unit per net sales (consolidated)	Reduce by 11% from fiscal 2013	Reduced by 14% from fiscal 2013	○	Reduce by 14% from fiscal 2013
	Reduce CO ₂ emitted from supply chains		Reduction rate against BAU (%) ^{*2} (consolidated)	Reduce by at least 15% from fiscal 2013	Reduced by 18% from fiscal 2013	○	Reduce by 18% from fiscal 2013	Reduce by 18% from fiscal 2013 (upward revision from initial 15% target)
Environmental impact reduction	 Effective use of resources	Reduce discarded materials emitted from manufacturing	Basic unit per net sales (consolidated)	Reduce by 17% from fiscal 2013	Reduced by 28% from fiscal 2013	○	Reduce by 28% from fiscal 2013	Reduce by 30% from fiscal 2013
			Reduction rate against BAU (%) ^{*2} (consolidated)	Reduce by at least 19% from fiscal 2013	Reduced by 22% from fiscal 2013	○	Reduce by 23% from fiscal 2013	Reduce by 23% from fiscal 2013 (upward revision from initial 20% target)
	Promote resource recycling	Recycling rate (Japan)	At least 99%	99.1%	○	At least 99%	Maintain at least 99%	
	Manage and respond to water resource risks	Plan progress (%)	Conduct third-party water risk surveys	Conducted surveys at 6 sites	○	Continue water risk surveys, give feedback on survey results to bases	Strengthen actions by production bases for evaluating risks and streamlining water use	
	 Conservation of biodiversity	 Prevention of global warming	Reduce CO ₂ emitted from manufacturing	Basic unit per net sales (consolidated)	Reduce by 11% from fiscal 2013	Reduced by 14% from fiscal 2013	○	Reduce by 14% from fiscal 2013
Reduce CO ₂ emitted from supply chains			Reduction rate against BAU (%) ^{*2} (consolidated)	Reduce by at least 15% from fiscal 2013	Reduced by 18% from fiscal 2013	○	Reduce by 18% from fiscal 2013	Reduce by 18% from fiscal 2013 (upward revision from initial 15% target)

Notes:

*1: Self-evaluation standards for achievement level: ○: Target achieved; ×: Target not achieved

*2: Reduction rate against BAU (business as usual) indicates the percentage rate of emissions reduction resulting from implemented actions against a computed value for the hypothetical absence of the actions. By not incorporating the influence of foreign exchange movements and other factors, this indicator allows a direct grasp of the efforts by each site.

*3: NGK basic unit per transport volume expresses in metric ton-kilometers the amount of crude oil equivalent fuel used.

*4: Based on the computation criteria stipulated in the Act on the Rational Use of Energy.

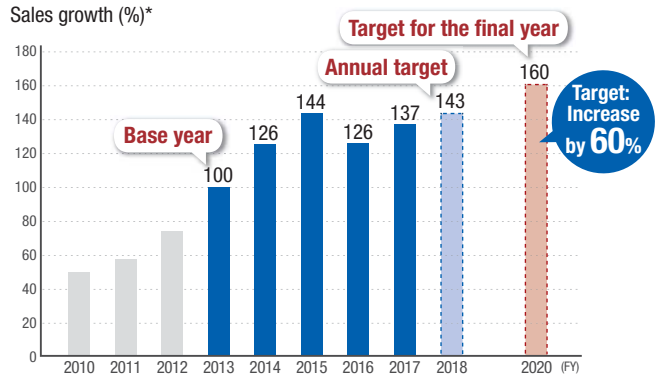
Development and Distribution of Products Contributing to Environmental Protection

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 impact on the global environment.

For the NGK Group, developing and distributing products contributing to environmental protection is a goal directly connected with our corporate philosophy and is therefore a priority item within the Fourth Five-Year Environmental Action Plan. We aim to achieve a 60% increase in sales of products that contribute to environmental protection compared with figures for fiscal 2013 (and maintain the sales percentage for products contributing to environmental protection at over 50% of all products) by fiscal 2020.

In fiscal 2017, we achieved sales growth of 37% from fiscal 2013, exceeding the annual target of 30%.

Sales growth for products contributing to environmental protection (NGK Group)



*Figures are indexed with fiscal 2013 set at 100.

Products Contributing to Environmental Protection

HONEYCERAM®

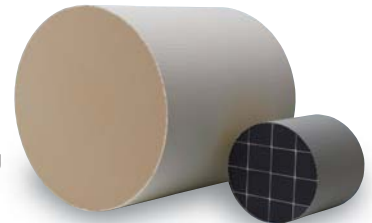
HONEYCERAM is a ceramic substrate for catalytic converters to purify harmful contents in the exhaust of automobiles.

It is currently manufactured in eight countries around the world, with total shipments of around 1.5 billion units.



Diesel particulate filters (DPFs)

The DPF is a porous ceramic filter used worldwide in the exhaust systems of diesel vehicles. Particulate matter (PM) is reliably captured by the filter's micropores, purifying the exhaust emitted from diesel vehicles.



NOx sensors

NGK has developed the world's first in-vehicle sensor to precisely measure concentrations of nitrogen oxides (NOx) in exhaust.



NAS® batteries

NGK was the world's first manufacturer to commercialize the NAS battery megawatt-class storage system. These systems support the proliferation of renewable energy, thereby contributing to the fight against global warming.



Low-level radioactive waste treatment systems

Developed using NGK's proprietary incineration technology and exhaust dust filtration technology, these systems are delivered to nuclear power-related facilities across Japan to safely treat low-level radioactive waste.



Wavelength-control drying systems

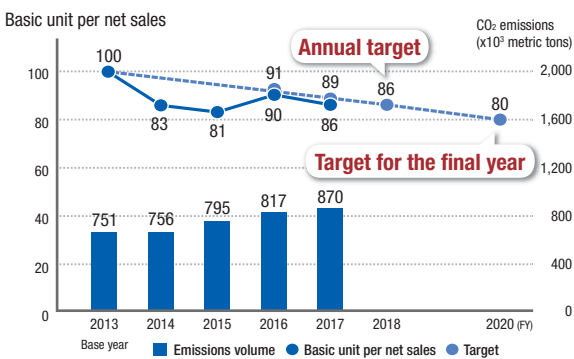
By performing selective irradiation with specific wavelengths of light, this system is able to dry products at a low temperature (approximately 40°C) to control heat damage, thereby contributing to improved product quality and productivity.



Reducing CO₂ and Waste

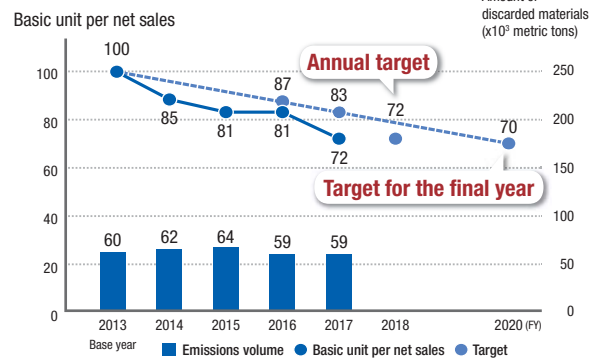
In order to achieve the environmental impact (CO₂ and discarded materials) reduction goals established in the NGK Group's Five-Year Action Plan, all domestic and overseas NGK production sites have developed and administered annual improvement plans corresponding to their own business plans, and this has resulted in steady, cumulative improvement. In fiscal 2017, despite undertaking a number of activities which increased environmental load, such as bringing a new, large-scale factory on line overseas and beginning mass production of new products, the cumulative effect of reduction measures, as well as measures to minimize startup loss, enabled NGK to meet its annual goals. A new factory is being brought on line in Japan in fiscal 2018 as well, but initiatives are underway to ensure we do even better in hitting our Five-Year Action Plan goals.

CO₂ emissions / basic unit per net sales* (NGK Group)



*Basic unit per net sales calculated with the value in fiscal 2013 set at 100.

Amount of discarded materials generated / basic unit per net sales* (NGK Group)



*Basic unit per net sales calculated with the value in fiscal 2013 set at 100.

Protecting Biodiversity

In the NGK Group, we view the challenge of protecting biodiversity as an integral part of achieving a sustainable society, and towards that end we are undertaking the following activities.

Activities for Achieving the Aichi Targets

The NGK Group has been pushing forward with activities pursuant to the Aichi Targets (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 2017, we did another biodiversity survey of a company-owned site and began promoting participation in the "My Action Declaration" initiative.

Participating in the "My Action Declaration" Initiative

In fiscal 2017, as a way of raising awareness among employees, we began promoting participation in the "My Action Declaration" initiative led by the Japan Business Federation and the Ministry of the Environment. Declarations were received from around 4,300 employees (97% of all NGK employees) who promised to take a personal interest in and work to protect the biodiversity around them. We are continuing to promote this initiative and working to ensure its horizontal expansion throughout NGK Group companies in Japan.

Aichi Targets	NGK Activities
Target 1 Spread awareness	Employee environmental education, next-generation education, cooperation with suppliers, promoting participation in My Action Declaration initiative
Target 4 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	Voluntary employee participation in forestation and other environmental conservation activities, biodiversity survey/appropriate control of company-owned site
Target 8 Control pollution by chemical substances, etc.	Chemical substance management, management of exhaust and wastewater, expanding sales of products that prevent air pollution, cooperation with suppliers
Target 9 Alien species	Biodiversity survey/appropriate control of company-owned site
Target 11 Conserve protected areas	Voluntary employee participation in forestation and other environmental conservation activities
Target 14 Ecosystem services	Voluntary employee participation in forestation and other environmental conservation activities, biodiversity survey/appropriate control of company-owned site

Notes:

- Source: "Guidelines for Action by the E&E Industries Concerning Biodiversity Conservation" (The Biodiversity Working Group, The 4 Electrical and Electronic Industry Associations)
- Red text shows NGK activities that started in fiscal 2016.

Risk Management of Water Resources and Response

Within the NGK Group, we perform water risk assessments for all of our production sites, as well as promote more efficient water usage according to independently established guidelines. With regard to water risk, we utilize public tools to carry out self-assessments at all production sites, and at sites where there are water shortage concerns, we bring in third parties to perform detailed analyses. Although no serious water-related risks have been identified to date at any of our facilities, we will continue to monitor the situation and stay abreast of regulatory trends to ensure stable operations in the future.

NGK Work Style Reforms

In April 2017, we implemented a broad array of changes within the NGK Group’s personnel system, including raising the mandatory retirement age to 65, increasing salaries for younger employees, and improving the terms of employment for non-regular employees.

As we push ahead with global business expansion and the introduction of new products and business, the roles and expectation on younger and mid-level employees who play a central role will grow more than ever. Our aim is to provide employees with an environment that challenges and motivates them while allowing them to perform to their highest potential.

At the same time, however, in order to maintain competitiveness by increasing the productivity of indirect departments, we have invited outside experts to come and perform business analysis for improving the efficiency of on-the-job time management.

From the latter half of 2018 onward, we are promoting cloud service-based telecommuting and other initiatives. These initiatives provide employees with

greater flexibility in their work style, such as being able to choose to work from home in situations that would traditionally require an employee to take a leave from work. By working to improve personnel systems and productivity, we are providing support for our employees to build up their expertise and become independent professionals who are capable of succeeding globally.



Vice President; General Manager,
Human Resources Department **Tadaaki Yamada**

Human Resource Development

At NGK, people are our most precious management resource. With respect for employee motivation and ambition, we engage in the cultivation of human resources who will lead the next generation. In recent years, NGK has concentrated efforts on the enhancement of training to develop future leaders to take management positions as well as globally minded personnel to support our overseas business expansion.

In fiscal 2017, we accompanied our reforms of the personnel system, such as raising the mandatory retirement age and promoting greater work-life balance, with programs aimed at fostering greater employee motivation and activity. Specifically, we offered training to promote autonomous career design for older staff, career path lecture courses aimed at fostering greater diversity, and training in how to perform interviews with subordinates.

Systematized Personnel Development in Four Areas



Promoting Systematic Education through Nearly 120 Programs

Using the major career milestones, such as joining the company or getting a promotion, as opportunities for career training, we have instituted and are systematically implementing such training in the four areas of “management training,” “manufacturing training,” “global training,” and “business skills training.” In addition to required job grade-specific training, we have introduced around 120 different types of programs that run during the year.

Within the area of management training, examples of the programs we run are the “Management Basics” training seminar, which teaches employees about the essential aspects of management, and the “Career Design in Your 50s” training seminar, which promotes autonomous career design among older employees. Manufacturing training programs include those that fall under the category of worksite capability enhancement and supervisor training, as well as ongoing training programs aimed at equipping young employees with the basics of ceramics manufacturing, such as materials, molding, working, drying, and firing ceramics. Within the area of global training, in tandem with foreign language instruction, we instruct employees in understanding different cultures, in how to give effective presentations, in business skills related to international law and labor management, in health and safety management, and in compliance-related matters.

In business skills training, we not only provide training in skills essential to the company’s needs, we provide a variety of growth opportunities that employees cannot experience in the course of their normal duties, such as opportunities for exchange and interaction with outside employees via training conducted in collaboration with other companies.

Quality Improvement Training for Manufacturing

In line with a younger workforce and an increase in mid-career hires coming from a variety of backgrounds, it is necessary to create training programs that cover a variety of needs. Given these conditions, we provide quality improvement training for employees in manufacturing divisions in five categories of content corresponding to job type and professional background. The instruction and exercises are tailored to the participants' level of understanding and job type.

Measuring Human Resource Development Achievements Using Quantitative Indices

We introduced quantitative indices to objectively evaluate the results of human resource development. We aim to accelerate employee skills development by making use of these objective evaluations.

On-Site Leader Development

We cultivate leaders who are motivated to pursue improvement, and this is done through the systematic promotion of worksite capability training. This training focuses on the fundamental elements of manufacturing, namely safety, environment, quality, deadlines, and cost, and is carried out within a framework that transcends just the factory itself.

Number of Participants in Quality Improvement-Related Training in FY2017

Leader training for worksite capability enhancement	10
Leader training for worksite capability enhancement at the Ishikawa Plant	7
Follow-up training for worksite capability enhancement	144
Instructor development training for worksite capability enhancement	2
Instructor brush-up training for worksite capability enhancement	8
Worksite IE basics	12
Quality control I	29
Quality control II	76

Quantitative Indicators to Measure the Outcomes of Human Resource Development

- Assessments of understanding and satisfaction levels using post-training surveys
- Checking the achievement level by the TOEIC test and instructors (native speakers of the target language)
- Tests during and after the training
- Calculated cost of loss
- Evaluation scores by judges, etc.

Progress of Training Aimed at Strengthening Worksite Capabilities

Fiscal **2013**

12 employees who completed leader training attended. In addition to the 13 employees already trained, the total number of instructors reached 25.

Fiscal **2014**

We held training to brush up skills of trained instructors. As of fiscal 2013, a total of 21 employees had participated in instructor development training. To further enhance skills, improvement activity examples were shared and examples from all plants were collected to create in-house case studies.

Fiscal **2015**

Employees who had completed in-house instructor development training served as lecturers. The contents of training programs were formulated by the instructors in charge of each program, and they incorporated their worksite experiences as instructors. Using case studies, they taught things such as cost reduction methods.

Fiscal **2016**

The content of leader training for worksite capabilities was revised by the in-house instructors to enhance individual guidance. The revised textbooks were also shared with Group companies.

Fiscal **2017**

The companies of the NGK Group collaborated together to invite outside instructors, conduct on-site training, and offer opportunities for interaction and mutual learning amongst companies. We also began trialing instructor-led training overseas.

Diversity

It is NGK Group's basic policy to recruit human resources and offer stable employment and equal opportunities regardless of race, nationality, creed, gender, or physical abilities. Also, in an aim to promote autonomy and independence, NGK maintains the human resource systems necessary to provide employees with fair compensation commensurate with their degree of contribution to the company.

NGK New Graduate Hires Note: Excluding new graduates planned to transfer from temporary to regular positions. (People)

Joined company	University graduate			Junior college/vocational school graduate	High school graduate, other
	Total	Men	Women		
April 2014	36	28	8	0	20
April 2015	38	29	9	0	30
April 2016	94	67	27	0	60
April 2017	65	50	15	0	46
April 2018	104	72	32	0	51

NGK Mid-Career Hires (People)

Joined company	Total	Total			
		University graduate men	University graduate women	Other men	Other women
April 2013–March 2014	7	3	1	3	0
April 2014–March 2015	49	15	4	30	0
April 2015–March 2016	200	69	12	116	3
April 2016–March 2017	158	66	15	73	4
April 2017–March 2018	135	58	12	63	2

System to Promote Diversity

At NGK, the Human Resources Department plays a central role in promoting diversity, including through nursing care support and promotion of women's active participation.

Regarding human rights issues, NGK strives to educate employees by distributing booklets on human rights on such occasions such as training for the recently promoted employees. A helpline is also available for consultation on these issues.

Promoting the Success of Women

The NGK Group strives to increase opportunities for motivated and skilled people to enhance their skills regardless of gender. We are also engaged in creating comfortable working environment for women. The number of female key personnel (management staff) of NGK in fiscal 2017 was 17.

Establishment of a Career Consultation Helpdesk

In March 2016 we established a career consultation helpdesk for female employees to discuss career-related concerns. At the helpdesk, certified career counselors provide support and consultation services to employees, while strictly observing confidentiality. Since May 2017, we have expanded the service to make it available not only to women but to all employees.

Ratio of Female Key Personnel (Managers)

	2014/3	2015/3	2016/3	2017/3	2018/3
Ratio of female employees ¹	13.3%	12.9%	12.6%	12.7%	12.5%
Ratio of female key personnel ²	1.5%	1.8%	1.8%	2.0%	2.0%
Ratio of female general employees ³	16.6%	16.1%	15.6%	15.5%	15.1%

¹: Ratio among all employees

²: Ratio among all key personnel

³: Ratio among all general employees

Ratio of Women in Managerial Positions at Overseas Group Companies (as of March 31, 2018)

	Europe	North and Central America	Asia	Other
Ratio of women in managerial positions	7%	17%	25%	29%

Social Contribution Activities

A Place Where Students from around the World Live, Learn, and Laugh Together

NGK International House

Forty students from ten different countries living together, learning together, and building friendships together.



“Except for weekends, I am in the laboratory until 11:00 p.m. every day. My room at the NGK International House has a big desk and is good for studying. When I get tired, I go out onto the balcony to get some air. Also, I love nature, so the sight of the forests and flowers makes me feel happy.” The speaker is Edwin Akandwanaho, a student from Uganda (right). He is studying road traffic at Nagoya University’s Graduate School of Environmental Studies.

Alexia Fabiani is from Italy (left), and she is studying physics at Nagoya University’s School of Science. “It’s safe and quiet here, and all the residents are nice people. When you live on your own it’s hard to make friends, but that’s not the case here. I can meet friends easily.” On days off the international students gather in the common kitchen area and cook. “I make a lot of Italian food like pizza and pasta. But I’m a vegetarian, so I don’t use any eggs or meat.” The students often share what they cook with one another.

NGK established the NGK Foundation for International Students in order to facilitate the cultivation of individuals who will contribute to the development of the international community. It is through the Foundation that NGK is helping to provide housing and scholarships to overseas students visiting Japan.

The impetus for the Foundation’s establishment stems from gratitude for the warm community support and hospitality shown to NGK’s first employees and families posted overseas at the time of its initial overseas expansion.

In addition to the individual rooms for the residents, the NGK International House has a dining area which can accommodate a large number of people, a study room which is freely accessible even at night, a hall which can be used for events, and Wi-Fi for the entire building. The International House provides a safe and secure living environment and optimal study environment for overseas students, as well as fosters interaction with the local community through language classes and intercultural events run by the students.

Achievements

Number of overseas students supported: **806** (1997–2017)

Total language class and intercultural event attendance: **964** (2000–2017)

Visit this page for details on NGK’s contributions to society. <https://www.ngk-insulators.com/en/sustainability/>

Corporate Governance

Board of Directors, Audit & Supervisory Board, Executive Officers



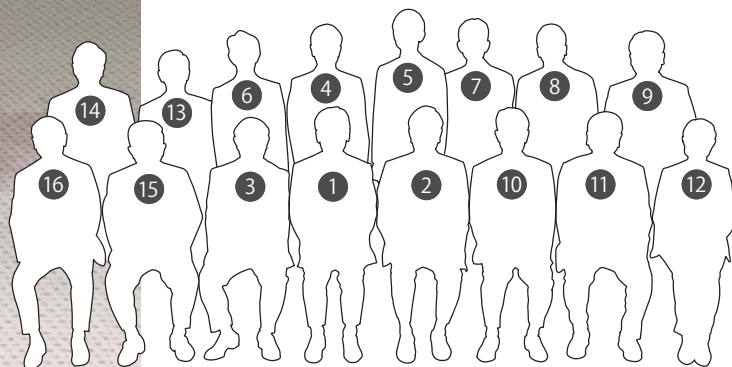
Board of Directors

- 1 **Taku Oshima**
President
- 2 **Yukihisa Takeuchi**
Executive Vice President
Group Executive, Corporate R&D; Development Committee Chair
- 3 **Hiroshi Kanie**
Executive Vice President
Responsible for Corporate Planning Office, New Business Planning Office, Secretarial Office, Corporate Communications Dept., Human Resources Dept., General Affairs Dept., and Power Business Group; Senior Officer in Charge of Group Companies; General Manager, Osaka Branch; in charge of overall personal information management, privacy protection, and Construction Business Act compliance
- 4 **Susumu Sakabe**
Director and Senior Vice President
Responsible for Finance Dept. and Purchasing Dept.; General Manager, Tokyo Main Office
- 5 **Ryohei Iwasaki**
Director and Senior Vice President
Group Executive, Process Technology Business Group; in charge of management affairs
- 6 **Chiaki Niwa**
Director and Senior Vice President
Group Executive, Corporate Manufacturing Engineering; responsible for Quality Management Dept., Environmental Management Dept., and Safety and Health Management Dept.; Chair of Facilities Committee, Quality Committee, Environmental Protection Committee, and Safety and Health Committee

- 7 **Shuhei Ishikawa**
Director and Senior Vice President
Group Executive, Electronics Business Group; General Manager, Electronic Components Div., Electronics Business Group
- 8 **Nobumitsu Saji**
Director and Senior Vice President
Responsible for Auditing Dept., Group Compliance Dept., Legal Dept., and Intellectual Property Dept.; Chair of CSR Committee and Internal Controls Committee; in charge of company-wide Competition Law compliance; Data Protection Officer
- 9 **Atsushi Matsuda**
Director and Senior Vice President
Group Executive, Ceramic Products Business Group; General Manager, Nagoya Site
- 10 **Hiroyuki Kamano**
Outside Director
- 11 **Toshio Nakamura**
Outside Director
- 12 **Emiko Hamada**
Outside Director

Audit & Supervisory Board

- 13 **Takeyuki Mizuno**
Audit & Supervisory Board Member
- 14 **Ken Sugiyama**
Audit & Supervisory Board Member
- 15 **Setsuo Tanaka**
Audit & Supervisory Board Member, Outside
- 16 **Junichi Itoh**
Audit & Supervisory Board Member, Outside



Executive Officers



Shigeru Kobayashi
Senior Vice President
Group Executive,
Power Business Group;
General Manager,
Komaki Site



Hiroshi Kurachi
Senior Vice President
General Manager,
Engineering Div.; General
Manager, Sensor Div.;
Ceramic Products
Business Group



Takaya Teshima
Senior Vice President
Group Vice Executive,
Process Technology
Business Group;
General Manager,
Chita Site



Hiroto Matsuda
Senior Vice President
General Manager,
Manufacturing Div.,
Ceramic Products
Business Group



Hiroyuki Tsuji
Vice President
Chief Technical Officer,
Electronics Business
Group (in charge of
technology/new product
promotion projects)



Tomohiro Yamada
Vice President
President, NGK
Electronics Devices Inc.



Tadaaki Yamada
Vice President
General Manager,
Human Resources
Dept.; in charge of
General Affairs Dept.



Akira Kato
Vice President
General Manager, New
Metals Div., Electronics
Business Group



Tsutomu Nanataki
Vice President
Group Vice Executive,
Corporate R&D; Project
Leader, Functional
Materials Development
Project, Corporate R&D



Masanobu Inoue
Vice President
General Manager,
Industrial Process Div.,
Process Technology
Business Group



Hiroharu Kato
Vice President
General Manager,
Worldwide Sales &
Marketing Div., Ceramic
Products Business Group;
President, NGK Europe
GmbH



Atsushi Miyajima
Vice President
General Manager,
Manufacturing
Engineering Div.,
Corporate Manufacturing
Engineering Group



Hideaki Shindo
Vice President
General Manager,
Finance Dept.



Hiroyuki Kamano

Outside Director

April 1971	Joins Ministry of Foreign Affairs
April 1981	Becomes registered attorney
October 1988	Becomes representative attorney of Kamano Sogo Law Offices (present position)
June 2007	Appointed as Outside Auditor of Komatsu Ltd.
July 2007	Appointed as Outside Director of Sumitomo Life Insurance Company
April 2009	Appointed as Vice President of Tokyo Bar Association
June 2011	Appointed as Director of NGK (present position)
June 2015	Appointed as Outside Auditor of House Foods Group Inc. (present position)

Three lines of defense to ensure more thorough compliance

For NGK, strict compliance is an essential business creed, and President Oshima is in the vanguard promoting awareness of it. Systems are in place to ensure that accidents or problems, even at overseas plants, are reported to top management immediately, as well as to the Board of Directors. I view this as compliance-minded business operation.

And yet an incident involving a delivery test discrepancy occurred recently. This unfortunately shows that a gap yet remains with regard to compliance-mindedness between top management and those on-site. Having said that, however, in a large organization, gaps in awareness are inevitable and preventing such incidents will require preventive systems be put in place in addition to awareness-raising efforts. In the case of delivery tests, we are separating the inspection department from the business division; however, the construction of this sort of system is the responsibility of management. Also, I feel that improving the awareness gap that exists between management and those on-site will require further personnel exchange and interaction between business divisions within Japan and overseas.

In addition, there are three lines of defense that are essential to ensuring strict compliance within a company whose operation is becoming increasingly globalized. The first line is the compliance activities undertaken on-site; the second is the support system comprised of the legal department, finance department, quality control department, and other functional departments working together across borders; and the third is internal auditing performed by the auditing department. A single mistake in compliance can be all that is needed to upend the management of a company. If you are not strict about compliance, it will end up costing you a lot more than if you were. I believe the issue of how to efficiently maintain the three lines of defense while finding ways of further raising on-site awareness is a challenge for management to address and the Board of Directors to verify.



Toshio Nakamura

Outside Director

April 1970	Joins Ministry of International Trade and Industry (now Ministry of Economy, Trade and Industry)
June 1998	Appointed as Director for Policy Coordination of Minister's Secretariat
June 2000	Appointed as Director-General of Small and Medium Enterprise Agency
November 2007	Appointed as President of Japan Chamber of Commerce and Industry, and Tokyo Chamber of Commerce and Industry
June 2011	Appointed as Director of NGK (present position)

Concentrating on robust communication and improved decision-making

This is my seventh term as Outside Director, and over that time I have developed a strong understanding of NGK's operations and business practices and have brought an outside viewpoint to meetings of the Board of Directors to ensure more robust discussion. Following every meeting of the Board of Directors, I talk with representatives from each division to hear their opinions as well as offer my own.

The larger an organization becomes, the greater the need for internal and external communication. When the divisions and departments within a company do not communicate with one another about what challenges exist, how company policies are working, etc., they will become insular and cut off from one another. It is not uncommon to find that the seeds* of new business, as well as possibilities for technologies that employees have, are to be found outside of a given business division's immediate domain. New awareness and perspectives gained from sharing experiences often leads to great leaps in business. I, too, endeavor to use the opportunity which the Board of Directors' meeting affords me to pursue more robust communication with those inside NGK.

What is also important, from the standpoint of corporate administration, is paying attention to the discussions and decision-making that take place prior to big decisions, as this makes it possible to perform reviews and verification after the fact.

*Technologies and know-how that can lead to the development of new business and products.

March 2016	Appointed as Chairman of National Association of Trade Promotion for Small and Medium Enterprises (present position)
May 2016	Appointed as Outside Director of Aoki Super Co., Ltd. (present position)
June 2016	Appointed as Outside Director of SMK Corporation (present position)

By ensuring that the points of discussion, and the arguments made surrounding those points, are recorded in a manner which allows them to be explained later, they can be reviewed to see whether something was forgotten or unanticipated or whether the risk decisions made were appropriate. The results of this review can then be applied to the benefit of future decisions. Amidst increasing uncertainty about the future, performing reviews and verification after the fact is essential for improving the quality of decision-making, and within NGK and elsewhere people are becoming increasingly accountability-conscious. As for myself, I see my role as providing ongoing input and feedback to ensure the thoroughness of this process.



Emiko Hamada

Outside Director

April 1984	Joins Taiyo Yuden Co., Ltd.
December 2001	Appointed as General Manager, Quality Assurance Control R Technology Division, Engineering Group, Taiyo Yuden
September 2003	Appointed as Chief Engineer, Basic Research Division, General Research Laboratory, Engineering Group, Taiyo Yuden
November 2008	Appointed as Associate Professor, Center for Social Contribution and Collaboration, Nagoya Institute of Technology (NITech)
April 2011	Appointed as Professor, Center for Social Contribution and Collaboration, NITech, and Professor for Master of Techno-Business Administration, NITech Graduate School
April 2012	Appointed as Professor, Center for Research on Assistive Technology for Building a New Community, NITech
May 2015	Appointed as Third-Area Program Officer, A-STEP (Adaptable and Seamless Technology Transfer Program through Target-driven R&D), Japan Science and Technology Agency (present position)
July 2016	Appointed as Part-time Lecturer, NITech (present position)
August 2016	Appointed as Visiting Professor, Nagoya University (present position)
June 2017	Appointed as Director of NGK (present position)

Expectations for further growth in NGK technology

New products are not created in a year or two. They are the cumulative result of many years of research trial and error. It is from that perspective that I am quite impressed with the achievement in this financial period of the Challenge 30 initiative, as well as the road map for steady roll-out of new products in the coming financial periods.

Still, though, I feel that NGK's material development strengths could be showcased even better. While it is good that NGK maintains a serious and professional corporate culture, I feel it still has challenges to overcome in terms of communicating its appeal. By making changes in how it communicates information, in particular changing how it presents itself so as to increase outside interest, NGK can facilitate more open innovation, through which the potential value of NGK technology can surely be enhanced even further. At present, all of the innate potential of NGK's technology is not being utilized. More proactive efforts to communicate this information is needed.

During Board of Director meetings and new product briefings, I make sure to draw on the B2C experience I have accumulated to allow me to steer discussion around to what the appeal of a new product is from a customer's perspective. I also make a point of asking whether the components and technology of the product can be put to use in even broader applications that meet customer needs, and whether this can be developed into an entire business package rather than just parts supply.

All of this has an impact on the future of NGK's business portfolio. NGK's high profitability is due to a lack of competition and an extremely good market position. I believe that action is needed for the future which will increase the range of products NGK offers in order to build up its business portfolio, and I intend to keep having this discussion with the Board of Directors.

NGK is conducting measures to expand and strengthen its corporate governance to increase corporate value with the intent of becoming a company trusted by all its stakeholders.

Basic Policies

Guidelines for corporate behavior and thorough observance of behavioral guidelines

To ensure appropriate operations and transparent management, NGK has set its sights on establishing and maintaining an organization capable of swiftly responding to changes in the business environment, and a fair and open management system emphasizing the interests of shareholders. These components make up NGK's basic approach to corporate governance.

To put this approach into practice, NGK has chosen a corporate governance structure anchored by an Audit & Supervisory Board. In addition to the General Meeting of Shareholders, the Board of Directors, and the Audit & Supervisory Board, NGK corporate governance includes the Executive Committee and several other committees established to assist the president in management decision-making. These bodies help to enhance governance efficacy by deliberating and reviewing important matters.

In recognition of needs to execute swift and optimal decision making and respond promptly to changes in the operating environment, NGK introduced an executive officer system, thus separating the management decision-making and supervision functions from business execution functions, and clearly defining the responsibilities of both.

Furthermore, to strengthen the supervision and monitoring functions of the Board of Directors, major committees among those tasked with mitigating the various risks surrounding NGK are obligated to report to the Board of Directors. NGK has also established a committee scheme, including a Nomination and Compensation Advisory Committee, a Corporate Council, a Conference of Outside Directors and Outside Audit & Supervisory Board Members, and a Business Ethics Committee to ensure the effectiveness of the Corporate Governance Code.

Corporate governance enhancement

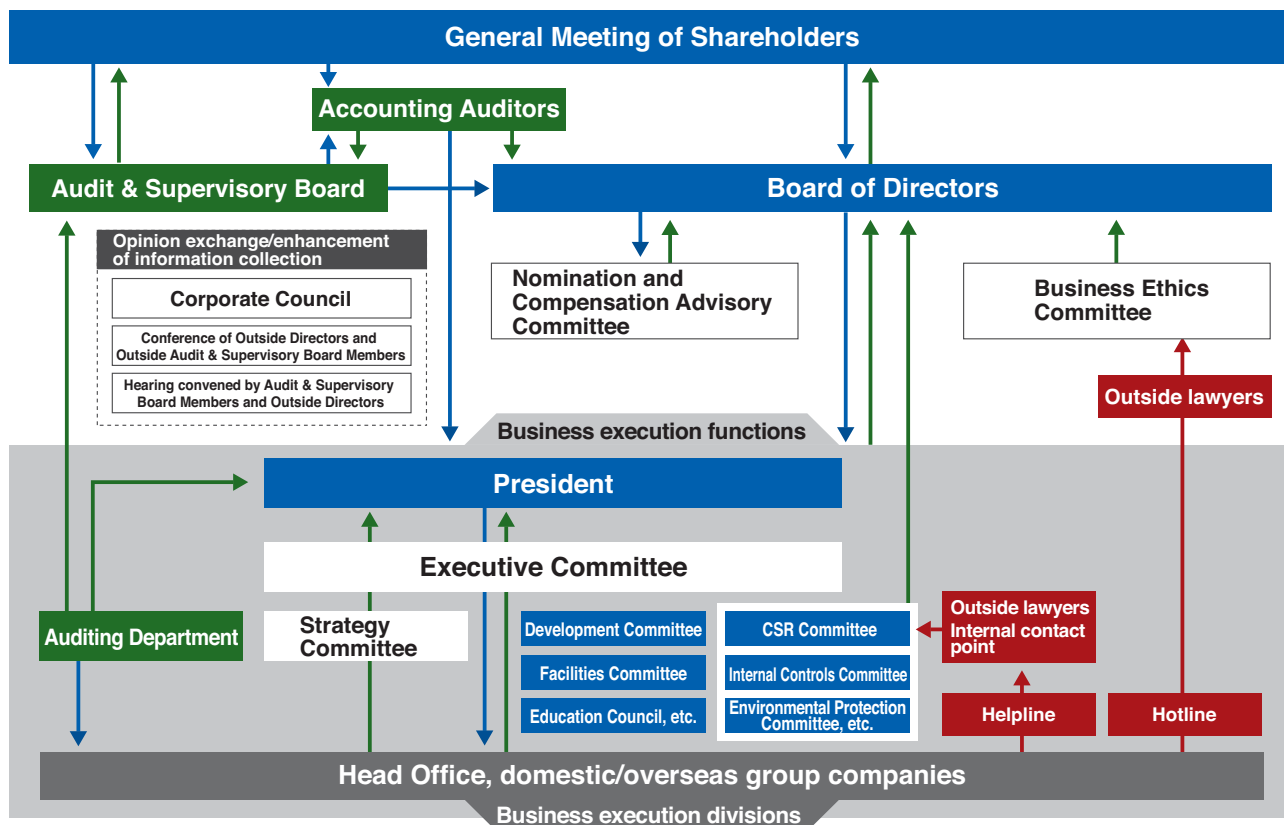
Ongoing structural enhancements aimed at strengthening corporate governance include the introduction of an executive officer system and an outside director system to improve the management supervision and monitoring functions and facilitate recommendations with respect to overall management.

April 1999	Formulated Guidelines for Corporate Behavior	June 2010	Appointed independent directors
April 2003	Revised NGK Group Guidelines for Corporate Behavior	July 2011	Major revision to NGK Group Guidelines for Corporate Behavior
June 2005	Introduced an executive officer system	April 2015	Signed on to UN Global Compact
	Introduced a stock option	June 2015	Established the Global Compliance Office
	Introduced an outside director system	December 2015	Established committees for corporate governance
July 2005	Established the CSR Committee	June 2017	Appointed one additional outside director
April 2007	Established the CSR Office		

Corporate Governance Structure Scheme

To ensure lawful business activities and management transparency, respond quickly to changes in the management environment, and create and maintain a fair management system from the shareholder's perspective, NGK has created the following systems. NGK implements all of the individual principles of Corporate Governance Code.

→ Authorization, supervision, election/dismissal, business execution delegation, audit, etc.
 → Report, proposal, presentation of agenda, findings, deliberation, recommendation, etc.
 → Whistle-blowing, consultation, etc.



Main Committees

NGK has further strengthened and enhanced its corporate governance structures by establishing committees to bolster the supervision and monitoring functions of the Board of Directors.

Board of Directors

The Board of Directors, comprising 12 members, deliberates matters prescribed in the Companies Act, as well as other important management issues, providing oversight for the execution of duties by directors. The Board of Directors includes three outside directors to create a system enabling management monitoring based on professional knowledge and decision-making from a wider perspective. As of June 26, 2018, the current Board of Directors comprises 12 members (11 men and one woman).

Audit & Supervisory Board

The Audit & Supervisory Board consists of four members, each of whom attends Board of Directors meetings and conducts other activities to audit the execution of duties by directors. The Audit & Supervisory Board includes two external members, each possessing significant business experience and extensive insight. The Audit & Supervisory Board members, including these highly independent outside members, conduct audits on the execution of duties by directors, business operations, and the company's financial position.

Executive Committee

Comprising the president, directors, Audit & Supervisory Board members, and executive officers and division heads designated by the president, this body deliberates the matters necessary to help the president with decision-making. As of June 26, 2018, the current Executive Committee comprises 16 members (15 men and one woman).

Business Ethics Committee

Comprised of outside directors and one internal director responsible for compliance, this committee monitors for fraud or illegalities involving senior management, as well as for compliance with the Competition Law and the Foreign Corrupt Practices Act, and reports directly to the Board of Directors. As a mechanism to prevent fraud or legal violations, in addition to the Helpline, an internal reporting system (Hotline) linked directly to outside lawyers was established with the aim of strengthening NGK's compliance structure.

Corporate Council

The meeting enables outside directors to exchange opinions with representative directors and others when proactive recommendations for senior management are sought from outside directors regarding various management-related issues.

Conference of Outside Directors and Outside Audit & Supervisory Board Members

Comprised exclusively of outside directors, these meetings facilitate an exchange of opinions regarding NGK management issues, with the intent of proactively contributing to discussions at Board of Directors meetings.

Hearing convened by Audit & Supervisory Board Members and Outside Directors

Comprised of Audit & Supervisory Board members and outside directors, these hearings gather information from internal sources regarding the business environment and issues surrounding NGK.

Nomination and Compensation Advisory Committee

Comprising a majority of outside directors, this committee attempts to ensure fairness and increase transparency related to determining the appointment and remuneration of board members and officers by deliberating matters related to the appointment and remuneration of board members and executive officers, Chief Executive Officer succession planning, and other matters, the results of which are reported to the Board of Directors.

Internal Control Systems

The Board of Directors and the executive bodies overseen by the president are responsible for establishing and operating NGK's internal control system. The Auditing Department, a specialized internal audit body, is responsible for assessing the status of business execution at each operating division. Moreover, NGK has established the Internal Controls Committee to manage its reporting system for internal controls pursuant to Japan's Financial Instruments and Exchange Act.

The NGK Group Guidelines for Corporate Behavior were formulated as a policy embodying the Group's corporate philosophy. These guidelines specify the Group's fundamental stance with respect to business activities and corporate behavior. The CSR Committee, under which the Compliance Subcommittee, Security Subcommittee, and Social Contribution Subcommittee are organized, is responsible for a range of activities that include formulating NGK Group Guidelines for Corporate Behavior, ensuring compliance with laws, regulations and corporate ethics is fully entrenched throughout the Group, and developing responses to incidents and accidents which it believes could significantly impact the Company. The Committee's actions are designed to maintain and improve the level of the Group's internal control system.

Please note that the "Resolution for the Development of Systems to Ensure the Appropriateness of Operations" was amended at a Board of Directors meeting held in March 2017.

Outside Directors and Outside Audit & Supervisory Board Members

NGK appoints individuals who possess outstanding achievements and a wealth of experience from a variety of industries to monitor director business execution in an attempt to realize stronger, more efficient management. Additionally, in terms of outside director independence, overall determinations are made with consideration for the Tokyo Stock Exchange "Guidelines for Listing" to avoid conflicts of interest with general shareholders. Our three outside directors are professionals able to make objective, rational decisions, while our two Outside Audit & Supervisory Board Members provide opinions mainly from social and financial perspectives.

Activities of Outside Directors and Outside Audit & Supervisory Board Members (fiscal 2017)

	Name	Attendance at Board of Directors meetings	Main activities
Outside Directors	Hiroyuki Kamano	Attended 15 out of the 15 meetings held.	Mr. Kamano provides opinions regarding compliance structure enhancement and management approaches for management planning, utilizing his substantial experience and specialization as an attorney.
	Toshio Nakamura	Attended 15 out of the 15 meetings held.	Mr. Nakamura provides opinions that clarify the foundation of business decisions, utilizing his wide-ranging experience and achievements in economic and industrial administration.
	Emiko Hamada	Attended 11 out of the 15 meetings held. Attended all 11 Board of Directors meetings held from when she assumed office as Director until the last day of the previous fiscal year.	Ms. Hamada provides opinions on strengthening technological capabilities, product development, and product commercialization, utilizing her experience from engaging in business development and extensive knowledge concerning research and development.

	Name	Attendance at Board of Directors meetings	Attendance at Audit & Supervisory Board meetings	Main activities
Outside Audit & Supervisory Board Members	Setsuo Tanaka	Attended 14 out of the 15 meetings held.	Attended 14 out of the 14 meetings held.	Mr. Tanaka provides opinions on practical responses and strengthening measures concerning the risk management system, utilizing his experience and achievements in police administration.
	Ichiro Terato	Attended 15 out of the 15 meetings held.	Attended 14 out of the 14 meetings held.	Mr. Terato provides opinions on financial policies, utilizing his experience and wide-ranging knowledge gained in management positions with The Bank of Tokyo-Mitsubishi UFJ (now MUFG Bank, Ltd.) and Nikon Corporation.

Current Independent Directors and Reasons for Appointment (fiscal 2018)

	Reasons for appointment
Outside Director Hiroyuki Kamano	Having long engaged in legal practice as an attorney-at-law, Mr. Kamano possesses a wealth of experience and achievements in the legal community, including his service as Vice-President of the Tokyo Bar Association. Drawing on this experience, he has been fulfilling his duties as an outside director of the company by sharing opinions regarding the management strategy and strengthening of the compliance structure, as well as offering suggestions in connection with the company's business operation and properly overseeing the management of the company. We have therefore elected him to the position of outside director.
Outside Director Toshio Nakamura	Having served as Director for the Trade Bureau of the Ministry of International Trade and Industry (former name of the Ministry of Economy, Trade and Industry), Director-General of the Small and Medium Enterprise Agency, and President of the Japan Chamber of Commerce and Industry, Mr. Nakamura has long been playing a vital role in the promotion of commerce and industry. By leveraging his knowledge and abundant experience cultivated over the course of his career, he has been appropriately fulfilling his duties as an outside director of the company by sharing his opinions on the importance of clarifying the basis for business decisions, as well as offering suggestions in connection with the company's business operation and overseeing the management of the company. We have therefore elected him to the position of outside director.
Outside Director Emiko Hamada	Ms. Hamada has made remarkable achievements, such as leading the invention and world-first commercialization of the CD-R (recordable CD) while working at Taiyo Yuden Co., Ltd. Since then, she has been engaged in research activities mainly based on industry-academia-government collaboration as Professor at the Nagoya Institute of Technology and Visiting Professor at Nagoya University. In her role as outside director she draws upon the insights which she has cultivated over the course of her career to offer recommendations about the management of corporate affairs, particularly from a technological capacity strengthening and product development and commercialization standpoint, and to provide appropriate administrative oversight. We have therefore elected her to the position of outside director.
Outside Audit & Supervisory Board Member Setsuo Tanaka	Mr. Tanaka has cultivated a wealth of experience and achievements over his career in government, which has spanned a variety of important posts within the National Police Agency prior to his current position as Commissioner General of the National Police Agency. Mr. Tanaka is able to leverage this experience to provide compliance and risk management-related recommendations regarding overall NGK operations. Based upon this demonstrated competency and capability, he has been selected as an outside audit and supervisory board member.
Outside Audit & Supervisory Board Member Junichi Ito	Mr. Ito has been involved with corporate management for many years, including as Senior Management Executive Officer for the Bank of Tokyo-Mitsubishi UFJ, Ltd. (now MUFG Bank, Ltd.) and Representative Director, Senior Executive Vice President and CFO for Nikon Corporation. As an expert in corporate management, Mr. Ito is able to leverage the wealth of experience and the insights he has cultivated over his long career to provide appropriate advice and oversight aimed at strengthening NGK's corporate governance. Based upon this demonstrated competency and capability, he has been selected as an outside audit and supervisory board member.

Training Policies for Executives

Newly appointed directors and executive officers are provided with training conducted by attorneys practicing in the United States and Japan related to the Companies Act and the Competition Law, conducted at the time of their appointment. In addition, each year lectures are held, targeting all directors and executive officers, related to compliance with the Competition Law, focused on the expanding scope of Competition Law enforcement and practical business risks. In addition, with regard to outside directors, we provide regular opportunities for the provision of individual explanations by personnel from relevant business divisions concerning mainly proposals presented to the Board of Directors meeting as well as information and exchange of opinions pertaining to business environment and related issues.

Policies for Determining Remuneration of Directors

With the aim of incentivizing the realization of NGK's corporate philosophy and management policies, as well as to heighten the transparency, fairness, and clarity of their responsibilities, the remuneration of NGK directors is comprised of three components: (1) a position-based, fixed annual salary as basic remuneration, (2) a performance-based bonus to further clarify the fulfillment of responsibilities of each director, and (3) stock-related remuneration designed to boost motivation and morale toward enhancing corporate value over the medium- to long-term and increasing their sensitivity to NGK's share prices. In terms of the ratio of fixed annual remuneration to variable remuneration, from the perspective of emphasizing performance over the medium- to long-term, NGK sets the performance-based variable remuneration at an appropriate level.

The Nomination and Compensation Advisory Committee comprising a majority of outside directors decides on policies for determining remuneration, proposals on the total amount of remuneration for directors and Audit & Supervisory Board members, and proposals on the amount of remuneration for individual directors and executive officers, the results of which are reported to the Board of Directors.

Outside directors and Audit & Supervisory Board members receive only basic remuneration based on their supervision of management from an independent perspective and role as monitors.

Remuneration of Directors and Audit & Supervisory Board members (fiscal 2017)

Director category	Total remuneration (million yen)	Total remuneration by type (million yen)				Applicable directors (people)
		Basic remuneration	Stock options	Bonus	Retirement benefits	
Directors (excluding Outside Directors)	676	428	65	182	–	10
Audit & Supervisory Board Members (excluding Outside Audit & Supervisory Board Members)	61	61	–	–	–	2
Outside Directors and Outside Audit & Supervisory Board Members	62	62	–	–	–	5

Directors Receiving Total Remuneration of ¥100 Million or More

Name	Director category	Total remuneration by type (million yen)				Total remuneration (million yen)
		Basic remuneration	Stock options	Bonus	Retirement benefits	
Taku Oshima	Director	68	11	47	–	127

Evaluation on the Effectiveness of the Board of Directors

With regard to its effectiveness, the Board of Directors issued a survey on the fiscal year ended March 31, 2018 to all directors and audit & supervisory board members. The results were reported at the Board of Directors meeting, after an analysis and evaluation by an external organization. In addition, the secretariat of the Board of Directors conducted initiatives in fiscal 2017 to improve the effectiveness of the Board of Directors. Such initiatives included interviewing directors and audit & supervisory board members individually, getting opinions on specific measures that can improve the effectiveness of the Board of Directors, and based on results of the interview, enriching discussions regarding themes related to long-term strategies. As a result, the Board of Directors was evaluated as effective, with its strength in how, under the leadership of the Chairman of the Board of Directors, each Director participates to conduct sound and transparent discussions while complying with governance requirements. We were evaluated by the external organization as having continued to retain this strength from the previous fiscal year. On the other hand, the following were raised as issues that needed to be further examined for their status or to be further discussed at Board of Directors meetings: a succession plan for the chief executive officer, cultivation of senior management, and understanding of risks for important, large-scale projects. Based on these results, NGK will work to continue to maintain and strengthen the effectiveness of the Board of Directors.

Policy on Cross-Shareholdings

NGK continuously holds shares of listed companies, which contribute to long-term business development, as cross-shareholdings, primarily in order to maintain and strengthen business relationships. NGK holds the shares of Morimura Group, which was established by the same founders of NGK, to enhance the brand value of the NGK Group. At its Board of Directors meeting, NGK determines the necessity of the continuous holding of shares as cross-shareholdings by regularly reviewing the significance of holding, stock prices, dividend yields, ratings, and so forth, and NGK gives specific explanations on the purpose and rationality of holding of shares as cross-shareholdings in its annual securities reports.

For voting rights pertaining to cross-shareholdings, NGK exercises voting rights focusing on factors including whether the content of proposals adversely affects the interest of shareholders and, from a medium- to long-term perspective, whether the investee company implements management that emphasizes the enhancement of corporate value and the interest of shareholders.

Compliance and Risk Management

Viewing compliance as the foundation of CSR, the NGK Group positions enhancing trustworthiness as the most important initiative and strives to create specific systems to inculcate this view among employees, prevent corruption, and comply with laws and regulations. In line with business expansion, the NGK Group is also engaged in minimizing risks related to globalization and diversification while augmenting our risk management structure.

Compliance Promotion Structure

We established the Compliance Subcommittee under the CSR Committee to ensure strict observance of laws, regulations, and corporate ethics within the Group. The Security Subcommittee has also been established to ensure accident prevention measures are in place, widely known, and strictly practiced.

Observing the Competition Law and Other Laws and Regulations Pertaining to Business Transactions

In addition to mandating compliance with the Antimonopoly Act in the NGK Group Guidelines for Corporate Behavior, we have established Competition Laws Compliance Rules, set forth to comply with international standards, which are strictly enforced by NGK both in Japan and its overseas locations. We have established these policies and procedures in order to eradicate unfair business practices and maintain fair and equitable business relationships with our business partners.

We also provide education and training aimed at ensuring widespread awareness and thorough compliance with the Competition Laws Compliance Rules and the Competition Laws Compliance Handbook. Furthermore, since fiscal 2015, we have contracted PwC Advisory LLC (renamed from Pricewaterhouse Coopers Co., Ltd. in March 2016) as our independent compliance professional to annually review the implementation status of the NGK Group's Competition Law compliance program per the Competition Law Compliance Rules as well as assessing the overall oversight and reporting structures in place for NGK Group companies, both in Japan and overseas locations. On top of this, starting in fiscal 2017, PwC has also conducted interviews with the directors overseeing NGK's various business groups to assess the tone of each director's approach toward competition law compliance as well as to further enhance their awareness of these efforts. The results of these reviews are being leveraged for a variety of purposes, such as improving the Competition Law compliance program.

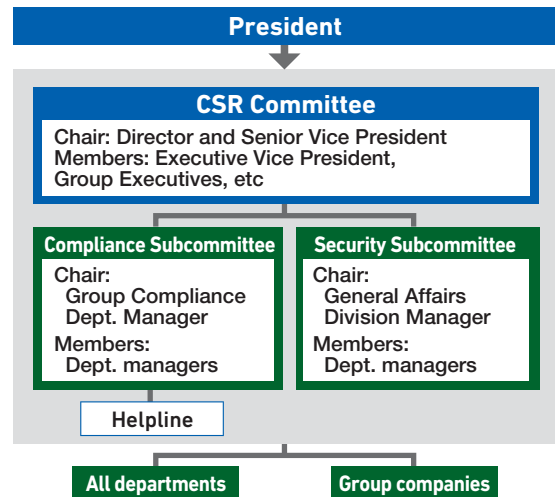
Anti-Corruption Activities In order to ensure compliance with anti-bribery laws as well as ethical standards for business conduct, we have instituted anti-bribery rules for dealing with foreign public officials. Moreover, we have also progressively enacted the same sort of anti-bribery rules at all of our overseas group companies, and in fiscal 2017, our Auditing Department performed a review of overseas money transfers and entertainment expenses.

Import and Export Control As part of its full compliance efforts, NGK is engaged in strictly observing laws and regulations related to import and export control. NGK establishes the observance of security export control-related regulations as part of Behavioral Guidelines within the NGK Group Guidelines for Corporate Behavior, and makes sure to control import and export operations by training its employees based on internal rules and the Export/Import Handbook.

Risk Management System

Risk Analysis and Response There are six types of risk which are viewed as common to all companies within the NGK Group, including compliance, information, and employment/labor. We make an effort to avoid and prevent these risks through deliberation of budgets and plans and overall examination and analysis in the course of execution and settlement processes at Strategy Committee and Executive Committee meetings.

Business continuity planning (BCP) was formulated to ensure the continuation of critical business functions in the event of large-scale natural disasters including wind and flood damage and earthquakes, massive transportation accidents or other emergency situations, which will be addressed by the Central Disaster Prevention and Control Headquarters and BCP Countermeasures Headquarters.



Business Continuity Planning (BCP) Initiatives

The NGK Group is developing company-wide business continuity planning (BCP) through the establishment of the BCP Headquarters, an organization for leading business continuity and quick recovery in the event of a large-scale natural disaster, led by the President. Countermeasure initiatives include the establishment of multiple manufacturing bases and procurement sources, damage mitigation measures related to buildings and equipment, and employee safety assurance. We conduct emergency drills assuming a natural disaster as a field exercise of the BCP. In the drill, participants are instructed to take real actions faithfully according to the plan, through which we identify in detail issues related to each process and procedure and use the findings to improve the BCP.

Information Security Structure

The NGK Group CSR Committee's Security Subcommittee takes responsibility for supervising overall information security, and supports the General Affairs and Information Systems divisions based on the Basic NGK Group Information Security Policy, in an attempt to properly manage and operate information assets. Every year, personnel of NGK's Information Technology Department visit several Group companies to conduct on-site checks and provide guidance on their implementation of IT security measures.

Privacy Policy and Structure

The NGK Group has established internal rules for privacy policy management in an effort to handle, manage, and protect personal information provided by customers. In fiscal 2015, NGK formulated and made public our Basic Policy on Specific Personal Information in response to the enforcement of the Act on the Use of Numbers to Identify a Specific Individual in Administrative Procedures. Moreover, our policies are fully compliant with the revised Act on the Protection of Personal Information, which came into effect on May 30, 2017.

As for Europe's General Data Protection Regulation (GDPR), which came into effect on May 25, 2018, NGK's affiliated companies in Europe have formulated internal rules in response.

Reference URL

Protection of personal information
<https://www.ngk-insulators.com/en/utpolicy/>

Basic policy on specific personal information (Japanese)
<https://www.ngk.co.jp/mynumber/>

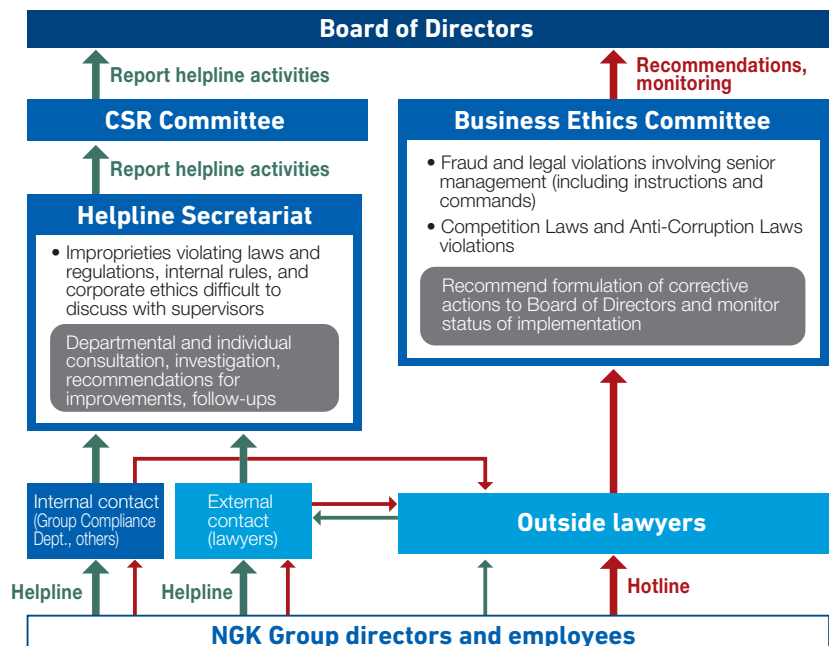
Whistle-Blowing System

Helpline

We have established a helpline to receive inquiries and reports from employees aimed at curtailing and preventing activities contrary to the spirit of the NGK Group Guidelines for Corporate Behavior and to facilitate the quick resolution when issues occur. Each overseas Group company has its own helpline. Those seeking advice or reporting issues are promised protection under corporate regulations. There were 43 consultation cases in fiscal 2017.

Hotline

We have established a hotline as an internal control system for responding to fraud and legal infractions committed by senior management, including Competition Laws and Anti-Corruption Laws violations. The hotline is operated by outside lawyers, who report directly to the Board of Directors. We have been pushing forward with the establishment of the hotline at overseas Group companies in light of the circumstances in each country.



Summary of Consolidated Financial Results for Five Fiscal Years



(Millions of yen)

	March 2014	March 2015	March 2016	March 2017	March 2018
Net sales	308,671	378,665	435,798	401,267	451,125
Cost of sales	208,052	254,387	289,266	272,435	312,107
Gross profit	100,619	124,278	146,532	128,832	139,018
Ratio of gross profit to sales (%)	32.6	32.8	33.6	32.1	30.8
Selling, general, and administrative expenses	56,367	62,701	65,634	65,619	68,991
Operating income	44,252	61,577	80,898	63,213	70,027
Operating margin (%)	14.3	16.3	18.6	15.8	15.5
Profit attributable to owners of parent	27,045	41,505	53,316	36,379	45,814
Net profit margin (%)	8.8	11.0	12.2	9.1	10.2
Capital expenditures	28,435	30,366	45,437	60,101	71,714
Depreciation and amortization	19,894	25,532	27,366	26,615	30,316
Research and development expenses	12,060	13,943	17,410	18,654	21,101
Cash flows from operating activities	32,648	73,002	59,445	80,172	50,554
Cash flows from investing activities	(21,185)	(39,497)	(47,773)	(56,453)	(49,414)
Cash flows from financing activities	2,027	(26,000)	(373)	(13,013)	22,546
Cash and cash equivalents, end of year	119,782	128,617	136,065	144,693	169,918
Total assets	614,220	702,234	711,897	759,434	836,335
Interest-bearing debt	167,296	156,203	163,973	174,150	211,573
Net worth	333,502	392,054	406,743	416,740	460,983
Equity	344,453	404,001	417,973	427,593	472,863
Profit per share (yen)	82.82	127.11	163.28	112.71	142.42
Cash dividends per share (yen)	22	28	38	40	44
Ratio dividends to net worth (%)	26.6	22.0	23.3	35.5	30.9
Return on equity (ROE) (%)	8.6	11.4	13.3	8.8	10.4
Equity ratio (%)	54.3	55.8	57.1	54.9	55.1
Total asset turnover (%)	52.4	57.5	61.6	54.5	56.5
Price-earnings ratio (PER)	25.96	20.18	12.73	22.36	12.88
Price-book value ratio (PBR)	2.11	2.14	1.67	1.94	1.28
Closing stock (yen)	2,150	2,565	2,079	2,520	1,834
Number of employees, end of year (persons)	13,210	16,217	16,657	17,517	18,783

Financial Position, Operating Results, and Cash Flow Analysis

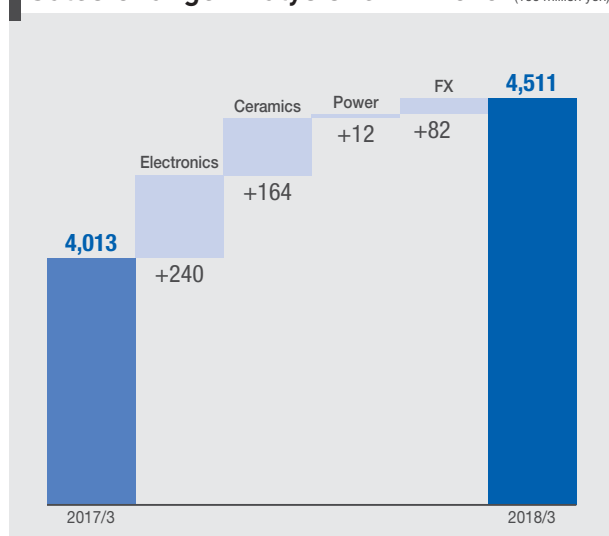
Operating Results

During the fiscal year ended March 31, 2018, the Japanese economy remained on a moderate recovery, underpinned by improvements in the employment and income environment. Among overseas economies, developed economies, such as the U.S. and Europe, continued on a moderate recovery, and China and emerging countries were also robust with a sign of pick up.

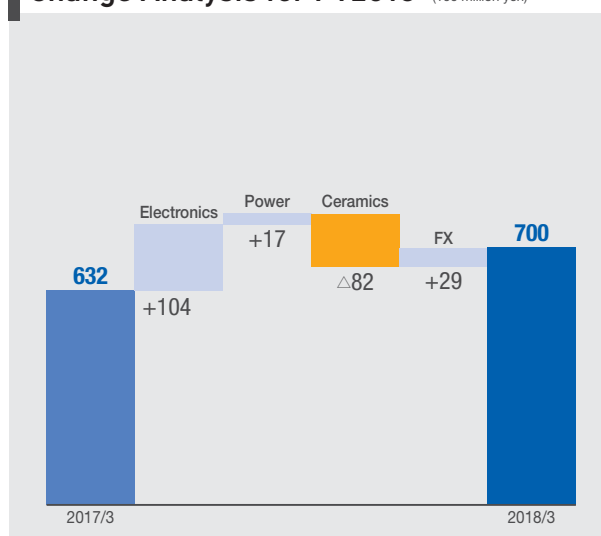
The NGK Group saw sluggish shipments of both insulators and NAS[®] (sodium-sulfur) batteries in the Power Business Segment. In the Ceramics Business Segment, the volume of automotive ceramics increased mainly due to an increase in sales of trucks in the Chinese market and tighter emissions regulations in Europe. In the Electronics Business Segment, whereas the quantity of ceramic packages for mobile phone base stations in China fell, the quantities of beryllium copper products and components for semiconductor manufacturing equipment rose.

As a result of the above, the total consolidated net sales for the fiscal year ended March 2018 increased by 12.4% year on year to ¥451,125 million. In terms of earnings, despite increases in costs for depreciation, research and development, etc., operating income increased by 10.8% year on year to ¥70,027 million and ordinary income increased by 9.4% to ¥70,615 million as a result of increased consolidated net sales and a weaker yen, etc. With respects to extraordinary income and loss, while posting impairment loss totaling ¥3,769 million and a ¥2,146 million provision for loss related to competition law under extraordinary loss, a gain on sale of investment securities of ¥1,286 million was recorded as extraordinary income. In addition to them, in the previous period (the fiscal year ended March 31, 2017), ¥11,213 million was posted for income taxes for prior periods. As a result of the above, profit attributable to owners of parent increased by 25.9% to total ¥45,814 million.

Sales Change Analysis for FY2018 (100 million yen)



Operating Income Change Analysis for FY2018 (100 million yen)



	2017/3	2018/3
FX rate	¥ 109/USD	¥ 111/USD
	¥ 119/EUR	¥ 129/EUR

Segment Overview

Power Business

Net sales of the Power Business Segment increased by 3.1% year on year to ¥54,452 million.

Although demand for power distribution equipment contracted in light of domestic electric power companies reducing capital investments mainly to cope with sluggish demand for electricity, shipments for China and the Middle East increased. As a result, sales of insulators increased. Sales of NAS® batteries were sluggish due to a lack of large shipments.

In terms of earnings, operating income recovered from a loss of ¥6,622 million in the previous fiscal year to a loss of ¥4,715 million.

Ceramics Business

Net sales of the Ceramics Business Segment increased by 9.2% year on year to ¥267,830 million.

Sales volumes of automobile ceramics, such as ceramic substrates for catalytic conversion (large-size HONEYCERAM), rose due to an increase in truck sales in the Chinese market. In addition, the quantity of sensors increased as the number of applied units per vehicle grew, accompanying tighter emissions regulations in Europe and China. Revenues from industrial process apparatuses, especially industrial heating systems, were up due to increasing capital investments related to automotive lithium-ion batteries by Chinese customers.

In terms of operating income, although volumes of automotive ceramics and industrial process apparatus rose, costs for launching equipment for production expansion increased in addition to increases in depreciation and development costs. As a result, operating income fell by 10.1% year on year to ¥58,086 million.

Electronics Business

Net sales of the Electronics Business Segment increased by 24.6% year on year to ¥128,955 million.

Sales volumes of components for semiconductor manufacturing equipment grew as capital investments of semiconductor manufacturers remained high in response to the trend toward multi-layering and microfabrication of semiconductors. The shipments of metals, such as beryllium copper products, rose primarily for industrial equipment in the Chinese market. The sales volumes of electronic components, such as composite wafers and piezoceramic actuators for HDD, increased whereas demand for ceramic packages declined. Soshin Electric Co., Ltd., our consolidated subsidiary, marked sales growth due to vibrant demand for components for industrial equipment.

Operating income surged by 217.2% year on year to ¥16,656 million primarily due to a sales increase in components for semiconductor manufacturing equipment.

(100 million yen)

	2014/3	2015/3	2016/3	2017/3	2018/3
Power business					
Sales	590	728	835	528	544
Operating income	(39)	(23)	26	(66)	(47)
Ceramics business					
Sales	1,908	2,271	2,509	2,450	2,678
Operating income	450	576	707	646	581
Electronics business					
Sales	589	788	1,014	1,035	1,290
Operating income	31	63	77	53	167

Financial Position

As of March 31, 2018, total assets increased by 10.1% from the previous fiscal year-end to ¥836,335 million.

Current assets increased by 7.8% from the previous fiscal year-end to ¥472,473 million, mainly reflecting increases in cash and bank deposits, notes and accounts receivable trade, and inventories, etc., despite a decrease in securities.

Non-current assets increased by 13.3% from the previous fiscal year-end to ¥363,862 million, mainly due to an increase in tangible assets. Current liabilities decreased by 1.2% from the previous fiscal year-end to ¥126,906 million. This was mainly due to decreases in provision for loss related to competition law and income taxes payable. Long-term liabilities increased by 16.3% from the previous fiscal year-end to ¥236,566 million, mainly due to increases in long-term borrowings and issuance of bonds payable.

Total net assets stood at ¥472,863 million, up 10.6% year on year, due to increases in retained earnings and foreign currency translation adjustments.

As a result, the ratio of net worth to total assets as of March 31, 2018 was 55.1% (compared with 54.9% at the previous fiscal year-end), with net worth per share standing at ¥1,432.67, up ¥137.01 from the previous fiscal year-end.

(100 million yen)

	2014/3	2015/3	2016/3	2017/3	2018/3
Financial position					
Total assets	6,142	7,022	7,119	7,594	8,363
Net assets	3,445	4,040	4,180	4,276	4,729

Cash Flows

There was a net increase of ¥25,225 million in cash and cash equivalents from the previous fiscal year-end to ¥169,918 million. This reflected ¥50,554 million in net cash provided by operating activities, ¥49,414 million in net cash used in investing activities, and ¥22,546 million in net cash provided by financing activities.

Cash Flows from Operating Activities

Net cash provided by operating activities was total ¥50,554 million. This was mainly attributable to posting an income before income taxes and non-controlling interests of ¥65,772 million and depreciation and amortization, despite cash outflows mainly due to increases in income taxes paid, inventories, and notes and account receivable trade. In comparison with the previous fiscal year, net cash provided by operating activities decreased by ¥29,618 million.

Cash Flows from Investing Activities

Net cash used in investing activities was total ¥49,414 million. This was mainly due to purchases of property, plant and equipment, and marketable securities, despite cash inflows due to proceeds from sales and redemption of marketable securities. In comparison with the previous fiscal year, net cash used in investing activities decreased by ¥7,039 million.

Cash Flows from Financing Activities

Net cash provided by financing activities was total ¥22,546 million. This was mainly due to proceeds from long-term borrowings and issuance of bonds payable, despite cash outflows due to cash dividends paid and repayment of long-term borrowings. In comparison with the previous fiscal year, net cash provided by financing activities increased by ¥35,559 million.

(100 million yen)

	2014/3	2015/3	2016/3	2017/3	2018/3
Cash flows from operating activities	326	730	594	802	506
Cash flows from investing activities	(212)	(395)	(478)	(565)	(494)
Cash flows from financing activities	20	(260)	(4)	(130)	225
Cash and cash equivalents	1,198	1,286	1,361	1,447	1,699

Capital Investment Overview

For the current consolidated accounting year, capital investment for the NGK Group totals ¥71,714 million.

For Power Business, ¥3,566 million in capital investment is being spent primarily on insulator production facility upgrades.

For Ceramics Business, ¥46,038 million in capital investment is being spent primarily on production facilities for automotive-related ceramic products.

For Electronics Business, ¥16,137 million in capital investment is being spent primarily on production facilities for semiconductor manufacturing equipment-related products.

For Headquarters, ¥5,973 million in capital investment is being spent primarily on equipment and facility upgrades and new business equipment and facilities.

Basic Policy for Profit Sharing and Dividends for the Current and Next Fiscal Years

NGK views the return of profits to shareholders as one of its most important management policies.

As a basic policy, we strive for shareholder-oriented management that emphasizes return on equity (ROE), and distribute the benefits of successful management with a medium-term target consolidated payout ratio of approximately 30% after consideration of a comprehensive range of factors, including business performance, financial position, and future business development.

NGK paid a year-end dividend of ¥23 per share for the fiscal year ended March 31, 2018. This and the interim dividend of ¥21, which had already been paid, brought the total annual dividend per share to ¥44.

Taking forecast of increases both in sales and earnings into consideration, NGK expects to raise both of the interim and the fiscal year-end dividend per share to ¥25 respectively for the fiscal year ending March 31, 2019. The total annual dividend per share will result in ¥50.

Meanwhile, NGK plans to utilize retained funds primarily to extend its existing core business and capital investments in new business projects, with a view to enhancing its corporate value.

	2014/3	2015/3	2016/3	2017/3	2018/3
Overview of capital expenditures					
Capital expenditures (100 million yen)	284	304	454	601	717
Depreciation and amortization (100 million yen)	199	255	274	266	303
Basic policy for profit sharing and dividends for the current and next fiscal years					
Dividend per share (yen)	22	28	38	40	44
Payout ratio (%)	26.6	22.0	23.3	35.5	30.9

Consolidated Financial Statements

Consolidated Balance Sheet

(Millions of yen)

ASSETS	Millions of yen		Thousands of U.S. dollars
	2018	2017	2018
As of March 31, 2018			
Current assets:			
Cash and cash equivalents	¥ 169,918	¥ 144,693	\$ 1,603,000
Time deposits	3,410	9,353	32,170
Marketable securities	29,029	36,760	273,858
Notes and accounts receivable:			
Trade notes and accounts	104,030	92,182	981,415
Other	12,498	12,652	117,906
Allowance for doubtful accounts	(124)	(868)	(1,170)
Total	116,404	103,966	1,098,151
Inventories	130,817	119,082	1,234,123
Deferred tax assets	16,538	19,691	156,019
Prepaid expenses and other current assets	6,357	4,719	59,971
Total current assets	472,473	438,264	4,457,292
Property, plant and equipment:			
Land	27,672	27,128	261,057
Buildings and structures	174,612	160,751	1,647,283
Machinery and equipment	451,894	406,079	4,263,151
Construction in progress	36,722	32,728	346,434
Total	690,900	626,686	6,517,925
Accumulated depreciation	(420,799)	(397,579)	(3,969,802)
Net property, plant and equipment	270,101	229,107	2,548,123
Investments and other assets:			
Investment securities	54,682	53,264	515,868
Investments in unconsolidated subsidiaries and associated companies	19,967	19,263	188,368
Intangible assets	3,659	2,962	34,519
Net defined benefit assets	7,816	6,925	73,736
Deferred tax assets	4,574	6,545	43,151
Other assets	3,063	3,104	28,896
Total investments and other assets	93,761	92,063	884,538
Total	¥ 836,335	¥ 759,434	\$ 7,889,953

(Millions of yen)

LIABILITIES AND EQUITY

As of March 31, 2018

	Millions of yen		Thousands of U.S. dollars
	2018	2017	2018
Current liabilities:			
Short-term borrowings	¥ 5,970	¥ 6,017	\$ 56,321
Current portion of long-term debt	10,572	6,973	99,736
Notes and accounts payable:			
Trade notes and accounts	45,697	38,147	431,103
Other	18,231	22,586	171,991
Total	63,928	60,733	603,094
Accrued expenses	19,408	16,429	183,094
Provision for NAS battery safety measures	2,561	3,650	24,160
Provision for loss related to competition law	1,175	9,168	11,085
Income taxes payable	16,510	21,057	155,755
Other current liabilities	6,782	4,413	63,981
Total current liabilities	126,906	128,440	1,197,226
Long-term liabilities:			
Long-term debt	195,032	161,160	1,839,925
Net defined benefit liability	20,910	20,927	197,264
Provision for product warranties	2,837	1,654	26,764
Deferred tax liabilities	11,655	15,201	109,953
Other long-term liabilities	6,132	4,459	57,849
Total long-term liabilities	236,566	203,401	2,231,755
Contingent liabilities			
Equity:			
Common stock			
Authorized—735,030 thousand shares	69,849	69,849	658,953
Issued—327,560 thousand shares at March 31, 2018 and 2017			
Capital surplus	71,948	72,055	678,755
Stock acquisition rights	858	899	8,094
Retained earnings	322,622	289,996	3,043,604
Treasury stock—at cost: 5,794 thousand shares and 5,915 thousand shares at March 31, 2018 and 2017, respectively	(12,153)	(12,408)	(114,651)
Accumulated other comprehensive income			
Unrealized gain on available-for-sale securities	24,659	23,458	232,632
Deferred loss on derivatives under hedge accounting	(31)	(21)	(292)
Foreign currency translation adjustments	(7,991)	(15,474)	(75,387)
Defined retirement benefit plans	(7,920)	(10,714)	(74,717)
Total	461,841	417,640	4,356,991
Non-controlling interests	11,022	9,953	103,981
Total equity	472,863	427,593	4,460,972
Total	¥ 836,335	¥ 759,434	\$ 7,889,953

Consolidated Financial Statements

Consolidated Statement of Income

(Millions of yen)

For the year ended March 31, 2018

	Millions of yen		Thousands of U.S. dollars
	2018	2017	2018
Net sales	¥ 451,125	¥ 401,267	\$ 4,255,896
Cost of sales	312,107	272,435	2,944,405
Gross profit	139,018	128,832	1,311,491
Selling, general and administrative expenses	68,991	65,619	650,859
Operating income	70,027	63,213	660,632
Other income (expenses):			
Interest and dividends income	2,223	1,742	20,972
Interest expense	(2,418)	(2,052)	(22,811)
Loss on sales of and disposals of property, plant and equipment—net	(319)	(202)	(3,009)
Equity in earnings of unconsolidated subsidiary and associated company	1,280	1,791	12,075
Reversal of allowance for doubtful accounts	750	28	7,075
Foreign exchange loss	(2,070)	(699)	(19,528)
Gain on sales of investment securities—net	1,236	5,249	11,660
Impairment loss on fixed assets	(3,769)	(4,161)	(35,557)
Provision of reserve for loss related to competition law	(2,146)	(6,314)	(20,245)
Loss on abolishment of retirement benefit plan of a subsidiary	—	(1,774)	—
Loss on liquidation of subsidiaries	(1,804)	—	(17,019)
Other—net	2,782	701	26,246
Other expenses—net	(4,255)	(5,691)	(40,141)
Income before income taxes	65,772	57,522	620,491
Income taxes			
Current	18,773	18,012	177,104
Prior periods	—	11,213	—
Deferred	664	(8,067)	6,264
Total income taxes	19,437	21,158	183,368
Net income	46,335	36,364	437,123
Net income (loss) attributable to non-controlling interests	521	(15)	4,915
Net income attributable to owners of the parent	¥ 45,814	¥ 36,379	\$ 432,208
		Yen	U.S. dollars
Per share of common stock			
Basic net income	¥ 142.42	¥ 112.71	\$ 1.344
Diluted net income	142.18	112.51	1.341
Cash dividends applicable to the year	44.00	40.00	0.415

Consolidated Statement of Comprehensive Income

(Millions of yen)

For the year ended March 31, 2018

	Millions of yen		Thousands of U.S. dollars
	2018	2017	2018
Net income	¥ 46,335	¥ 36,364	\$ 437,123
Other comprehensive income (loss)			
Unrealized gain on available-for-sale securities	1,195	2,646	11,274
Deferred loss on derivatives under hedge accounting	(13)	(23)	(123)
Foreign currency translation adjustments	7,731	(9,828)	72,934
Share of other comprehensive income in associated companies	97	382	915
Defined retirement benefit plans	2,809	4,437	26,500
Total other comprehensive income (loss)	11,819	(2,386)	111,500
Comprehensive income	¥ 58,154	¥ 33,978	\$ 548,623
Total comprehensive income (loss) attributable to:			
Owners of parent	¥ 57,284	¥ 34,042	\$ 540,415
Non-controlling interests	870	(64)	8,208

Consolidated Financial Statements

Consolidated Statement of Changes in Equity

(Millions of yen)

For the year ended March 31, 2018

	Thousands	Millions of yen				
	Outstanding number of common stock	Common stock	Capital surplus	Stock acquisition rights	Retained earnings	Treasury stock
Balance at April 1, 2016	326,579	¥ 69,849	¥ 72,092	¥ 876	¥ 266,581	¥ (1,364)
Net income attributable to owners of the parent	-	-	-	-	36,379	-
Cash dividends, ¥40 per share	-	-	-	-	(12,964)	-
Purchase of treasury stock	(5,003)	-	-	-	-	(11,182)
Disposal of treasury stock	69	-	(37)	-	-	138
Net change in the year	-	-	-	23	-	-
Balance at March 31, 2017	321,645	69,849	72,055	899	289,996	(12,408)
Net income attributable to owners of the parent	-	-	-	-	45,814	-
Cash dividends, ¥41 per share	-	-	-	-	(13,188)	-
Purchase of treasury stock	(1)	-	-	-	-	(4)
Disposal of treasury stock	122	-	(107)	-	-	259
Net change in the year	-	-	-	(41)	-	-
Balance at March 31, 2018	321,766	¥ 69,849	¥ 71,948	¥ 858	¥ 322,622	¥ (12,153)

	Millions of yen						
	Accumulated other comprehensive income				Total	Non-controlling interests	Total equity
	Unrealized gain on available-for-sale securities	Deferred loss on derivatives under hedge accounting	Foreign currency translation adjustments	Defined retirement benefit plans			
Balance at April 1, 2016	¥ 20,833	¥ -	¥ (5,888)	¥ (15,359)	¥ 407,620	¥ 10,353	¥ 417,973
Net income attributable to owners of the parent	-	-	-	-	36,379	-	36,379
Cash dividends, ¥40 per share	-	-	-	-	(12,964)	-	(12,964)
Purchase of treasury stock	-	-	-	-	(11,182)	-	(11,182)
Disposal of treasury stock	-	-	-	-	101	-	101
Net change in the year	2,625	(21)	(9,586)	4,645	(2,314)	(400)	(2,714)
Balance at March 31, 2017	23,458	(21)	(15,474)	(10,714)	417,640	9,953	427,593
Net income attributable to owners of the parent	-	-	-	-	45,814	-	45,814
Cash dividends, ¥41 per share	-	-	-	-	(13,188)	-	(13,188)
Purchase of treasury stock	-	-	-	-	(4)	-	(4)
Disposal of treasury stock	-	-	-	-	152	-	152
Net change in the year	1,201	(10)	7,483	2,794	11,427	1,069	12,496
Balance at March 31, 2018	¥ 24,659	¥ (31)	¥ (7,991)	¥ (7,920)	¥ 461,841	¥ 11,022	¥ 472,863

	Thousands of U.S. dollars					
	Common stock	Capital surplus	Stock acquisition rights	Retained earnings	Treasury stock	
Balance at March 31, 2017	\$ 658,953	\$ 679,764	\$ 8,481	\$ 2,735,811	\$ (117,057)	
Net income attributable to owners of the parent	-	-	-	432,208	-	
Cash dividends, \$0.39 per share	-	-	-	(124,415)	-	
Purchase of treasury stock	-	-	-	-	(38)	
Disposal of treasury stock	-	(1,009)	-	-	2,444	
Net change in the year	-	-	(387)	-	-	
Balance at March 31, 2018	\$ 658,953	\$ 678,755	\$ 8,094	\$ 3,043,604	\$ (114,651)	

	Thousands of U.S. dollars						
	Accumulated other comprehensive income				Total	Non-controlling interests	Total equity
	Unrealized gain on available-for-sale securities	Deferred loss on derivatives under hedge accounting	Foreign currency translation adjustments	Defined retirement benefit plans			
Balance at March 31, 2017	\$ 221,302	\$ (198)	\$ (145,981)	\$ (101,075)	\$ 3,940,000	\$ 93,896	\$ 4,033,896
Net income attributable to owners of the parent	-	-	-	-	432,208	-	432,208
Cash dividends, \$0.39 per share	-	-	-	-	(124,415)	-	(124,415)
Purchase of treasury stock	-	-	-	-	(38)	-	(38)
Disposal of treasury stock	-	-	-	-	1,435	-	1,435
Net change in the year	11,330	(94)	70,594	26,358	107,801	10,085	117,886
Balance at March 31, 2018	\$ 232,632	\$ (292)	\$ (75,387)	\$ (74,717)	\$ 4,356,991	\$ 103,981	\$ 4,460,972

Consolidated Financial Statements

Consolidated Statement of Cash Flows

(Millions of yen)

For the year ended March 31, 2018

	Millions of yen		Thousands of U.S. dollars
	2018	2017	2018
Operating activities:			
Income before income taxes	¥ 65,772	¥ 57,522	\$ 620,491
Adjustments for:			
Income taxes—paid	(23,306)	(15,235)	(219,868)
Depreciation and amortization	30,316	26,615	286,000
Impairment loss on fixed assets	3,769	4,161	35,557
Decrease of provision for NAS battery safety measures	(1,089)	(1,756)	(10,274)
(Decrease) increase of provision for loss related to competition law	(7,993)	4,860	(75,406)
Equity in earnings of unconsolidated subsidiary and associated company	(1,280)	(1,791)	(12,075)
Gain on sales of investment securities—net	(1,236)	(5,249)	(11,660)
Changes in assets and liabilities:			
(Increase) decrease in notes and accounts receivable—trade	(10,196)	8,623	(96,189)
Increase in inventories	(10,342)	(12,192)	(97,566)
Increase in other current assets	(427)	(2,665)	(4,028)
Decrease in net defined benefit assets	2,691	2,319	25,387
Increase in notes and accounts payable—trade	7,318	3,242	69,038
(Decrease) increase in other current liabilities	(2,856)	9,621	(26,943)
Other—net	(587)	2,097	(5,539)
Total adjustments	(15,218)	22,650	(143,566)
Net cash provided by operating activities	50,554	80,172	476,925
Investing activities:			
Purchases of marketable securities	(57,400)	(46,300)	(541,509)
Proceeds from sales and redemption of marketable securities	55,805	38,766	526,462
Proceeds from sales and redemption of investment securities	12,182	6,920	114,925
Purchases of property, plant and equipment	(67,062)	(59,361)	(632,660)
Decrease in time deposits	6,481	2,786	61,142
Decrease in restricted deposits	—	2,142	—
Other—net	580	(1,406)	5,470
Net cash used in investing activities	(49,414)	(56,453)	(466,170)
Financing activities:			
Increase in short-term borrowings—net	14	1,603	132
Proceeds from long-term debt	42,444	30,122	400,415
Repayments of long-term debt	(6,825)	(19,239)	(64,387)
Purchase of treasury stock	(4)	(11,182)	(38)
Cash dividends	(13,188)	(12,964)	(124,415)
Other—net	105	(1,353)	991
Net cash provided by (used in) financing activities	22,546	(13,013)	212,698
Foreign currency translation adjustments on cash and cash equivalents	1,539	(2,078)	14,519
Net increase in cash and cash equivalents	25,225	8,628	237,972
Cash and cash equivalents, beginning of year	144,693	136,065	1,365,028
Cash and cash equivalents, end of year	¥ 169,918	¥ 144,693	\$ 1,603,000



Corporate Outline

<p>Company name NGK Insulators, Ltd.</p> <p>Address 2-56 Suda-cho, Mizuho, Nagoya 467-8530, Japan Telephone + (81) 52-872-7181</p> <p>Established May 5, 1919</p> <p>Paid-in capital 69.8 billion yen (as of March 31, 2018)</p> <p>Net sales 451.1 billion yen (consolidated, for FY2017)</p>	<p>Consolidated subsidiaries 58 consolidated subsidiaries (21 in Japan, 14 in North/Central America, 7 in Europe, 16 in Asia and elsewhere)</p> <p>Equity-method affiliates 2</p> <p>Employees NGK 4,142 (as of March 31, 2018) Consolidated 18,783 (as of March 31, 2018)</p>
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Organization

Head Office

- Auditing Department
- Quality Management Department
- Environmental Management Department
- Safety & Industrial Health Management Department
- Corporate Planning Office
- New Business Planning Office
- Secretarial Office
- Corporate Communications Department
- Human Resources Department
- Group Compliance Department
- Finance & Accounting Department
- Legal Department
- Intellectual Property Department
- General Affairs Department
- Purchasing Department

Corporate R&D

- Business Planning Department
- Wafer Project
- NCM Project
- Functional Materials Development Project
- SOFC Project
- ZNB Project
- ACB Project
- Materials Research Laboratory
- Future Technology Management Center

Corporate Manufacturing Engineering

- Administration Department
- Manufacturing Engineering Department
- Information Technology Department
- Construction & Maintenance Department
- Global Engineering Department

Power Business Group

- Business Planning Department
- Quality Assurance Department
- Sales & Marketing Division
- Insulator Division
- NAS Battery Division

Ceramic Products Business Group

- Business Planning Department
- Quality Assurance Department
- Global Sales & Marketing Division
- Engineering Division
- Manufacturing Division
- Sensor Division

Electronics Business Group

- Business Planning Department
- Quality Assurance Department
- New Business Promotion Project
- New Metals Division
- Electronic Components Division

Process Technology Business Group

- Business Planning Department
- Quality Assurance Department
- High Performance Ceramics Division
- Industrial Process Division

Subsidiaries and Affiliated Companies

Sites, Main Office, Branch, Sales Offices

Nagoya Site/Tokyo Main Office/Osaka Branch/Chita Site/Komaki Site/Ishikawa Plant/
Sapporo Sales Office/Sendai Sales Office/Hokuriku Sales Office/Hiroshima Sales Office/
Takamatsu Sales Office/Fukuoka Sales Office

Group Companies in Japan

Energy Support Corporation/Akechi Insulators, Ltd./NGK Okhotsk, Ltd./NGK Metex Corporation/
NGK Fine Molds, Ltd./NGK Ceramic Device Co., Ltd./NGK Electronics Devices, Inc./Soshin Electric Co., Ltd./Soshin
Device Co., Ltd./Soshin Powertech Co., Ltd./Risshin Electronics Co., Ltd./Ikebukuro Horo Kogyo Co., Ltd./NGK
Chem-Tech, Ltd./NGK Filtech, Ltd./NGK Adrec Co., Ltd./NGK Kilntech Corporation/NGK Sports Planning Co.,
Ltd./NGK Life Co., Ltd./NGK Yu-Service Co., Ltd./NGK Logistics, Ltd.

Group Companies Overseas

America

NGK-Locke Inc./NGK-Locke Polymer Insulators, Inc./
NGK Ceramics USA, Inc./NGK Automotive Ceramics USA, Inc./
NGK Ceramics Mexico, S. de R.L. de C.V./NGK Metals Corporation/
NGK Insulators of Canada, Ltd./FM Industries, Inc./
NGK Electronics USA, Inc./Soshin Electronics of America Inc.

Europe, Africa

NGK Berylco U.K. Ltd./NGK Ceramics Europe S.A./
NGK Europe GmbH/NGK Deutsche Berylco GmbH/
NGK Berylco France/NGK Ceramics Polska Sp. z o.o./
NGK Ceramics South Africa (Pty) Ltd.

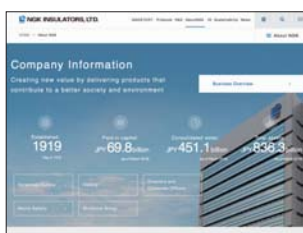
Asia, Oceania

NGK Insulators Tangshan Co., Ltd.
NGK Insulators (China) Investment Co., Ltd.
NGK Ceramics Suzhou Co., Ltd.
NGK Technocera Suzhou Co., Ltd.
NGK Automotive Ceramics Korea Co., Ltd.
P.T. NGK Ceramics Indonesia
Siam NGK Technocera Co., Ltd.
NGK Ceramics (Thailand) Co., Ltd.
NGK Technologies India Pvt. Ltd.
NGK Stanger Pty. Ltd.

Details of NGK are available on the company website

The NGK Report 2018 provides comprehensive information on both financial and non-financial matters.
For more detailed information, please see the NGK website.

The NGK Sustainability Data Book 2018 (PDF) is available on our website and provides a detailed report on NGK's
ESG initiatives.



About NGK
【English】

<https://www.ngk-insulators.com/en/info/>
【Japanese】
<https://www.ngk.co.jp/info/>



Investor Relations
【English】

<https://www.ngk-insulators.com/en/ir/>
【Japanese】
<https://www.ngk.co.jp/ir/>



Sustainability
【English】

<https://www.ngk-insulators.com/en/sustainability/>
【Japanese】
<https://www.ngk.co.jp/sustainability/>



**NGK Sustainability
Data Book 2018**

Third-Party Opinion



Professor, Ph. D. in Law (LL.D.),
Graduate School and Faculty
of Safety Science, Kansai University;
Executive Director of Japan Society
for Business Ethics;
Senior Researcher of Business Ethics
Research Center

Mr. Kazuhiko Takano

In May 2019, the NGK Group, whose business plays an important role in supporting Japanese industry, will mark the 100th anniversary of its founding. I admire the fact that it has been able to consistently fulfill society's expectations for stable production, all while continuing to grow over so many years. I specialize in CSR research, which looks at the various management systems that underlie corporate sustainability, and it is from that perspective that I read the NGK Report 2018. Based on this, I would like to discuss the CSR operational strengths and challenges of the NGK Group.

The first area to consider is corporate governance. Although NGK has an Audit & Supervisory Board, it also has a Nomination and Compensation Advisory Committee that has a majority membership comprised of outside directors and where executive personnel and individual compensation matters are discussed outside of the Board of Directors. Also, directors and Audit & Supervisory Board members are given a survey, which is used in evaluating the effectiveness of the Board of Directors. These factors ensure free and open discussion takes place among the Board of Directors. In addition to all of this, hearings are convened by Audit & Supervisory Board members and outside directors in order to glean information from relevant people within the company, a hotline has been established to receive information about unethical or illegal behavior involving company executives, and a Business Ethics Committee is in place to oversee its operation. All of this and more contributes to outstanding corporate governance, which is more robust than any other leading company.

The second area to look at is compliance and risk management systems. The NGK Group is truly a global enterprise, with an overseas sales ratio of 72.6%, and as such, faces major risks from various competition and anti-corruption laws and regulations, which are applied extraterritorially and which stipulate large fines and punishments. The NGK Group thus operates a PDCA cycle that involves the Compliance Subcommittee underneath its CSR Committee drawing up various rules and regulations based on the NGK Group Guidelines for Corporate Behavior, and these are then taught to employees, monitored, and revised as needed. Also, with regard to major risks, the Group as a whole has formulated business continuity planning (BCP) and conducts regular operational training. The compliance and risk management systems in place are very thorough, and I feel that the incorporation of a PDCA cycle keeps these systems within a positive feedback loop.

The third area to look at is communication with employees. When employees are kept aware of important issues and a healthy and transparent corporate culture is fostered, I believe companies can handle any risks which might arise. The NGK Group carries out an extremely diverse range of employee training, with compliance training being particularly emphasized. In addition, the Group undertakes serious efforts to foster a healthy and transparent corporate culture through such initiatives as CSR Talk Live, where top management and employees are able to engage in direct dialogue with one another.

The fourth area to consider is social contribution activities. Here, special attention needs to be given to the NGK International House and scholarship fund which, for many years, have helped enable students from around the world to come and study in Japan. This demonstrates strong human concern and generates significant goodwill.

The NGK Group does have challenging areas, however, where more work is needed, as is made evident by an incident in January 2018, which involved a delivery test discrepancy. I would like to see NGK use this as an opportunity to improve its management systems and structures even further. While this of course will involve quality-related challenges, there are other areas where further improvements should be expected, including compliance with overseas laws and regulations like the EU's GDPR (General Data Protection Regulation) that will need to be addressed as the NGK Group expands further overseas, and response preparations for massive compound disasters that will accompany projected megathrust Tokai earthquakes and Nankai Trough earthquakes. If it maintains steady improvement of its compliance and risk management systems, I believe this will help the NGK Group continue its growth for the next 100 years.

WE SUPPORT



External Evaluation

In September 2017, NGK was selected for the second consecutive year for the Dow Jones Sustainability Asia Pacific Index in the Dow Jones Sustainability Indices, a major index for socially responsible investment.

MEMBER OF
**Dow Jones
Sustainability Indices**
In Collaboration with RobecoSAM



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