



# NGK REPORT 2021

**NGK INSULATORS, LTD.**



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## NGK Group's ESG

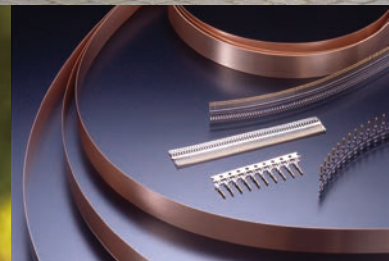
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**NGK Group Vision: Road to 2050**

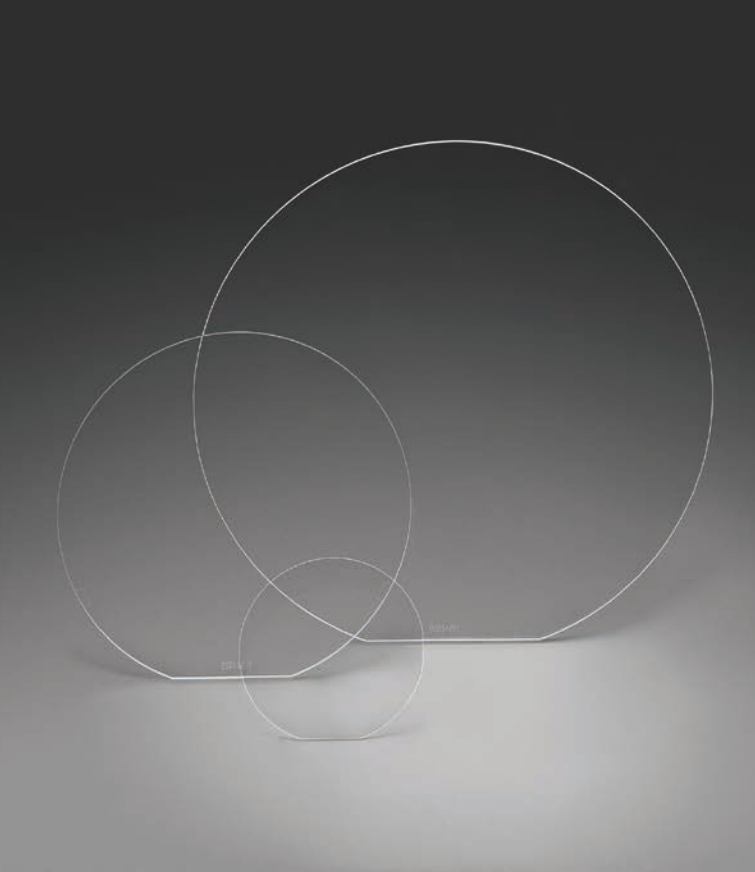
# **Carbon Neutrality**



# **Digital Society**

NGK Group will contribute to carbon neutrality and digital society  
with our unique ceramic technologies.





## Gallium nitride (GaN) wafers

Our original crystal growth technology has realized low defect density across the entire GaN wafer surface. Enabling unprecedented ultra-bright laser diodes and high-efficiency power devices, these devices can be used as light sources for projectors, inverters for electric vehicles, and other applications.

**NGK Group products with big potential**

# Contributing to the realization of **CN/DS**

Under the NGK Group Vision, we are aiming to have carbon neutrality and digital society-related products account for 80% or more of our sales by 2050.

The following products will be some of the first to help us achieve this.



## Piezoelectric micro-actuators for hard disk drives (HDDs)

Indispensable for precise control of HDDs' magnetic heads, these ultra-compact actuators are widely used in data centers around the world as key devices in achieving both higher capacity and higher reliability of HDDs.





## Bonded wafers

Bonded wafers are substrates for electronic devices developed by proprietary bonding technologies and ultra-high-precision wafer polishing technologies that have been cultivated in the ceramics business. Combining different materials enables bonded wafers to deliver performance and functionality that cannot be achieved with wafers made from a single material.

## Subnano-ceramic membranes

We have developed a variety of subnano-ceramic membranes, which are able to separate specific molecules from mixed liquids or gases. These new ceramic filters make possible innovative separation processes that have the potential to save energy and reduce costs.

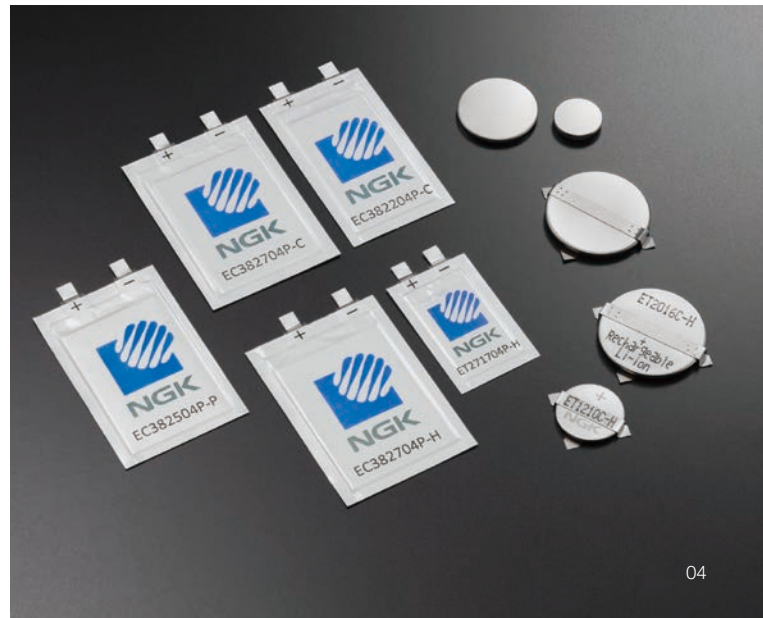


## Zinc rechargeable batteries

These batteries use zinc, which is inexpensive and offers high energy density. Zinc normally causes short-circuiting during charging when used in rechargeable batteries, but NGK has solved this problem and developed a zinc rechargeable battery by utilizing its proprietary hydroxide ion conducting ceramic separator. Highly safe, this zinc rechargeable battery is an optimal storage solution for indoor installations.

## Lithium-ion rechargeable batteries, “EnerCera®”

The EnerCera series is a line of compact, thin, high energy density lithium-ion (Li) rechargeable batteries utilizing NGK’s proprietary crystal oriented ceramic plate as electrodes. One of the particular features of these batteries is their high heat resistance. The series is offered in two types: “EnerCera Pouch,” which can be embedded in IC cards using hot lamination; and “EnerCera Coin,” the world’s first Li-ion battery that can be reflow-soldered to circuit boards and is capable of high current discharge. EnerCera batteries have been lauded as revolutionary storage devices.



# NGK Group Philosophy

## Our Mission

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**Enriching Human Life  
by Adding New Value to Society.**

## Our Values

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Quality of  
**People** Embrace challenges and teamwork.

Quality of  
**Product** Exceed expectations.

Quality of  
**Management** Social trust is our foundation.

Visit the “About NGK” section of our website to read the NGK Group Philosophy.

<https://www.ngk-insulators.com/en/info/governance/>

The NGK Group Philosophy is a signpost that guides every employee of the NGK Group. Formulated in 2019 to mark our 100th anniversary, it encompasses our desire to use our proprietary ceramic technologies to contribute to future energy, environmental protection, and industrial progress, and to help people around the world live a happy, comfortable life.

## Road to 2050: Launch of the New NGK Group

On April 1, 2021, Shigeru Kobayashi took over as president of NGK Insulators, Ltd., and I assumed the role of chairman. During my tenure as president, beginning in 2014, we were able to help NGK Group develop as a truly global company by bringing innovation to old ways of doing business and by reforming our corporate culture to create a workplace conducive to free and open discussion. All of

this represented the start of a new chapter for NGK, and I felt that the time was right to pass the baton on to a successor. We marked the occasion of NGK's 100th anniversary in 2019 by laying out our corporate mission in a revised NGK Group Philosophy. We then spent a year formulating the NGK Group Vision to serve as a roadmap for realizing that mission by 2050. It is now up to our new President Kobayashi to start us on that journey.

Selection of the new president was deliberated on by the Nomination and Compensation Advisory Committee, comprised of outside directors/auditors, the president and executive vice presidents, and the selected candidate was then decided on by the Board of Directors. A group of candidates, all with a wealth of managerial experience, was put forward, and Shigeru Kobayashi chosen from among them as the top candidate in light of his outstanding qualifications, capacity for identifying issues, leadership skills, interpersonal skills and many other qualities as a senior manager. I look forward to the significant contributions he will make, as the leader of the NGK Group, to the growth and development of our future business.

During my tenure as president, my first priority was to strengthen the functions of the Head Office. Communications with business divisions and departments has improved, and, given how highly the Head Office is now regarded in terms of competency and effectiveness, I feel that this represents a significant achievement. The accomplishments which I remember best came from helping to resolve anti-trust law violation, nonconformity in testing procedure of insulators and related products and other issues that must never occur again. I feel that what we achieved in these areas helped to ensure that we were on track for the future as we marked the 100th anniversary of our founding. I also look to you, our stakeholders, to help us in building the next 100 years of NGK.

As Chairman, I am eager to support our new President Kobayashi and to contribute to the discussions we will have about major policies and other issues. I leave the executive administration of NGK to its president and other executive officers and turn my attention to cultivating the Board of Directors as a committee body for in-depth discussion of NGK's medium- to long-term management strategy and other important matters. My attention is also directed towards facilitating activities which further the NGK Group's financial and business interests, its contributions to society, among other endeavors for which your continued support is greatly appreciated.

Chairman

*Taku Oshima*









## A photograph of a modern office interior. The space features a large, multi-level staircase with glass railings and a dark wooden handrail. The walls are made of light-colored stone or concrete. In the foreground, a blue chair is visible. The ceiling is white with several recessed lights. A large blue banner with the text "Vision and V" is overlaid on the top right of the image.

# Contributing to carbon neutrality and a digital society under the NGK Group Vision

An era of transformation has arrived for the NGK Group. The needs and expectations of society are changing fast. As a corporate group built on pursuing solutions to social issues, we must change too. Guided by the NGK Group Vision announced in April 2021, and equipped with our unique ceramic technologies, the NGK Group is embarking on a journey of new growth.

President

*Shigeru Kobayashi*

## Inaugural resolutions Never lose an enterprising spirit

In December 2020, Chairman Taku Oshima—who was then President and Chair of the Nomination and Compensation Advisory Committee—offered me the position of President. I accepted right then and there. I was keen to continue the work of improving our company through the reforms that I had become familiar with during the seven years I worked alongside Chairman Oshima during his tenure as President.

Prior to my appointment, my job was to facilitate business rebuilding as the Group Executive of the Energy Infrastructure Business Group. I never imagined the position of President would be offered to me.

I joined NGK in 1983. I had always dreamed of working outside Japan, and the chance to be posted overseas was a big attraction for me.

My first role in the company was in insulator sales. After eight years, I received my first overseas posting—to Montreal, Canada. This was followed by postings to Indonesia, the United States, and China. In total, I spent nine years working abroad. Even when based in Japan, I've spent at least 120 days out of every year overseas on business trips. All this experience has taught me that, while cultures may differ, trust and reliability are universally important to business sustainability.





## Message from the President

Upon having been appointed President, I set four resolutions.

The first resolution is to make good on the more than 250 billion yen in investment that we have made over the past three years. This investment—which was primarily focused on automotive-related business and semiconductor manufacturing equipment-related products—ensures that we have enough production capacity to meet future demand. It is my responsibility to make sure that this translates into greater profits.

The second resolution is to create new businesses and new products that will sustain the NGK Group into the future. In line with the NGK Group Vision, which will be described later, we will focus on new products in the two fields of carbon neutrality and the digital society.

The third resolution is to pursue globalization. Japan,

where the NGK Head Office is located, accounts for just 28% of total NGK Group sales. We have a diverse array of customers all around the world. We also have an increasingly diverse workforce spread across business sites in 20 different countries. I will engage with our customers and employees around the world to facilitate greater globalization of the NGK Group. In addition, the NGK Group will provide a work environment where all employees, regardless of nationality, have opportunities for advancement on the global stage.

The fourth resolution is to grow the NGK Group as a company that all employees are proud to work for and that all stakeholders can trust. To this end, we will create a pleasant work environment characterized by free and open discussion, where employees are empowered to tackle challenges and are stimulated creatively.

### NGK Group Vision

## Growing carbon neutrality and digital society-related business into 80% of all sales by 2050

In April 2021, the NGK Group released its 2050 vision in the form of the NGK Group Vision: Road to 2050. This is the first public announcement of specific long-term targets that the Group has made since the K Plan 21 was released in 1989.

The discussions that led to the formulation of this medium-to-long-term vision began immediately after the revised NGK Group Philosophy was released two years ago—at the time of the company's 100th anniversary. These discussions were centered on the four areas of energy, mobility, ICT and power devices, and industry. They

explored such questions as what society will be like in 2050, what kinds of issues society will face, and what the NGK Group can do to help address those issues. Based on this, we came up with an answer to the fundamental question of what we want to be as a company. Our answer, which underlies the NGK Group Vision, was: 'A company that contributes to carbon neutrality and the digital society with our unique ceramic technologies.' The discussions involved top management as well as a diverse cross-section of employees.

### From company foundation to the present, offering value to society through SDG ideas



Lithium-ion rechargeable batteries, "EnerCera"



Insulators



NAS® batteries



Gallium nitride (GaN) wafers



Subnano-ceramic membranes



Particulate matter (PM) removal filters



Reference URL Envisioning SDGs from 100 years ago

<https://www.ngk-insulators.com/en/sdgs/>



NGK came into being 100 years ago in response to the challenge of spreading electricity throughout Japan. Since then, our products and technologies have continued to address society-wide issues such as air pollution and increasing digitization. Examples of our technologies include ceramics for purifying automobile exhaust and ceramics for semiconductor manufacturing equipment. Central to all challenges we have undertaken is the unique ceramic technologies that we have been refining for a century. Now we are working to leverage our three strengths in materials, processes, and mass production to enable the NGK Group to deliver new original products and create new businesses in the two areas of carbon neutrality and digital society.

We see a competitive carbon neutrality market is beginning to emerge around the world. The NGK Group already has an established track record of research into relevant technologies, like storage batteries, subnano-ceramic membranes for CO<sub>2</sub> separation, and solid oxide electrolysis cells (SOEC). We see these technologies being used to make products that will drive new growth for the Group. In the future, we aim to establish a carbon cycle that uses CO<sub>2</sub> collected through subnano-ceramic membranes—along with renewable energy—to synthesize hydrogen and carbon monoxide via SOEC and then process it into fuel and chemical products using honeycomb structural reactors.

In digital society-related markets, the NGK Group already has competitive strengths. Semiconductor manufacturing equipment incorporates ceramic components, which is an area where the NGK Group and other Japanese corporate groups are strong. We will capitalize on these advantages to continue meeting the needs of customers, while also developing and offering new products.

Our plan is to develop this trend such that 50% of total sales by 2030—and 80% of total sales by 2050—come from products related to carbon neutrality and digital society. Achieving this will require strong, new products

that will be the cornerstone of the NGK Group. Therefore, over the next 10 years, we will invest 300 billion yen into research and development, with 80% of that being allocated to research and development related to carbon neutrality and the digital society.

Demand for ceramics used in purifying automobile exhaust, one of our current core businesses, is not going to drop off rapidly. Moving forward, we will use the profitability of this business to fund new product and business development.

In terms of concrete policies to realize this new vision, we have formulated Five Transformations. These are ESG (Environmental, Social, and Governance) Management, Profitability Improvement, Research and Development, Commercialization, and Digital Transformation (DX). We must strive for a major transformation, particularly regarding the speed with which we go from Research and Development to Commercialization. All processes involved between development and commercialization require transformation. Along with working on selection and concentration, we will work to improve the efficiency of materials development through the application of DX—for example, using materials informatics\*.

In addition, we recognize the need for greater emphasis on not only tangibles but also intangibles—that is, on providing services and solutions as well as products. One example of this is shifting from our traditional approach of selling products that reduce CO<sub>2</sub> to engaging in businesses capable of reducing CO<sub>2</sub> emissions. We will provide those customers who want more than physical products with services whose functionality is derived from our unique ceramic technologies. This represents one of the innovative schemes that we must put into action.

The NGK Group is currently undergoing its third foundational period. We will work together as one with all stakeholders, both inside and outside the Group, to bring about the NGK Group Vision.

\* A method for material development using information processing technologies such as big data, AI, and machine learning.

## ESG in the NGK Group

### Newly formulated NGK Group Environmental Vision

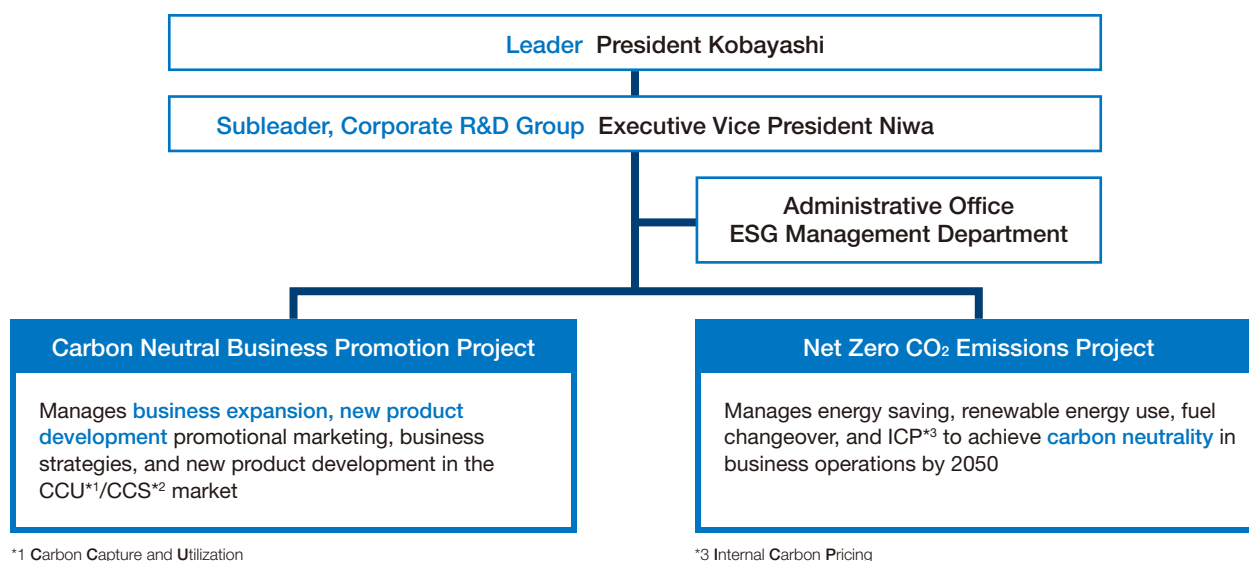
Within the NGK Group Vision, ESG management plays a central role in Group management. However, in my view, it is the 'E' (Environmental) that is most fundamental to the success of ESG management. Thus, when we formulated the NGK Group Vision, we also formulated the NGK Group Environmental Vision. This ambitious vision seeks, among other things, a reduction in our CO<sub>2</sub> emissions by fiscal 2030 to levels 50% below those of fiscal 2013. Eventually, our goal is to achieve net zero CO<sub>2</sub> emissions in our own activities by 2050.

Although one of the corporate strengths of the NGK

Group is its environmentally friendly products, the firing process used to produce ceramics requires large amounts of electricity and fuel. CO<sub>2</sub> emissions are an unavoidable byproduct. Therefore, we will reduce our CO<sub>2</sub> emissions while pursuing technological innovation and collaborating with society.

The capital investment associated with this needs to begin now if we want to meet our targets for fiscal 2030. That is why I am heading up a Carbon Neutral Project, which will accelerate a changeover to alternative fuel sources, such as hydrogen and ammonia.

### Launch of the CN (Carbon Neutral) Project



As for the 'S' (Social) in ESG, in April we formulated the NGK Group Human Rights Policy. To ensure that the human rights of all people involved in the NGK Group are not violated, we will comply with international standards of human rights and provide opportunities for everyone to play an active role, regardless of their gender or nationality.

And as for the 'G' (Governance), a resolution was passed at the General Meeting of Shareholders in June 2021 that increased the ratio of independent outside directors on the Board of Directors to one-third (three out of nine). This also represents an opportunity to further separate our supervisory and executive functions.

We are also working to ensure that assignments to

senior management positions are carried out regardless of nationality or gender. We have appointed an American executive officer for 2021, and we also appointed a female executive officer for 2020.

A company that loses the trust of society cannot survive. Compliance is the top operational priority. To boost our operations to world-class standards across the board, we introduced our NGK Group Basic Guidelines for Compliance Activities. Based on the shared values and understanding of the NGK Group presented in these guidelines, we will undertake compliance activities that always conform to the international standards.

### Results for the fiscal year ended March 2021

#### Securing increased revenue from a recovery in automotive and semiconductor-related business

Despite the impact of the COVID-19 pandemic, the fiscal year ended March 2021 saw a quick rebound in automobile sales, centering on China, and strong growth in demand for semiconductor manufacturing equipment. As a result, sales revenue increased and year-on-year operating income declined by only 8%. We were able to continue supplying our products, thanks to stringent infection-control measures taken by employees at our production facilities in and outside Japan.

In the fiscal year ending March 2022, we anticipate a continuation of this automotive and semiconductor-related growth, as well as greater activity associated with new

products. Regarding our EnerCera<sup>®</sup> lithium-ion rechargeable batteries, we are already working with more than 300 other companies and expect to see significant growth once the business model is established. As for our zinc rechargeable batteries, this fiscal year we plan to continue demonstration followed by commercialization. And from next fiscal year, we plan to start selling zinc batteries for specific applications to a limited number of customers. Soon we hope to see a successful conclusion to the demonstration testing of our subnano-ceramic membranes, which has been taking place in Texas, U.S.



## Towards the future

### Converting our business structure in anticipation of a Third Foundation

In conjunction with the formulation of the NGK Group Vision, an organizational restructuring was undertaken this past April. Of particular note is the establishment of the ESG Management Department, which brings together various ESG-related functions that had previously been divided among several different departments. This department will implement ESG-related activities across the entire Group, while also proactively communicating ESG-related efforts. Also, a Digital Transformation and Innovation Department was established, which brings together digital-related IT departments and others, to facilitate DX. These two departments are responsible for handling the question of how employees' jobs will change. We are working to cultivate leaders who will provide support for this change process.

To bring about the NGK Group Vision, every employee must be motivated to tackle the challenges of transformation without fear of failure. We must all take part in free and open discussion. The NGK Group's corporate culture is sober, technologically oriented, and at times somewhat risk-averse. But we must remember that trial and error is the only way to break new ground. We come up with a hypothesis; we test it; and, if it is wrong, we redo it. Nothing is ever perfect right from the start. We are building an ambitious company that does not fear failure. And it is in this context—and in line with our Group slogan of 'Surprising Ceramics.'—that we are pursuing the Five Transformations and converting our business structure in anticipation of our Third Foundation driven by NGK's unique ceramic technologies. Expect to see great things in the NGK Group's future.





## NGK Group Vision: Road to 2050

# Pursuing the ‘5 Transformations’ that will make us ‘what we want to be’ in 30 years

The NGK Group Vision announced in April 2021 presents a picture of ‘what we want to be’ by 2050 along with the path we will take to get there.

For NGK, 2021 is the year of our ‘Third Foundation’ as we pursue the self-transformation that will enable us to realize our vision.

### What we want to be

A company to contribute to carbon neutrality and digital society with our unique ceramic technologies



### What we must do

Convert our business structure through 5 transformations



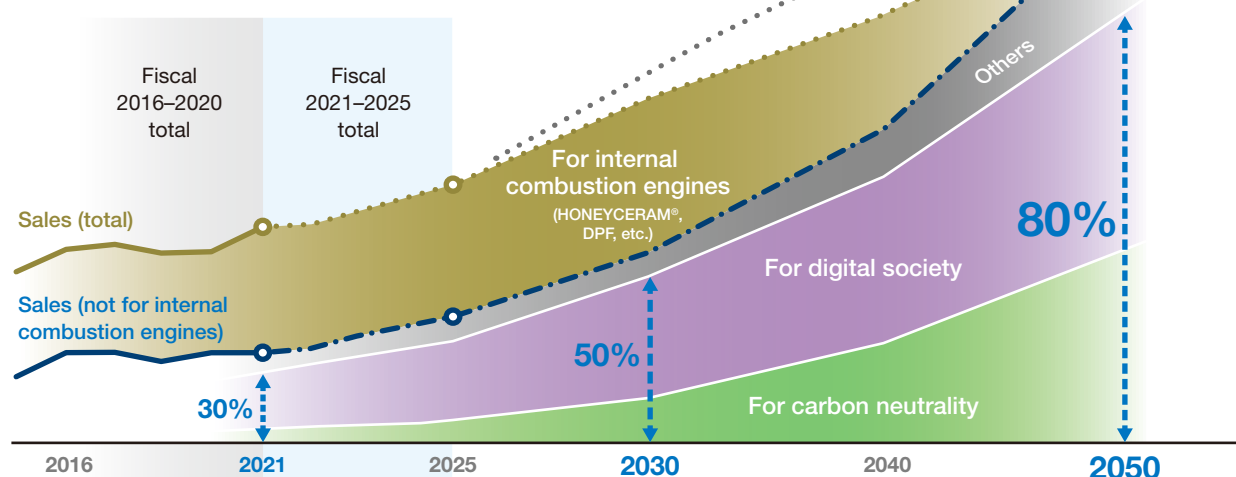
# Achieve 80% of sales from CN/DS

(Carbon Neutrality/Digital Society)

In expectation of carbon neutrality and digital society being our growth areas in the future, we are pursuing business transformations that will ensure products related to these areas account for 80% of our sales by 2050.

Demand for internal combustion engine remained scenario

Zero scenario



## Prospects for FY2025

Capital investment	376.6 billion yen	250 billion yen
R&D	108.4 billion yen	130 billion yen
Operating income	303.7 billion yen	400 billion yen
Free cash flow	+2.7 billion yen	+250 billion yen
Interest bearing liabilities	+100.3 billion yen	±0 billion yen

Input for sustainable growth

Retained funds

Return

Sales	600 billion yen
Operating income	90 billion yen
Net income	60 billion yen
ROE	10%
Dividend payout ratio	30%
Earnings per share (EPS)	200 yen

## Backcasting from the envisioned society of 2050

Since our foundation in 1919, we have been promoting business diversification and global expansion in the aim of contributing to the resolution of social issues as the times change.

Currently, carbon neutrality in 2050 is recognized as a global challenge. In addition, it is certain that digitalization will progress rapidly in the future. In formulating our medium-to-long-term vision, we imagined a society of 2050. Then, we positioned carbon neutrality and the digital society as social issues we should tackle on.

Backcasting from there, we considered what we need to

work on. We will continue to contribute to society with our unique ceramic technologies at our core. In order to do so, it is necessary to refine the technologies and raise the level. Next, to commercialize, it is essential to make a major change in management and the way we offer our products. Therefore, we have defined the current situation as the 'Third Foundation' and will work on self-transformation. We will contribute to society through our business by realizing what has previously been difficult with ceramic technologies at the core, and by working to the point where the key devices are implemented in society.

## 5 Transformations

For the NGK Group, the following ‘5 Transformations’ represent ‘what we must do’ in order to become ‘what we want to be.’

### ESG as a foundation of management

- E** NGK Group Environmental Vision:  
Contributing to achievement of  
CN through products and services  
Realizing net zero CO<sub>2</sub> emissions  
in our own activities by 2050
- S** Solutions to social issues  
through businesses  
Recruitment and cultivation of  
human resources
- G** Gradual reform of governance  
Development of a culture of openness

### Achievement of ‘New Value 1000’

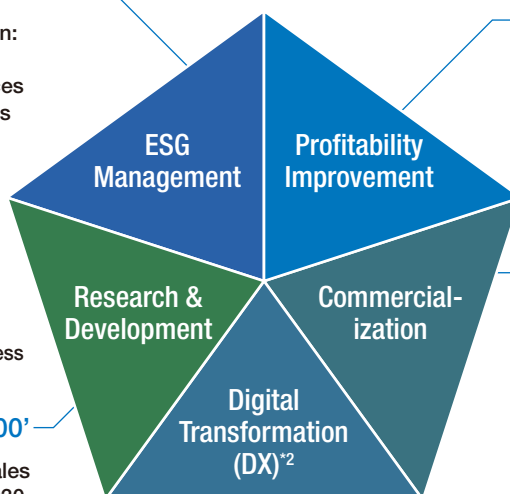
- Attain more than 100 billion yen of sales in newly launched businesses\*<sup>1</sup> in 2030
- Investment of 300 billion yen in R&D over the next 10 years
- Concentration in the CN and DS areas (80%)

\*<sup>1</sup> Businesses just launched and to be newly launched in the future

\*<sup>2</sup> DX: Digital Transformation

Transform business models and corporate structure with digital technology

\*<sup>3</sup> NGK ROIC (see page 30)



### Increase of earning power, creating a cycle for growth

- ROIC\*<sup>3</sup> / Analysis and improvement of profitability in each business
- Strengthening entire process chain

### Reinforcement of societal implementation of our products

- Improvement of cross divisional marketing capabilities
- Expansion of collaboration with outside partners
- Expanding solution business

### Propulsion for the whole transformation

- Digitization of all processes in the company
- Training of IT liaisons in each division

#### ESG Management

The central management focus moving forward will be contributing to society—as a member of society—through our business. In particular, with regard to E (environment), we have formulated the ‘NGK Group Environmental Vision’ along with the ‘NGK Group Vision.’ In that Environmental Vision, we stipulate our targets as contributing to carbon neutrality through products and services as well as achieving net zero CO<sub>2</sub> emissions in our own activities by 2050.

#### Profitability Improvement

Regarding improvement in earning power, we are going to take on the following initiatives:

- Generating cash by securely increasing our earning power over the next five years as explained earlier
- Instilling management utilizing ROIC and analysis and improvement of profitability in each business within the entire NGK Group
- Starting new actions in production processes to continue to reinforce our strengths as a manufacturer

#### Research & Development

We will aim and work on to create a business with sales of 100 billion yen by 2030 through new business development, which we call ‘New Value 1000.’ In order to achieve this, we will invest 300 billion yen in R&D over the next 10 years with 80% allocated to carbon neutrality and digital society.

#### Commercialization

In order to make ceramic products born from our strength more widely used in society, we will focus on expanding to solution business, not limited to just selling things, by improving our marketing capabilities and expanding collaboration with the outside partners.

#### Digital Transformation (DX)

We will use the power of digital to accomplish the above business transformation.



# New value to be provided by NGK

## For Carbon Neutrality

For carbon neutrality, separation and capture of CO<sub>2</sub> have been challenges. By using our ceramic membranes, it is possible to separate and capture specific gases with high precision and stability at the molecular level. Zinc rechargeable batteries using unique ceramic separators and water solutions as the electrolyte can be used safely indoors without the risk of fire accident.

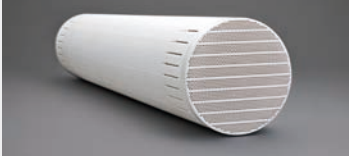
Furthermore, as future products, we will develop the followings;

- SOEC, a solid oxide electrolysis cell that can produce fuels and raw materials with high efficiency from CO<sub>2</sub> and water.
- Honeycomb structural reactors, which make reactions of synthetic fuel highly efficient by utilizing large-scale ceramics extrusion technology and separation membrane technology.

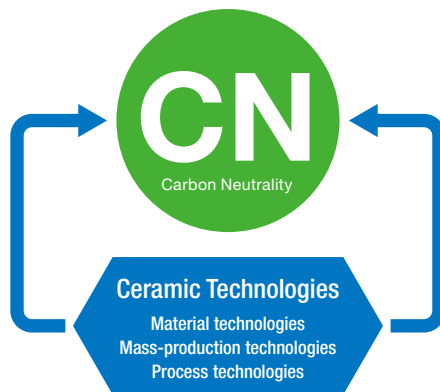
### New products

Under harsh usage, realizing high-precision separation and capture of CO<sub>2</sub>

Subnano-ceramic membranes



Large ceramic membranes that can separate CO<sub>2</sub> at the molecular level with our unique hydrothermal synthesis technologies



As there is no risk of fire accidents, they can be installed indoors and safely realize emergency power supply and renewable energy utilization

Zinc rechargeable batteries



High-safety and high-capacity storage batteries using our proprietary ceramic separators and water solutions as the electrolyte

## For Digital Society

We will contribute to agendas such as the expansion of the IoT and advanced security with our ultra-thin batteries. These batteries combine high-temperature endurance, high capacity, and low resistance properties that were previously difficult to realize. We commercialized them thanks to our crystal control technologies. They are expected to be utilized in weak power supplies and applied in smart cards and wearable devices. Meanwhile, our advanced wafers, which are manufactured

using unique, ultra-high precision-polishing and bonding technologies, facilitate the precise and powerful filtering capabilities required of 5G and successor next-generation, high-speed communications networks. We will utilize our high precision technologies of ceramics for the development of future products. For example, mobility sensors that contribute to autonomous driving technology and also bonded wafers that realize miniaturization of devices and ultra-high-speed communications.

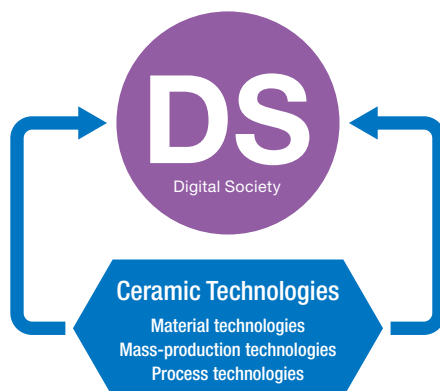
### New products

- Realizing a maintenance free IoT
- More secure smart cards
- Wearable devices closer to our life

EnerCera®



Highly heat-resistant, high-capacity, high power, fast-charging and ultra-small and thin batteries utilizing our unique crystal-orientation control



Contribution to 5G and next-generation telecommunications networks with high speed and high data capacity

Wafers



Highly functional bonded wafers realized by our unique precision-polishing and bonding technologies

# Formulation of the ‘NGK Group Environmental Vision’

The NGK Group is working to contribute to society through its business and has positioned ESG as a foundation of management.

In April 2021, we formulated the ‘NGK Group Environmental Vision’ along with the ‘NGK Group Vision.’ We stipulate our targets as contributing to carbon neutrality through products and services and achieving net zero CO<sub>2</sub> emissions in our own activities by 2050.



## NGK Group Environmental Vision

The NGK Group will contribute to the realization of society’s direction toward  
“carbon neutrality,” “a recycling-oriented society,”  
and “harmony with nature” through its business activities.

### Toward carbon neutrality

We will develop and provide products and services that contribute to the realization of a carbon-neutral society and apply them to our own business activities in order to achieve our goal of net zero CO<sub>2</sub> emissions by 2050.

### Toward a recycling- oriented society

We will contribute to the realization of a recycling-oriented society by reducing our natural resource consumption and developing and providing resource-efficient products.

### Toward harmony with nature

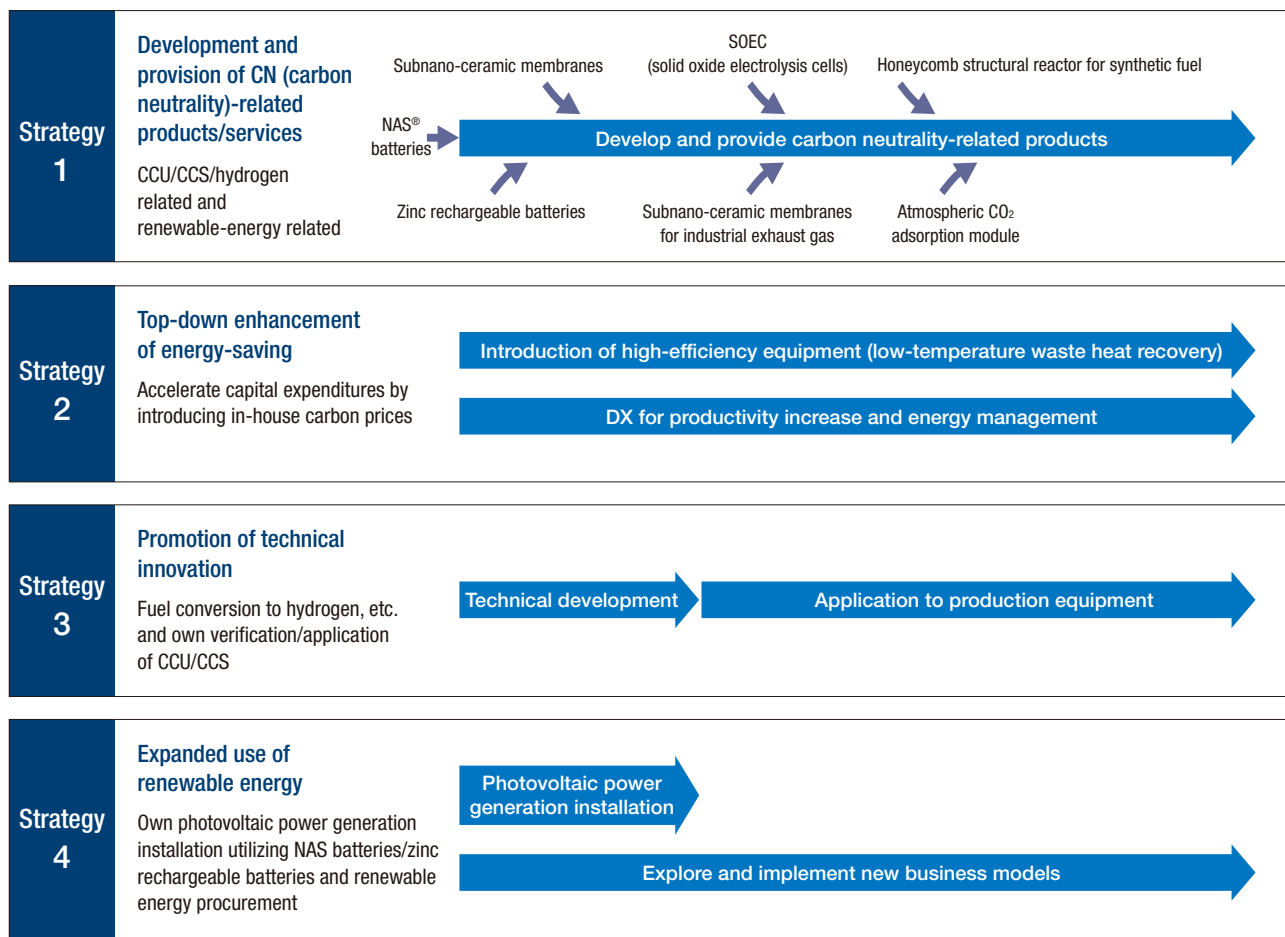
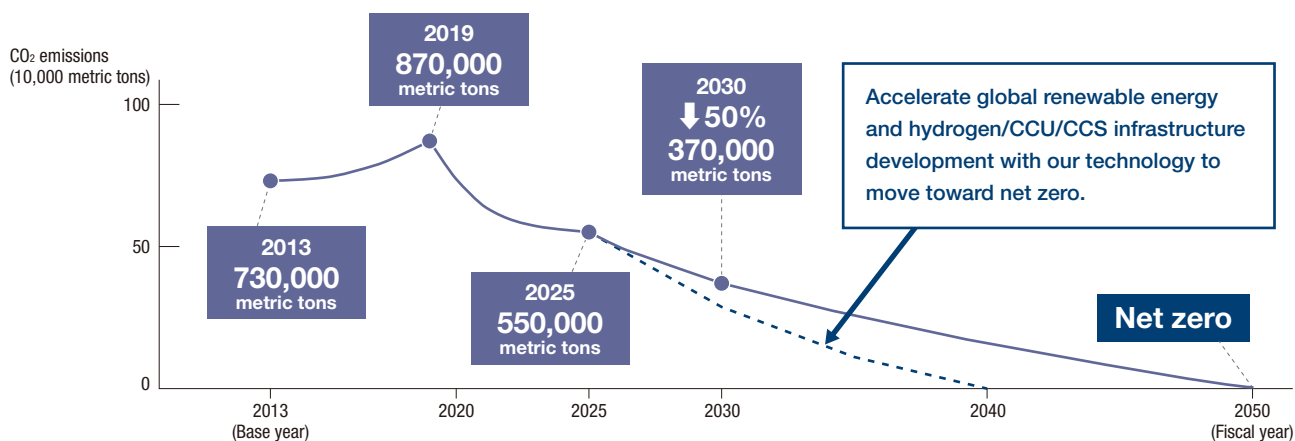
We will minimize our environmental impact on ecosystems and raise stakeholder awareness through educational activities in order to achieve harmony with nature.



## Carbon Neutrality Strategic Roadmap to achieve net zero CO<sub>2</sub> emissions

In light of the NGK Group Environmental Vision's call to realize net zero CO<sub>2</sub> emissions in our own activities by 2050, we have formulated the Carbon Neutrality Strategic Roadmap in order to achieve our goals. We have set a milestone (mid-term goal) of reducing CO<sub>2</sub> emissions 50% by fiscal 2030 (from their fiscal

2013 levels), and, along with this, we are developing technology related to hydrogen and CCU/CCS (Carbon Capture and Utilization/Carbon Capture and Storage) that will help us to achieve our goals ahead of schedule.



# Business strategy innovation and internal reform

## Introduction

### Now is the time for change

The NGK Group Vision sets forth what we want to be in order to fulfill the stated mission of our Group Philosophy: Enriching Human Life by Adding New Value to Society. As Executive Vice President, I was involved in the formulation of this Group Vision, and share in the heartfelt conviction behind it that we must change, and we must do so now.

By formulating a new vision, we have identified the “mountains” that we must climb. These mountains are represented by two areas—carbon neutrality and digital society—where we can put our ceramic technology strengths to good use. What we need to do now is establish our climbing strategy and then set our Group in motion in implementing it.

This does not mean, however, that we cannot change mountains once we have started climbing. We are in an era of rapid change and uncertainty, one characterized by VUCA (volatility, uncertainty, complexity, and ambiguity). It may be

that in five years’ time we will switch our focus towards a different mountain. What is important is that we get started climbing, that we take action, while also being willing to course-correct whenever circumstances require in the world.

Up until now, the NGK Group has focused on insulators, automotive-related business, and other markets where change occurs at a relatively unhurried pace. However, the times now call for a greater sense of urgency and flexibility in adapting to change. If we continue at the same pace we have been going at, we will not be able to stay in business. Over the next 10 years, we need to put in place a foundation that will allow us to achieve our goal of having 80% of Group sales come from carbon neutrality and digital society-related business by 2050. First and foremost, if we want to realize our vision, we will need to adopt a greater sense of urgency.

## Sense of urgency

### A necessary change in mindset among all Group employees

Faster research and development is essential to fostering a greater sense of urgency in our business. It is assumed that ceramic research and development will take anywhere from four to five years to up to 10 or more years. However, I want us to focus on shortening it to one year, depending on the research theme. If we do not accelerate the development cycle, which includes everything from research and development up through release on the market, we will never be able to compete in the rapidly changing carbon neutrality and digital society-related markets.

In order to speed up the development cycle, we must first increase our development themes and speed up the rate of commercialization. We also need to be faster about ascertaining, selecting, and focusing in on promising themes. Achieving this will necessarily entail transformation of whole process from product development to commercialization. We

will also make use of external resources, such as venture capital investment, to help in speeding up processes.

Besides this, in order to shorten the lead time from R&D to commercialization to market launch, our policy is to upgrade equipment and lines dedicated to trialing products consistently related to our carbon neutrality and digitalization efforts. We will develop prototypes concurrently with an eye to eventual mass production. I would like to use our existing plants for the mass production of new products.

On the other hand, to truly increase the speed at which we develop business, all our employees must change their mindset. This doesn’t mean they should change to follow a vision. Rather, it means they should make a conscious effort to change themselves so that what they make and do will change as a consequence.

## From products to solutions

### Pursuing business strategy innovation

This past April, the NGK Group, working in conjunction with local government and others, established Ena Electric Power Co., Ltd. as a new, regional power producer and supplier in Ena, Gifu Prefecture. We are not simply selling products, i.e., long-lasting, large-capacity NAS<sup>®</sup> storage batteries. Rather, we are providing a system for storing and discharging renewable

energy according to supply and demand. By switching our focus to providing a solution that encompasses a local production for local consumption system and that facilitates greater regional energy resilience, we are generating new economic value.



Chiaki Niwa  
Executive Vice President

Renewable energy usage is not only connected with achieving net zero CO<sub>2</sub> emissions from production facilities, it also presents opportunities for NGK to develop and sell innovative solutions for making renewable energy systems more end-user-friendly. We have already begun demonstration testing of subnano-ceramic membranes used for CO<sub>2</sub> separation. By having a proven achievement, we will be able to provide a system that can be used not only by gas and oil fields but also by chemical companies and others in the industrial sector.

We will develop a strategy that is not simply focused on the ceramic membranes alone but also on the CO<sub>2</sub> capture

equipment, systems, and even engineering. In carbon neutrality-related fields, it is particularly important to sell solutions rather than products. We must move away from the conventional “sell out” model used to sell parts and devices and, instead, change ourselves to develop new markets in previously untapped areas.

Our efforts may sometimes meet with failure, but what is important is that we keep trying new strategies so that we will find new value to offer society. This will lead to significant sales and profits in the future. I think this is exemplified by Commercialization, one of the Five Transformations of the NGK Group Vision.

## Technological innovation Resolutely moving ahead despite major hurdles

Even aside from these sorts of externally focused efforts, realizing the NGK Group Vision and Environmental Vision will require major self-transformation on the NGK Group. For example, in order to realize net zero CO<sub>2</sub> emissions by 2050, which is one of the goals of our Environmental Vision, we will need to implement a variety of technological innovations. One particularly high hurdle will be switching from fossil fuels, like natural gas, to alternative fuels, such as hydrogen and ammonia, to power ceramic firing. Not only within the NGK Group but in all of human history there is no example of hydrogen or ammonia-powered ceramic firing used in mass production. Both the flame color (radiation temperature) and atmosphere (partial vapor pressure inside the kiln) differ between fossil fuels and hydrogen and ammonia. Even the materials themselves will need to be changed; thus, the technological hurdles are extremely high. Nevertheless, we are resolute and determined.

We are considering a variety of ideas and combinations for the future, such as using hydrogen, ammonia and, so-called,

“green methane” fuel\* at different production facilities, depending on local considerations, as well as testing out CCS (CO<sub>2</sub> collection and storage), which utilizes our subnano-ceramic membranes for CO<sub>2</sub> separation at our own production facilities and then implementing them across society.

All of these transformations are based on another one of the Five Transformations: promoting Digital Transformation (DX). DX is essential for shortening the time frame of research and development and for constructing innovative business strategies. We envision the implementation of DX in two phases: a DX 1.0, which uses digitization to increase efficiency and a DX 2.0, which creates new value. First, we will implement DX 1.0 throughout the Group to improve the digital literacy of each employee, and, then, we will develop DX 2.0 based on a fundamental rethinking by each employee of their job and duties.

\* Methane produced from CO<sub>2</sub> using artificial photosynthesis and renewable energy.



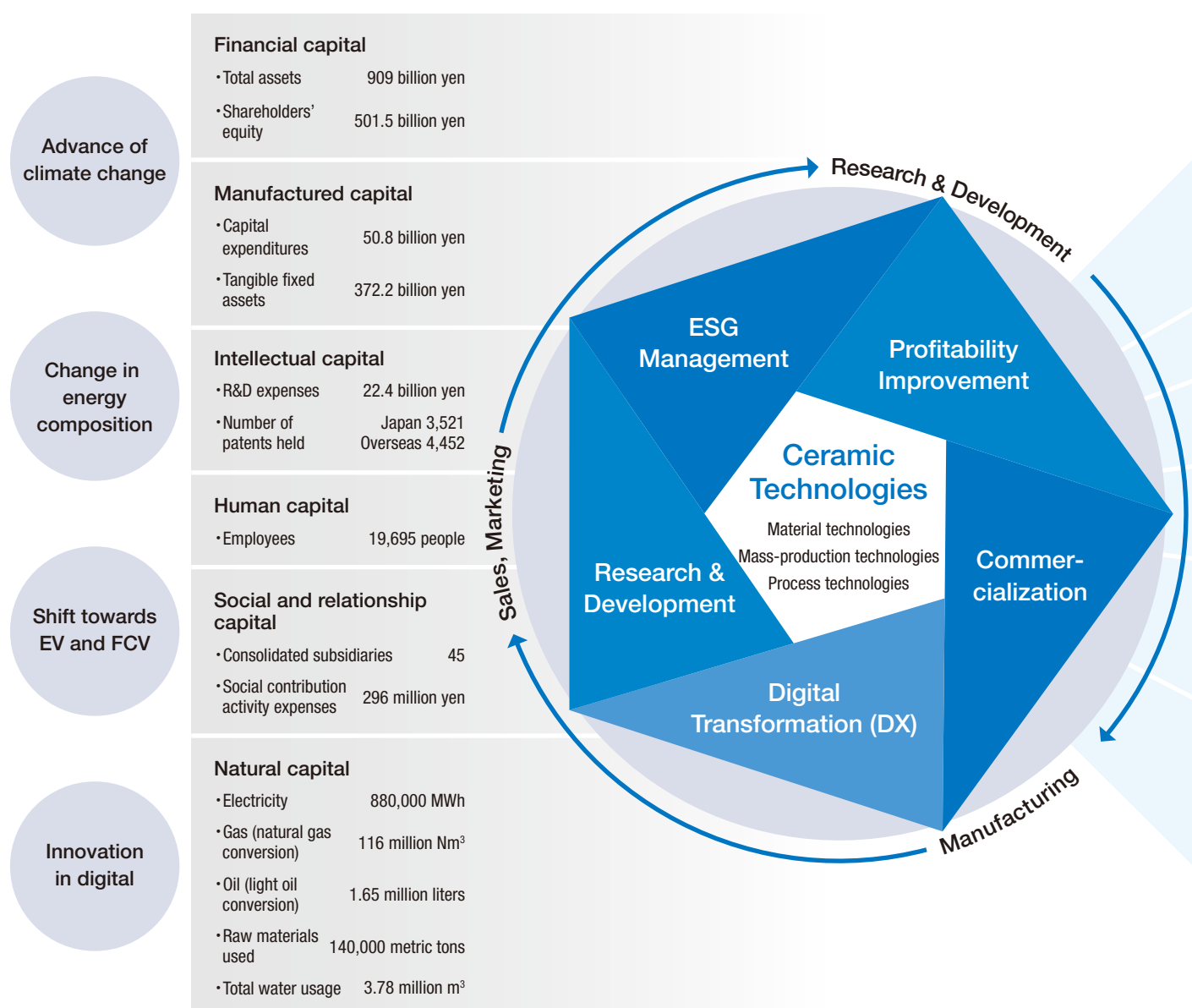
# Addressing society's challenges, developing new areas for growth

Pursuing our vision through investment in growth areas

## Megatrends

## Input Fiscal 2020

## Business Activities



Corporate Governance

## Output

Fiscal 2020

Net sales	452.0 billion yen
Operating income	50.8 billion yen
Net income attributable to owners of the parent	38.5 billion yen
Return on equity (ROE)	7.9%

Gross profit	123 billion yen
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New product* sales ratio	30%
*Within 5 years of commercialization	

Employee satisfaction (NGK)	68%
Number of female managers (NGK)	29 people

CSR Procurement Guideline adoption rate for business partners	99.6%
Overseas students supported	
39 students from 5 countries stayed in company dormitory	
Scholarships (non-repayable) for 20 students from 10 countries	

CO <sub>2</sub> emission	756,000 metric tons
Discarded materials reduction	3,000 metric tons
Sales growth for products contributing to environmental protection	144
(Figures are indexed with fiscal 2013 set at 100)	
Recycling rate	99.7%

## Charting a Course Ahead

### NGK Group Vision

**A company to contribute to carbon neutrality and digital society with our unique ceramic technologies**

## Carbon Neutrality

Making clean energy more efficient

Making mobility clean and safe

## Digital Society

Making smart society more comfortable

Making industries innovative



# Focusing on carbon neutrality and digital society in the development of new growth products

## R&D policies

### Remain committed to unique core technologies

Although the NGK Group Vision presents us with a new path forward for the NGK Group, the aim of our research and development remains to develop ever more advanced material and process technologies with a focus on fine ceramics while continually creating new and competitive products. It is the job of Corporate R&D to keep coming up with products that will enable us to continue growing via carbon neutrality and digital society-related business once gasoline-powered automobile business and other internal combustion engine automotive-related business have passed their peak.

The business fields that attract attention are changing rapidly, and technological innovation in the market is also picking up speed. In order to adapt to this situation, we must increase the number of research and development themes that we are working on, as well as accelerate the speed of that research and development, as we pursue a strategy of open

innovation. At the same time, however, we will continue to carefully invest time and resources into developing the unique core technologies that are NGK's greatest strength.



## Recent results

### EnerCera® goes into mass production, and gallium nitride (GaN) wafer samples start shipment

One of the research and development success stories of fiscal 2020 is our EnerCera lithium-ion rechargeable battery. These thin, flexible, pouch-type batteries have now gone into mass production for use in multifunctional credit cards and automobile card keys. Additionally, we anticipate adoption of EnerCera for various types of smart cards, logistics-related IC tags and other IoT devices, wearable devices, and numerous other applications. Mass production of coin-type EnerCera batteries able to withstand temperatures of up to 105°C began in the first quarter of fiscal 2021, while a lineup that includes batteries able to function at temperatures of up to 125°C is expected to go into mass production during fiscal 2022. In tandem with this is the development of power systems and other systems and devices, which is being carried out in collaboration with IC manufacturers and device manufacturers. These are ultimately intended for joint sale to IoT device manufacturers and other end product manufacturers.

As for new bonded wafers, which utilize the technology in our bonded wafer for surface acoustic wave (SAW) filter, we are

working to apply them to new SAW filters for 5G communications and optical devices for optical networks and data centers. These wafers are scheduled to go into mass production from next fiscal year.

We have begun providing samples of our gallium nitride (GaN) wafer for laser light to facilitate interest and adoption in the even larger market of power semiconductors. We will work closely with the device makers who are our customers to develop two types of wafers: a four-inch wafer for high-frequency applications and a six-inch wafer for high-power applications.

We are also currently performing demonstration testing at oil fields in Texas, U.S. of subnano-ceramic membranes capable of CO<sub>2</sub> separation and capture. The development of this technology will also facilitate CO<sub>2</sub> capture at power plants and production sites and represents a potential area of significant carbon neutrality-related business growth.



A portrait of Tsutomu Nanataki, a middle-aged man with glasses, wearing a dark suit, white shirt, and a patterned tie. He is gesturing with his hands while speaking. The background is a blurred green and white.

## Tsutomu Nanataki

Senior Vice President  
Group Executive, Corporate R&D

### New Value 1000

#### Aiming for 100 billion yen in sales from newly launched businesses

Our research and development will contribute to the realization of the NGK Group Vision by setting the New Value 1000 target. Essentially, New Value 1000 involves achieving 100 billion yen or more in sales from newly launched businesses by 2030 and increasing research and development expenditures to 300 billion yen over the next 10 years, with 80% being allocated to carbon neutrality and digital society-related areas.

With regard to carbon neutrality-related business, we are developing subnano-ceramic membranes for use in CO<sub>2</sub> capture, utilization, and storage; various storage batteries, such as zinc rechargeable batteries for use in renewable energy applications; and solid oxide electrolysis cells (SOEC) essential for high-efficiency synthesis of fuel and base materials from captured CO<sub>2</sub> and water. With regard to power semiconductors that achieve high energy efficiency and are used in EV power sources, we are expanding the application of gallium nitride

(GaN) wafers by increasing their performance, as well as developing DCB and AMB substrates that use silicon nitride materials with high thermal conductivity.

With regard to digital society-related business, in addition to expanding applications and sales of EnerCera, we are developing new bonded wafers suited to new applications, such as optical computers and quantum devices. We are also working on next-generation susceptors for semiconductor manufacturing equipment, a large market, and ceramic packages for self-driving and other applications.

The top priority in all of the development we are undertaking is to ensure we put the NGK Group's unique technologies to use in differentiating ourselves from the rest of the market. It is essential that we invest the time necessary to further develop these unique technologies, but also work to accelerate the pace of research and development overall.

### Moving forward

#### Maintaining a sense of urgency about technological development that leads to competitive new products

We have begun focusing serious attention on a development method known as materials informatics. The aim of this method, which involves creating databases of accumulated testing results and then having AI analyze them, is to make it possible to develop innovative ceramic materials in a short period of time. The fact that the NGK Group has a century's worth of accumulated testing data makes us well suited to this method. We have finished digitizing this testing data, and we are now working on converting it into structured data suitable for analysis. This is being undertaken as a company-wide project involving not just Corporate R&D but also Corporate Manufacturing Engineering and the new Digital Transformation and Innovation Department. Results will be confirmed over a one-to-two-year period. Even if it takes 10 years, we will establish the technology. This method is already being utilized for organic materials, but many uncertainties and significant challenges remain with regard to its application for ceramics.

It is also important that we pursue open innovation. We will begin by doubling the number of joint research projects that we carry out with universities and research institutions, which

currently numbers around two dozen, introduce technology from outside the NGK Group, and pursue joint development with companies that are working on developing devices like EnerCera. We are looking at equipping our other business sites with facilities like the ID-Room, which we set up at the NGK Head Office in order to facilitate this sort of development. In April 2021, in partnership with the Nagoya Institute of Technology, we established the NGK Environment Innovation Laboratory on the university's campus in Nagoya. We have begun work on the next generation of innovative products, like power semiconductor materials and high-performance storage battery materials.

We are also actively expanding the number of personnel that we have in research and development. In the past, once the research and development team had finished a prototype, the production engineering team would begin work on designing a pilot plant. Moving forward, in order to facilitate an efficient transition to mass production without the need for reworking, we are instituting a project system that ensures personnel familiar with both product design and manufacturing are involved in development from the basic process design phase.

# Producing ceramics is like putting together a complex jigsaw puzzle

From its very beginning, the NGK Group has sought to reexamine conventional ceramic manufacturing practices in light of the latest science and technologies 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.

## Core Technologies of the NGK Group





**Ceramic manufacturing is patient, methodical work, which requires you to blow life into inanimate material that is hard and brittle.**  
**There are three stages by which raw materials become products, and each requires advanced technologies.**

**1. Selecting and mixing the raw materials on which the product is based: Blending and kneading**

**2. Molding the product: Shaping**

**3. Firing the product so as to realize the optimal crystalline structure: Baking**

Particles of the powdered raw materials that form ceramics have a diameter of just 1/1,000 of a millimeter. If the particles are too large, it will take too long to fire them, and if they are too small, they will exhibit cracking and variability. If particles of different sizes are mixed together, distortion may result. The optimal raw materials must be chosen from tens of thousands of possibilities and blended together.

The blended raw materials are molded using a method that suits the shape of the product and fired in a kiln. Upon firing, the particles of raw materials fuse together and contract, causing finished products to shrink by about 25% for insulators and about 10% for HONEYCERAM®. The key priority is to create uniform, appropriate gaps between powder particles during the molding stage. Failure to do so will result in variability in how the product shrinks when fired, causing its shape to change. Conditions inside the kiln are also important. The powdered raw materials harden to create minuscule

crystals, and the structure of these crystals determines a ceramic product's characteristics. That crystallization process is influenced by the temperature and duration of the firing process, flame color (radiant temperature), and surroundings (water vapor partial pressure inside the kiln). If temperature variations inside the kiln create differences in how firing proceeds, the finished product will not be uniform.

In this way, high-performance ceramic products can only be produced if a variety of conditions are satisfied at every stage of manufacture. It is like a complex jigsaw puzzle. The breadth of accumulated technologies and expertise is the source of the NGK Group's competitive strength.

To realize the NGK Group Vision, we carry out groundbreaking research and development and create innovative technologies in the shortest time possible by combining our accumulated strengths with state-of-the-art technologies such as Digital Transformation (DX).



# Investing management resources in growth areas in order to realize our vision

In my job in charge of the NGK Group's finances, I will lead efforts to utilize financing, business portfolio management, and IR activities to help move business in the direction of the NGK Group Vision.

### Duties of the head of finance

#### Implement capital policy that contributes to raising corporate value

As the head of finance, whose duties revolve around minimizing capital costs and maximizing profitability in excess of capital costs, is responsible for formulating capital policy and maintaining clear and appropriate communication with shareholders and investors. One of our key management indicators is ROE (return on equity), and our medium-to-long-term target for ROE is 10%. Using NGK ROIC

(return on invested capital), which is closely linked to ROE, as a management indicator, we are pursuing management that prioritizes capital efficiency.

Moving forward, we will continue to support top management from a financial perspective while also keeping them in check.

### Towards realization of the NGK Group Vision

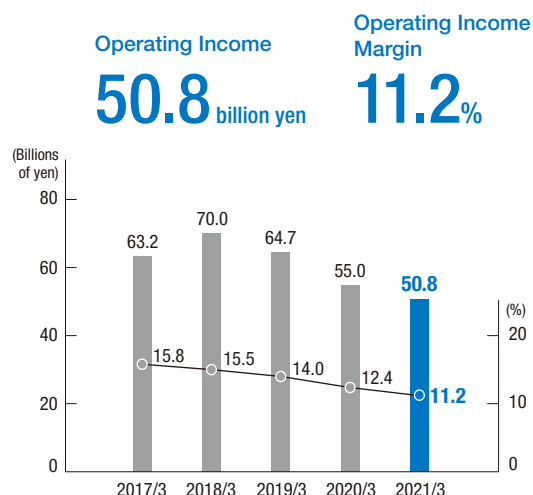
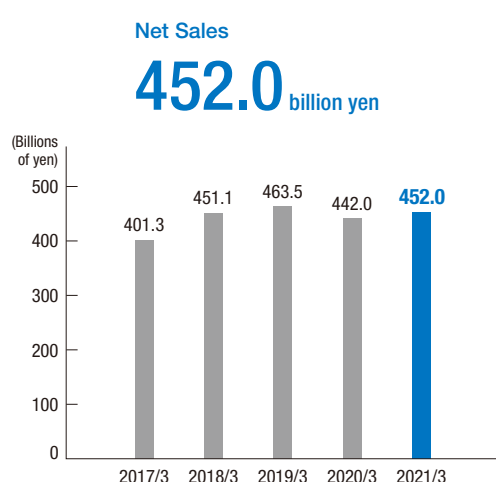
#### Focusing on investments and R&D in new fields

We are anticipating sustained returns on the capital investment that we made over the past five years. This free cash flow will be used for capital investment in carbon neutrality and digital society, two focuses of the NGK Group Vision, and focused investment in research and development, aiming for a milestone target of 100 billion yen in sales from new product business\*<sup>1</sup> by 2030.

However, issues such as how to sell products and how to

cultivate a market for them make it difficult to get the ball rolling for new businesses, so achieving 100 billion yen in sales is a tall order. Starting in fiscal 2021, we have created a new project team that will develop carbon neutrality-related products as our third pillar, and it is important that we invest resources into such fields.

\*<sup>1</sup> Business that will be launched in future and businesses that are still quite small in scale.



## Hideaki Shindo

Director and  
Senior Vice President



### Key indicators

### Using NGK ROIC as a management indicator

The five key management indicators that we focus on are net sales, operating income, net income, ROE, and NGK ROIC. Operating income represents business results and is used as the basis for determining input into growth sectors, return for stakeholders, and retained funds. Net sales are a measure of growth, while ROE is used as an external indicator and NGK ROIC as an internal indicator.

$$\text{NGK ROIC} = \text{Operating income} \div \text{Business assets}$$

A key aspect of NGK ROIC is that it utilizes business assets (accounts receivable, inventories, fixed assets) in lieu of invested capital, and operating income in lieu of after-tax operating income, as these are directly connected with the results of business divisions, or can be controlled by business divisions.

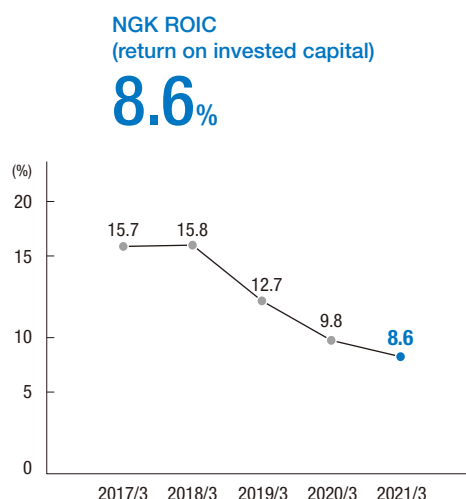
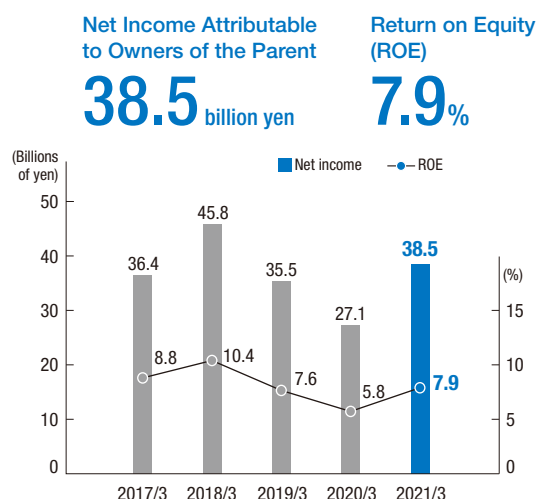
NGK Group business represents highly capital-intensive process manufacturing; thus, while the profit potential is high, the asset turnover ratio is low, being about 0.5. The burden of capital investment is a barrier for competitors entering this industry. An excessive amount of assets can lead to inefficiency in managing them, and, in recognition of this, we have been using NGK ROIC as an indicator since 2016. In order to optimize inventories assets and fixed assets on the balance sheets of each business division, targets are established and performance is tracked, with the managers in

charge of a given business area explaining inventory reductions and investment efficiency at biannual budget meetings, in some cases to the president directly.

In addition to this, from fiscal 2021, we have begun ROIC tree-based management, which we break all the way down to items such as net sales cost ratio, SGA (selling, general, and administrative) expense ratio, and inventory/accounts receivable turnover period (in months) at the level of the individual business division in order to facilitate business improvement.

The NGK ROIC target for fiscal 2021 has been set at 12%. When you take taxes and expenses into account, a 12% rate is required in order to achieve an ROE of 10%. We explain to the entire NGK Group that if we don't exceed this figure, we cannot provide investors with the level of returns they desire.

Looking at the performance forecast for fiscal 2021, with the post-COVID-19 rebound in demand, particularly for automotive-related products, insulator and package businesses are expected to move into the black, with profitability expected to improve significantly. With impairment of fixed assets and business restructuring well on the way to completion, depreciation costs are expected to slow down gradually due to low investments compared to previous years. In terms of efficiency, as well, inventory reductions and other factors are keeping financial leverage at around 0.4, which puts us on track for ROE of 10% or more.



## Capital policy and financial strategy

### Emphasizing soundness and maintaining a minimum rating of at least A+

With regard to debt-to-equity structure on the balance sheet, we are aiming for a DE ratio of around 0.4. This will preserve an equity ratio of at least 50%, enabling us to ensure our bond rating remains at least A+ (R&I). At present, liability costs are low compared to capital costs, but, because, an increase will upset our financial equilibrium, we believe this is a reasonable level for achieving both capital efficiency and financial soundness.

In terms of financing, we think about timing, amount, and time frame based on a forecast of cash flow three years out. We prioritize economic cost while adopting a mix of long and short-term financing to ensure there is no overlap in repayment timing.

In addition, we focus on net DE ratio<sup>\*2</sup>. Due to past incidents, such as NAS<sup>®</sup> battery fires and anti-trust cases,

which required cash outflow, as well as due to active capital investment, we borrowed 305 billion yen over the past 10 years. As of March 31, 2021, our net cash total was minus 97.8 billion yen, with an interest-bearing debt balance of 264.2 billion yen. In order to put our net cash back into the black, we are emphasizing cash flow in our managerial decisions.

We have embarked on a plan to invest 300 billion yen into research and development over the next 10 years as part of the NGK Group Vision. The money to fund this investment can come from the cash flow generated by our business. We intend to maintain our DE ratio by balancing interest-bearing debt repayment with borrowing.

<sup>\*2</sup> Net DE ratio = (Interest-bearing debt as of the end of the previous fiscal term – Cash and cash equivalents as of the end of the previous fiscal term) ÷ Equity as of the end of the previous fiscal term × 100

## Shareholder returns and IR

### Lowering capital costs by communicating with investors

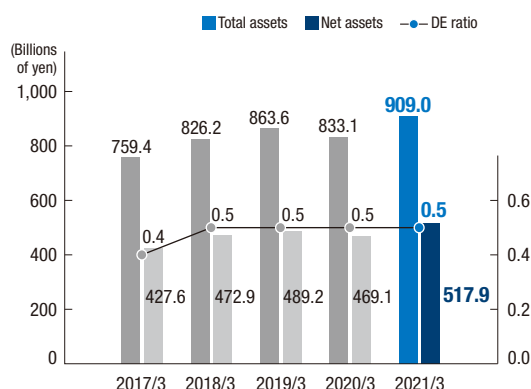
Our profit return policy aims to achieve a medium-term consolidated dividend payout ratio of around 30%, which is paid as direct shareholder returns. We make use of three-year moving averages, due to the fact that net income fluctuates from year to year as a result of such factors as extraordinary income and loss and tax burden. Also, starting from the period

ended March 2021, we have added net asset dividend ratio as a new metric to complement dividend payout ratio. Our three-year moving average target is 3%. This is because multiplying ROE with the dividend payout ratio gives a net asset dividend ratio of 3%.

**Total Assets**  
**909.0** billion yen

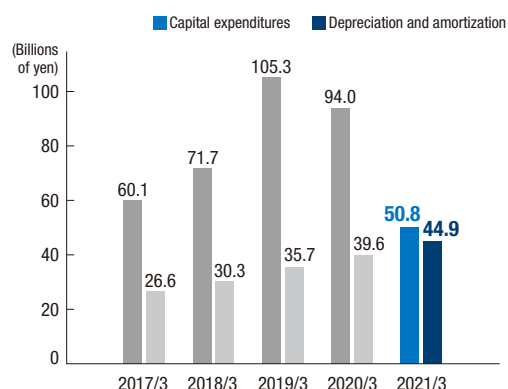
**Net Assets**  
**517.9** billion yen

**DE Ratio**  
**0.5**



**Capital Expenditures**  
**50.8** billion yen

**Depreciation and Amortization**  
**44.9** billion yen





In fiscal 2021, we also acquired 5 million shares of treasury stock at 9.7 billion yen. The NGK Group has also been proactive about shareholder returns from a medium-to-long-term perspective and is condensing shareholders' equity through the acquisition since 1996 of a cumulative total of 108.93 million shares of treasury stock at 135.6 billion yen.

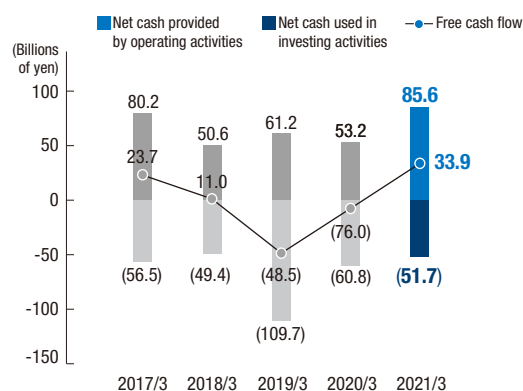
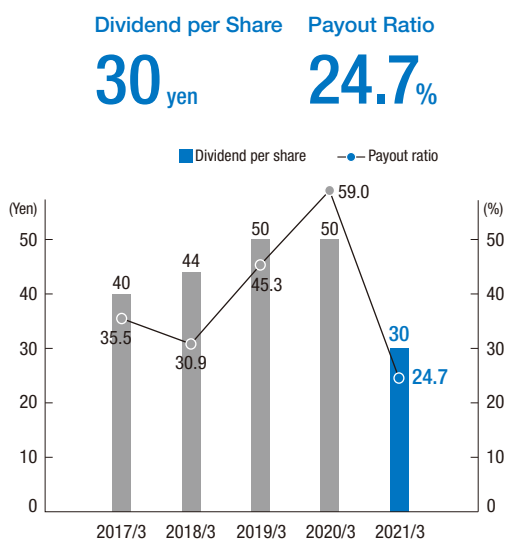
Since the 1990s, NGK has undertaken IR activities aimed at increasing ROE. In addition to financial results briefings for investors held biannually in Tokyo, major securities companies host a forum for overseas investors. We also undertake overseas IR twice a year. Recently, due to the impact of the COVID-19 pandemic, we have focused on online communications, along with phone interviews and personal visits with institutional investors totaling around 160 sessions for the year. We also carry out IR targeting individual investors.

We recognize that, at 8.7%, the NGK Group's capital cost is high and that we have a high  $\beta$  value<sup>\*3</sup>. In order to lower this capital cost, we need to communicate with investors through IR activities to close the gap in future awareness. We are also explaining the governance initiatives that we have put in place to make sure investors understand that a new system has been

established for safeguarding against a reoccurrence of past problems. Also, because gasoline-powered, diesel-powered, and other internal combustion engine-related business accounts for such a large portion of NGK Group sales, I feel this creates resistance to purchasing our shares due to the global trend towards EVs. But the reality is that sales of internal combustion engine automobiles will not suddenly decrease before 2030. We carefully explain to investors that in the meantime we are taking the cash we earn and aggressively investing it in areas such as carbon neutrality and digital society.

Following our announcement of the NGK Group Vision, investors have complimented us on how clear and easy-to-understand the Group's direction has become. We are also embarking on our NGK Group Environmental Vision, which aims to realize net zero CO<sub>2</sub> emissions by 2050. We are therefore investing time and energy into meeting with ESG investors to explain the ESG management-centered goals that we are working toward.

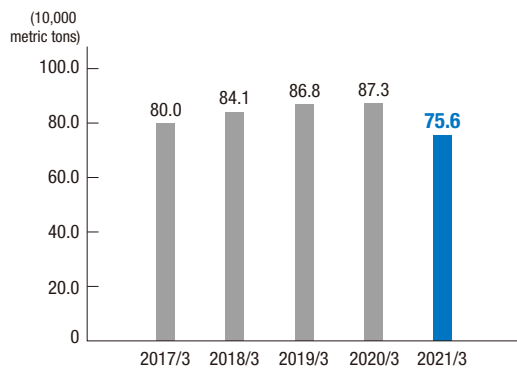
<sup>\* 3</sup>  $\beta$  = Securities-specific returns ÷ Overall market returns



## Non-Financial Highlights

### CO<sub>2</sub> Emission

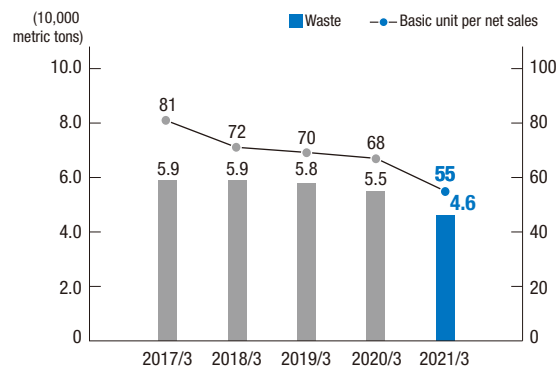
**756,000** metric tons  
All NGK Group manufacturing sites



Note: Excluding non-production bases  
For the consolidated values of OUTPUT/energy-origin CO<sub>2</sub> and Scope 2 (energy-origin CO<sub>2</sub>), the calculation standard has been changed from the previous fixed value for the emission coefficient of electricity (a factor for converting electricity consumption into CO<sub>2</sub>) to annually updated values of each electric power supplier.

### Waste

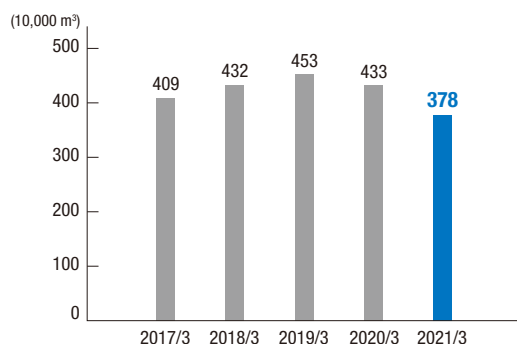
**46,000** metric tons  
All NGK Group manufacturing sites



Note: FY2013 = 100  
Excluding non-production bases

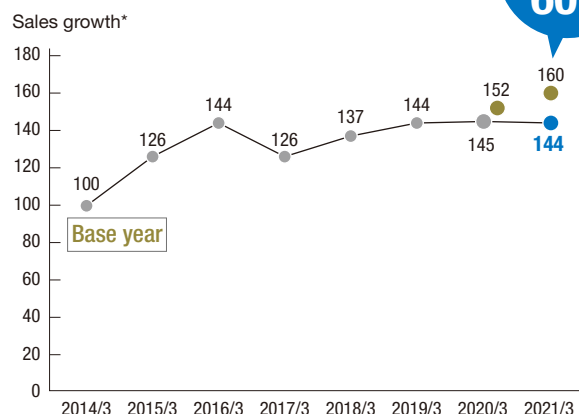
### Total Water Usage (10,000 m<sup>3</sup>, NGK Group)

**3,780,000** m<sup>3</sup>



### Sales Growth for Products Contributing to Environmental Protection (NGK Group)

Target:  
Increase by  
**60%**



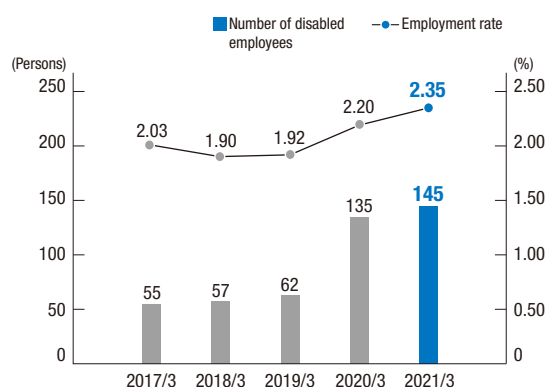
\* Figures are indexed with fiscal 2014 set at 100.

### Number of Disabled Employees

**145**

### Employment Rate\*

**2.35%**

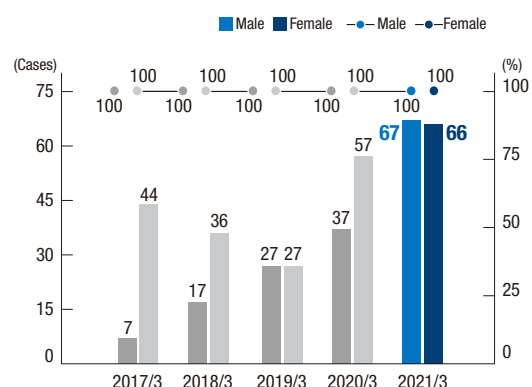


### Number of Parental Leave Takers

**133**

### Retention Rate (NGK)

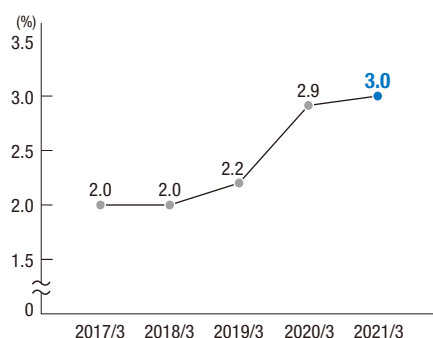
**100%**



\* Figures are for the total of the three companies including NGK, NGK Yu-Service, and NGK Ceramic Device.

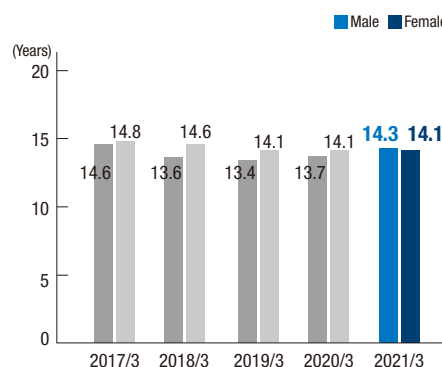
Percentage of Female Managers  
(NGK)

**3.0%**



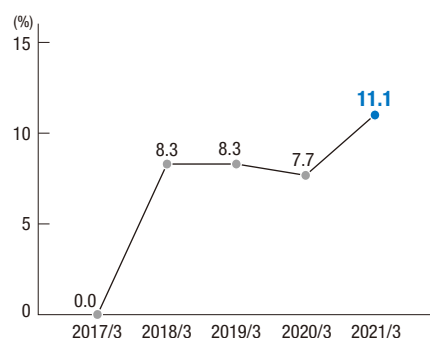
Average Duration of Continuous Employment  
(NGK)

Male **14.3** years Female **14.1** years



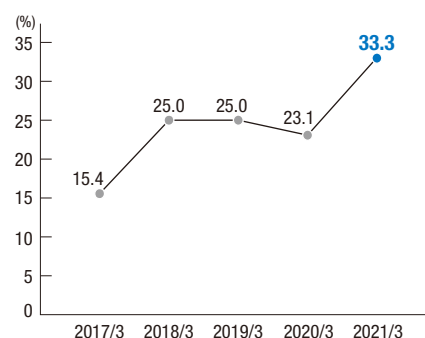
Percentage of Female Directors  
(NGK)

**11.1%**



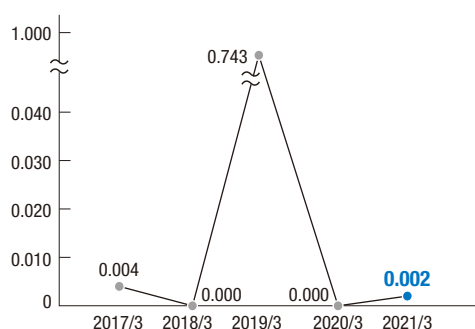
Percentage of Outside Directors  
(NGK)

**33.3%**



Severity Rate (Number of Lost Work Days  
per 1,000 Hours) (NGK)

**0.002**

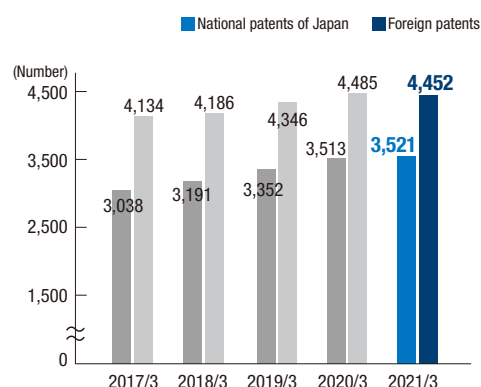


Number of Patents Held  
Japan

**3,521**

Foreign patents

**4,452**







# NGK Group's ESG

By pursuing business in harmony with the environment, respect for human rights, safe and comfortable workplaces, and improved corporate governance, the NGK Group strives to be a corporation trusted by all of its stakeholders.



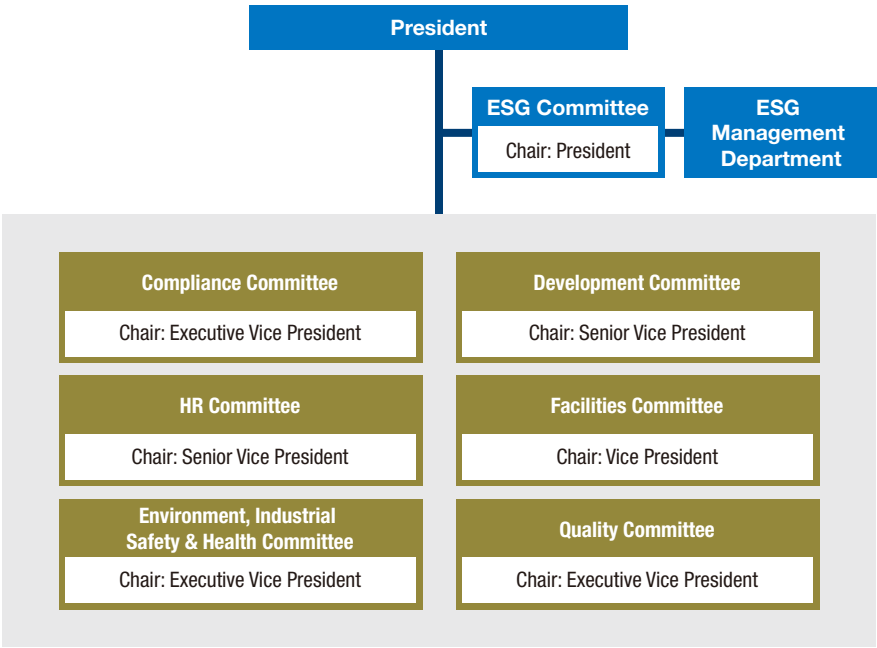
To help realize the Sustainable Development Goals (SDGs) adopted by the United Nations, the NGK Group seeks to provide new value to society with our unique technologies, thus contributing to the realization of a sustainable world and winning positive expectations and trust among society. All those who work in the NGK Group respect human rights and comply with the law by acting on a foundation of fair values and internationally recognized norms of judgment.

ESG Action Framework

ESG is central to the management of the NGK Group. Amidst ongoing overseas business expansion, we seek to ensure greater managerial transparency and autonomy within an environment which cultivates within every member of the NGK Group a sense of fairness accompanied by decision-making and action which accords with international norms.

In April 2019, the ESG Committee was established as a body for information sharing, opinion exchange and policy discussion among senior management, and this has now been followed by the establishment of the ESG Management Department in April 2021 in order to handle lateral implementation of ESG-related activities across the NGK Group and to strengthen information dissemination about the activities.

ESG Action Framework Chart





## Fiscal 2020 ESG Committee Achievements

1st	April 27, 2020	<ul style="list-style-type: none"> <li>● Decisions on fiscal 2020 action plans and key themes</li> </ul>
2nd	July 7, 2020	<ul style="list-style-type: none"> <li>● ESG seminar by outside experts</li> <li>● Discuss governance system</li> </ul>
3rd	September 25, 2020	<ul style="list-style-type: none"> <li>● Formulate NGK Group environmental vision</li> <li>● Discuss governance system</li> </ul>
4th	October 29, 2020	<ul style="list-style-type: none"> <li>● Study social contribution activities</li> </ul>
5th	December 22, 2020	<ul style="list-style-type: none"> <li>● Plan ESG information disclosure and integrated report (NGK Report 2021)</li> <li>● Evaluate research and development topics from an SDGs perspective</li> <li>● Tabulate ESG activity-related capital investment</li> <li>● Study carbon neutrality-focused capital investment</li> </ul>
6th	February 25, 2021	<ul style="list-style-type: none"> <li>● Discuss Board of Directors, Executive Committee</li> <li>● Global warming task force report</li> </ul>
7th	March 19, 2021	<ul style="list-style-type: none"> <li>● Discuss NGK Group Environmental Vision and new Five-Year Environmental Action Plan</li> <li>● Develop NGK Group human rights policy</li> </ul>

## Key ESG Activity Themes

At the first ESG Committee session in fiscal 2021, we decided on the key action themes for the fiscal year.

Key themes	Main activities	Activity leader
Carbon neutrality	<ul style="list-style-type: none"> <li>● Pursue CCU/CCS (CO<sub>2</sub> capture, utilization, and storage) market business expansion and new product development</li> <li>● Net zero CO<sub>2</sub> emissions-focused ICP, energy efficiency, fuel changeover, renewable energy use</li> </ul>	CN Project
Climate change countermeasures	<ul style="list-style-type: none"> <li>● Plan specific action on TCFD (governance, strategy, risk management)</li> </ul>	Task force
Revamping of governance system	<ul style="list-style-type: none"> <li>● Strengthen supervision functions of Board of Directors</li> <li>● Corporate governance code compliance</li> </ul>	Task force
Supply chain expansion	<ul style="list-style-type: none"> <li>● Expand CSR procurement</li> <li>● Promote human rights activities</li> </ul>	Task force
Community service activities	<ul style="list-style-type: none"> <li>● Promote social contribution activities within the Group</li> </ul>	Task force

Note: Task forces are project teams comprising members of relevant business divisions.

## NGK Group Signs UN Global Compact

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 SDGs, is an important corporate social responsibility.

The UN Global Compact is a global framework for realizing sustainable growth through companies and organizations acting as good members of society.



## Position on SDGs

Ever since its foundation, the NGK Group has pursued business in the energy, ecology, and electronics sectors in efforts to keep nature's air and water clean and thus help people live a comfortable, healthy life. Many of our technologies and products contribute to the SDGs, and we will continue to provide new value by leveraging our unique ceramic technologies towards the realization of a sustainable society.



The NGK Group 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

NGK's basic approach to corporate governance is to establish and maintain an organization capable of swiftly responding to changes in the business environment while ensuring the legality of business activities and the transparency of management and a fair and open management system emphasizing the interests of shareholders.

To put this approach into practice, NGK has chosen a governance structure anchored by the Audit & Supervisory Board. In addition to the General Meeting of Shareholders, the Board of Directors, and the Audit & Supervisory Board, the corporate governance system at NGK 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.

Considering the importance of swift and optimal decision-making and its execution for responding promptly to changes in the operating environment, NGK introduced a corporate officer system, thereby separating the management decision-making and supervision function from the business execution function, and clearly defining the responsibilities of both as well as strengthening their functions.

Furthermore, to strengthen the supervision and monitoring functions of the Board of Directors, NGK has mandated the main committees, among the committees that handle the respective risks surrounding NGK, to make reports to the

### A Audit & Supervisory Board

**Constituent members: 4**

**Number of meetings in fiscal 2020: 14**

The Audit & Supervisory Board comprises members of NGK who attend Board of Directors meetings and other important meetings. At those meetings they are able to audit the directors' decision-making process and execution of duties, confirm the status and operation of the company's internal control system, and review the appropriateness of accounting auditors' auditing methods and results.

### B Corporate Council

**Constituent members: 10**

**Number of meetings in fiscal 2020: 1**

The Corporate Council comprises outside directors, representative directors, and directors presiding over the secretarial office. It serves as a vehicle for outside directors to offer advice to senior management on a variety of management-related issues.

### C Conference of Outside Directors and Outside Audit & Supervisory Board Members

**Constituent members: 5**

**Number of meetings in fiscal 2020: 1**

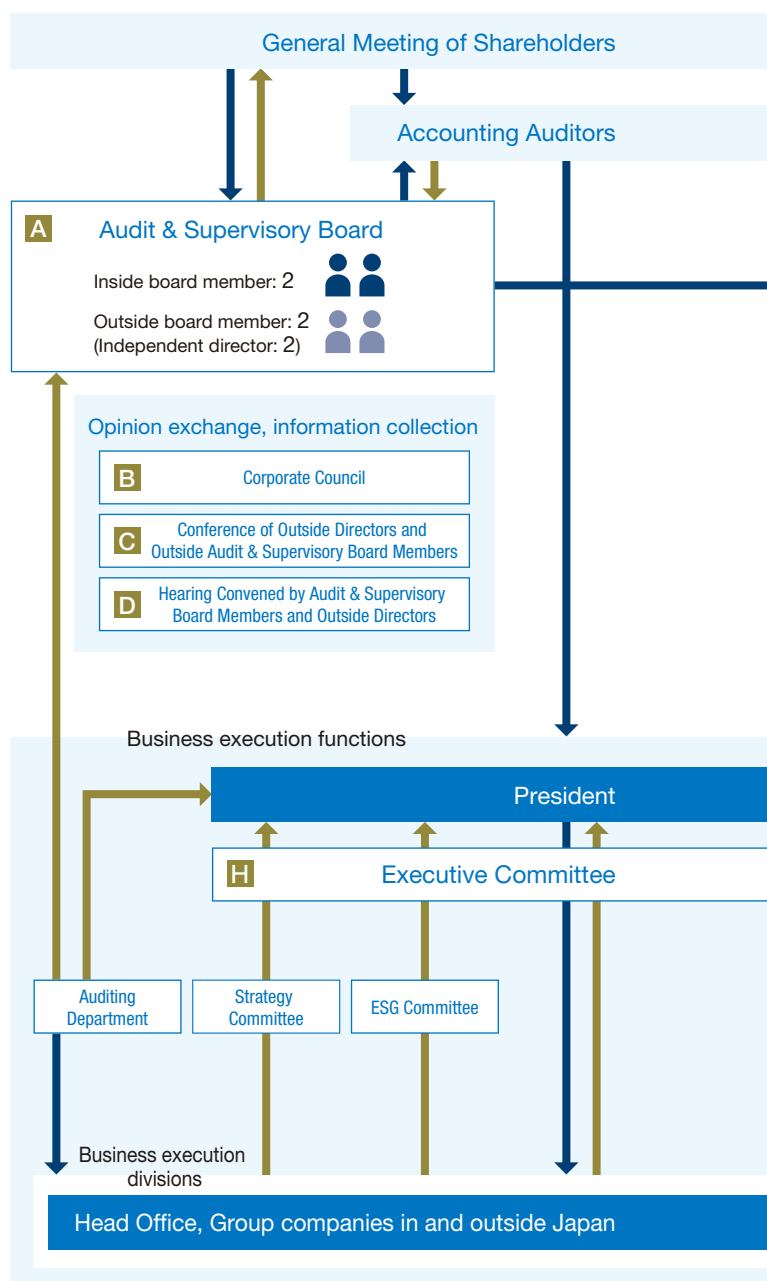
This conference comprises outside directors who exchange opinions concerning managerial issues and other matters, aiming to actively contribute to discussions at the Board of Directors' meetings.

### D Hearing Convened by Audit & Supervisory Board Members and Outside Directors

**Constituent members: 7**

**Number of meetings in fiscal 2020: 12**

This hearing comprises Audit & Supervisory Board members and outside directors. Information is collected from the personnel in charge within each division regarding the business environment and issues of NGK.



Board of Directors. In addition, NGK ensures that the intent of the Corporate Governance Code is thoroughly implemented by establishing meeting structures, such as the Nomination and Compensation Advisory Committee, Corporate Council, Conference of Outside Directors and Outside Audit & Supervisory Board Members, and Business Ethics Committee.

In addition, we have established the NGK Group Code of Conduct to stipulate how everyone working for the NGK Group should execute their jobs so that they abide by society's laws and the company's articles of incorporation and comply with corporate ethics. All executives and employees are well versed in the code and are obligated to abide by it. To reflect changes in society since the previous revision, in January 2019 the NGK

Group Code of Conduct was revised with an emphasis on respect for human rights, thorough compliance, and the realization of a sustainable society through business activities.

## Corporate Governance System

To ensure lawful business activities and management transparency, respond swiftly changes in the management environment, and establish and maintain a fair management system from the shareholder's perspective, NGK has established the following systems.

### E Board of Directors

**Constituent members: 9**

**Number of meetings in fiscal 2020: 14**

The directors who make up the Board of Directors deliberate and decide upon matters prescribed under the Companies Act, NGK's articles of incorporation, and other such authoritative sources, as well as upon important management-related matters. The Board also monitors the job performance of all company directors.

### F Nomination and Compensation Advisory Committee

**Constituent members: 5**

**Number of meetings in fiscal 2020: 4**

Comprising independent outside directors, chair, and the president, this committee deliberates on personnel matters of directors and Audit & Supervisory Board members, remuneration of directors and executive officers, proposals for remuneration of all Audit & Supervisory Board members, and Chief Executive Officer succession planning.

### G Business Ethics Committee

**Constituent members: 6**

**Number of meetings in fiscal 2020: 6**

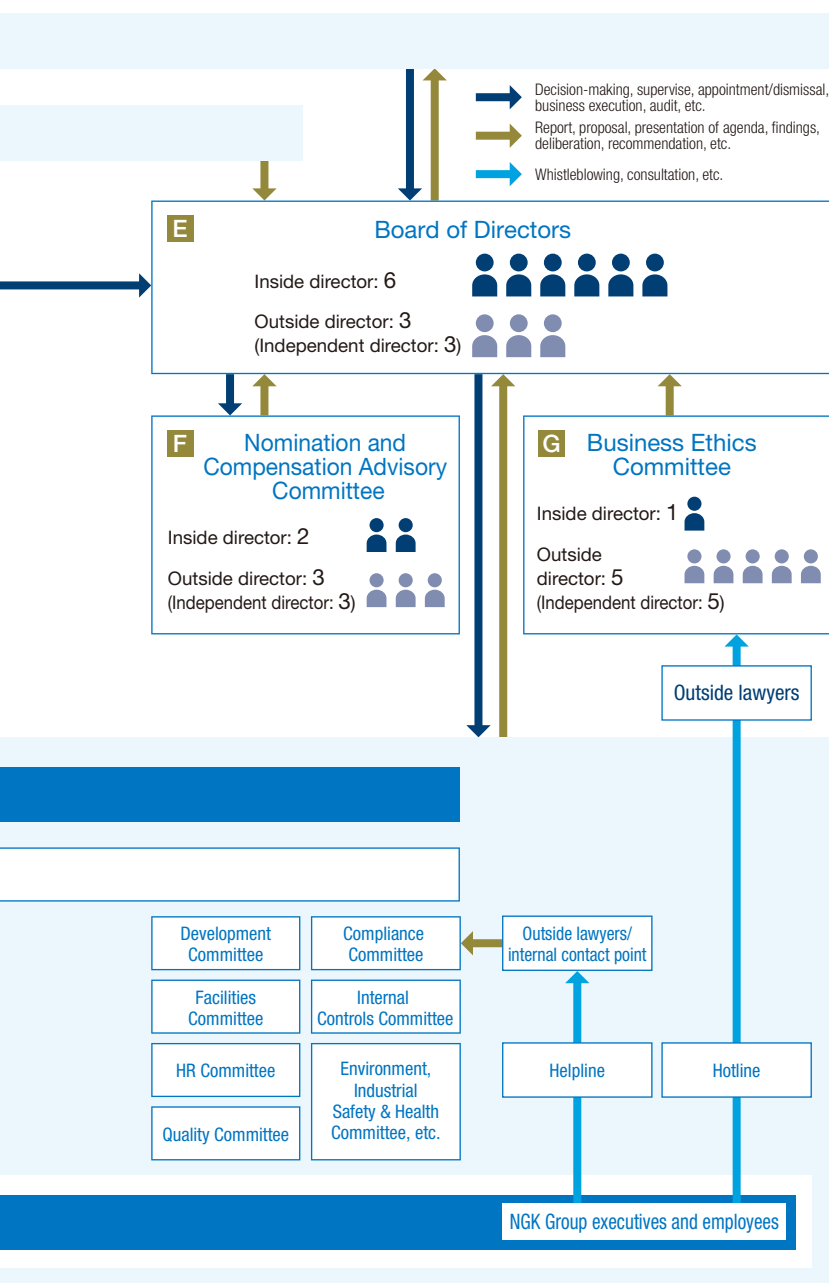
This committee comprises outside directors and an inside director in charge of compliance. Its members look for fraud or illegalities involving officers and others of NGK, as well as monitor compliance with competition laws and the Foreign Corrupt Practices Act.

### H Executive Committee

**Constituent members: 17**

**Number of meetings in fiscal 2020: 19**

This committee comprises the president, vice president, group executives, the group executive for Corporate R&D, the group executive for Corporate Manufacturing Engineering, executive officers in charge of each division, senior fellows, and Audit & Supervisory Board members, as well as executive officers, committee chairs, general managers, and division heads designated by the president. This body deliberates the matters necessary to help the president with decision-making.





## 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	Established the NGK Code of Conduct
April 2003	Revised guidelines into the NGK Group Code of Conduct
June 2005	Introduced an executive officer system
	Introduced a stock option
	Introduced an outside director system
July 2005	Established the CSR Committee
April 2007	Established the CSR Office
June 2010	Appointed independent directors
July 2011	Revised the NGK Group Code of Conduct
April 2015	Signed on to the UN Global Compact
June 2015	Established the Global Compliance Office
December 2015	Established the Nomination and Compensation Advisory Committee, Corporate Council, Conference of Outside Directors and Outside Audit & Supervisory Board Members, and Business Ethics Committee
June 2017	Appointed one additional outside director
October 2018	Appointed a chief compliance officer

January 2019	Revised the NGK Group Code of Conduct
April 2019	Established the ESG Committee
February 2020	Endorsement of recommendations of the Task Force on Climate-related Financial Disclosures (TCFD)
April 2020	Established the Compliance Committee
	Established the HR Committee
April 2021	Formulated the NGK Group Vision
	Formulated the NGK Group Human Rights Policy
	Established the NGK Group Basic Guidelines for Compliance Activities
	Established the ESG Management Department
June 2021	Outside directors increased to 1/3rd of Board of Directors
	An outside director made the chair of the Nomination and Compensation Advisory Committee



Reference URL Corporate Governance Report

[https://www.ngk.co.jp/resource/pdf/sustainability/governance\\_en.pdf](https://www.ngk.co.jp/resource/pdf/sustainability/governance_en.pdf)

## Key Focuses of the Board of Directors

The Board of Directors focuses primarily on deliberating and deciding matters (such as company-wide unified budgeting; strategic planning such as dissolution, mergers, and alliances of the company; appointing and removing representative directors; approval of financial statements, business reports, etc.; the disposal and acceptance of transfer of important

assets; and the appointment and dismissal of an important employee) prescribed under the Companies Act, NGK's articles of incorporation, and the governing rules of the Board of Directors. The Board also monitors the job performance of all company directors.

The following are key matters the Board of Directors deliberated and voted on in fiscal 2020.

- Budgeting and account settlement
- Establishment of new group companies, mergers, investments in joint ventures (establishment of new regional power companies)
- Capital investment in production facilities and equipment
- Sale of cross-shareholdings
- Formulation of medium-to-long-term vision
- Content of the NGK Group Environmental Vision and the fifth Five-Year Environmental Action Plan
- Formulation of the NGK Group Human Rights Policy
- Basic Guidelines for Compliance Activities (and guideline-related corporate rules and regulations governing implementation)
- Policies for determining remuneration of directors and other senior management

## Evaluation on the Effectiveness of the Board of Directors

With regard to its effectiveness, the Board of Directors issues a survey at the end of every fiscal year to directors and Audit & Supervisory Board Members. The results are reported at the Board of Directors' meeting, after the analysis and evaluation by an external organization, and NGK implements specific initiatives to enhance the effectiveness of the Board of Directors based on issues identified in the results of this evaluation.

Regarding the evaluation of the Board of Directors conducted in fiscal 2020, a survey with a total of 50 questions and an open-ended section was conducted at the beginning of April 2021, and the results thereof were reported at a meeting of the Board of Directors held on June 10. Regarding the overall evaluation, we received the following comments from the external organization.

Based on the results of this evaluation, NGK will continue endeavoring to maintain and strengthen the effectiveness of the Board of Directors, including implementing specific measures suited to actual circumstances at the Company.

- The foundational elements required of the Board of Directors have been maintained, such as leadership, commitment, and its sound culture and operation. The Board of Directors also raised additional issues in order to make improvements.
- Owing to the above, the external organization considers that the Board of Directors possesses continuous effectiveness.
- In addition to continuing issues previously identified, including the understanding of risks for important, large-scale projects, and the analysis of past management decisions, etc., new issues were identified to further increase effectiveness, including medium- to long-term strategy, the optimal use of funds, and the enhancement of risk management, etc.
- In particular, there was an increasing awareness of issues within NGK related to the composition of the Board of Directors, as well as operational issues such as the establishment of proposals, etc. Therefore, continuing review of the ideal composition and functions of the Board of Directors and more focused discussions on medium- to long-term strategy and risk management are expected to contribute to further improvements in the effectiveness of the Board of Directors.

### Measures to Boost Effectiveness

#### Survey

Questionnaire given to directors and Audit & Supervisory Board members



#### Analysis and Evaluation

Questionnaire results analyzed and evaluated by an outside organization



#### Improvement Initiatives

Specific initiatives created based on evaluation results

# Corporate Governance (Management System)

## Board of Directors (as of June 30, 2021)



**Taku Oshima**  
Chairman

Attendance at Board of Directors meetings  
100% (14/14)

March 1980 Joins NGK  
June 2007 Appointed as vice president  
June 2011 Appointed as senior vice president  
June 2014 Appointed as representative director and president  
April 2021 Appointed as representative director and chairman (incumbent)



**Shigeru Kobayashi**  
President

Attendance at Board of Directors meetings  
100% (11/11)

March 1983 Joins NGK  
June 2016 Appointed as vice president  
June 2018 Appointed as senior vice president  
June 2020 Appointed as director and senior vice president  
April 2021 Appointed as representative director and president (incumbent)



**Hiroshi Kanie**  
Executive Vice President

Attendance at Board of Directors meetings  
100% (14/14)

March 1981 Joins NGK  
June 2010 Appointed as vice president  
June 2012 Appointed as senior vice president  
June 2014 Appointed as director and senior vice president  
June 2018 Appointed as representative director and executive vice president (incumbent)

Responsible for Auditing Dept., Corporate Planning Office, New Business Planning Dept., Human Resources Management Dept., Group Compliance Dept., Legal Dept., Intellectual Property Dept., and General Affairs Dept.; Senior Officer in charge of Group Companies; Chief Compliance Officer; Chair of Compliance Committee and Internal Controls Committee



**Chiaki Niwa**  
Executive Vice President

Attendance at Board of Directors meetings  
100% (14/14)

March 1984 Joins NGK  
June 2013 Appointed as vice president  
June 2015 Appointed as director and vice president  
June 2016 Appointed as director and senior vice president  
June 2020 Appointed as representative director and executive vice president (incumbent)

Responsible for Corporate R&D, Corporate Manufacturing Engineering, Quality Management Dept., Environment, Industrial Safety & Health Dept., and Digital Transformation and Innovation Dept.; Chair of Quality Committee, Environment, Safety and Industrial Health Committee



**Ryohei Iwasaki**  
Director and Senior Vice President

Attendance at Board of Directors meetings  
100% (14/14)

March 1982 Joins NGK  
June 2008 Appointed as vice president  
June 2009 Appointed as director and vice president  
June 2012 Appointed as director and senior vice president (incumbent)

Responsible for business groups, Group Executive, Process Technology Business Group; in charge of management affairs



**Hideaki Shindo**  
Director and Senior Vice President  
Newly appointed

April 1988 Joins NGK  
June 2018 Appointed as vice president  
June 2021 Appointed as director and senior vice president (incumbent)

Responsible for ESG Management Dept., Secretarial Office, Finance Dept. and Purchasing Dept.



Independent Director  
**Hiroyuki Kamano**  
Outside Director

Attendance at Board of Directors meetings  
100% (14/14)

April 1971 Joins Ministry of Foreign Affairs  
April 1979 Trains at Legal Training and Research Institute, Supreme Court of Japan  
April 1981 Becomes registered attorney  
Oct. 1988 Becomes managing partner, Kamano Sogo Law Offices (incumbent)  
June 2007 Appointed as outside audit & supervisory board member, Komatsu Ltd.  
July 2007 Appointed as outside director, Sumitomo Life Insurance Company  
April 2009 Appointed as vice president, Tokyo Bar Association  
June 2011 Appointed as director, NGK (incumbent)  
June 2015 Appointed as outside audit & supervisory board member, House Foods Group Inc.  
June 2020 Appointed as outside director, Spancrete Corporation (incumbent)  
June 2021 Appointed as outside audit & supervisory board member, House Foods Group Inc. (incumbent)



Independent Director  
**Emiko Hamada**  
Outside Director

Attendance at Board of Directors meetings  
100% (14/14)

April 1984 Joins Taiyo Yuden Co., Ltd.  
Dec. 2001 Appointed as general manager, Quality Assurance Control R Technology Div., Engineering Group, Taiyo Yuden  
Sept. 2003 Appointed as chief engineer, Basic Research Div., General Research Laboratory, Engineering Group, Taiyo Yuden  
Nov. 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 (incumbent)  
July 2016 Appointed as part-time lecturer, NITech (incumbent)  
Aug. 2016 Appointed as visiting professor, Nagoya University (currently Nagoya University, Tokai National Higher Education and Research System)  
June 2017 Appointed as director, NGK (incumbent)  
June 2019 Appointed as outside director, Taiyo Yuden (incumbent)  
March 2021 Appointed as member of Low-Carbon Society Strategy Promotion Committee, Center for Low Carbon Society Strategy, Japan Science and Technology Agency (incumbent)



Independent Director  
**Kazuo Furukawa**  
Outside Director

Attendance at Board of Directors meetings  
100% (14/14)

April 1971 Joins Hitachi, Ltd.  
April 2005 Appointed as representative executive officer, executive vice president, and executive officer; general manager and CEO, Information & Telecommunications Group; general manager, Export Control Div.; Hitachi  
April 2006 Appointed as representative executive officer and president, Hitachi  
June 2006 Appointed as director, representative executive officer, and president, Hitachi  
May 2007 Appointed as vice chair, Keidanren (Japan Business Federation)  
April 2009 Appointed as director, representative executive officer, and vice chair, Hitachi  
June 2009 Appointed as special advisor, Hitachi  
June 2011 Appointed as president, Information Processing Society of Japan  
Oct. 2011 Appointed as chair, New Energy and Industrial Technology Development Organization  
June 2019 Appointed as director, NGK (incumbent)  
Aug. 2019 Appointed as outside director (audit and supervisory committee member), Pasona Group Inc. (incumbent)

## Audit & Supervisory Board (as of June 30, 2021)



### Nobumitsu Saji

Audit & Supervisory  
Board Member  
Newly appointed

Attendance at Board of  
Directors meetings  
100% (14/14)

March 1984 Joins NGK  
June 2013 Appointed as vice president  
June 2014 Appointed as director and vice president  
June 2015 Appointed as director and senior vice president  
June 2021 Appointed as Audit & Supervisory Board member  
(incumbent)



### Takeshi Shimazaki

Audit & Supervisory  
Board Member

Attendance at Board of Directors  
meetings 100% (14/14)  
Attendance at Audit & Supervisory  
Board meetings  
100% (14/14)

March 1982 Joins NGK  
April 2010 Appointed as manager, Finance Dept.  
June 2015 Appointed as general manager, Auditing Dept.  
June 2019 Appointed as Audit & Supervisory Board member (incumbent)



Independent Auditor

### Junichi Itoh

Audit & Supervisory  
Board Member, Outside

Attendance at Board of Directors  
meetings 100% (14/14)  
Attendance at Audit & Supervisory  
Board meetings  
100% (14/14)

April 1975 Joins The Mitsubishi Bank, Ltd. (now MUFG Bank, Ltd.)  
June 2002 Appointed as executive officer, The Bank of  
Tokyo-Mitsubishi, Ltd. (now MUFG Bank)  
May 2005 Appointed as managing executive officer, The Bank of  
Tokyo-Mitsubishi (now MUFG Bank)  
June 2005 Appointed as managing director, The Bank of  
Tokyo-Mitsubishi (now MUFG Bank)  
Jan. 2006 Appointed as managing director, The Bank of  
Tokyo-Mitsubishi UFJ, Ltd. (now MUFG Bank)  
May 2009 Appointed as senior managing executive officer, The Bank  
of Tokyo-Mitsubishi UFJ (now MUFG Bank)  
June 2011 Appointed as senior executive vice president, CFO and  
representative director, Nikon Corporation  
June 2016 Appointed as counselor, Nikon Corporation (incumbent)  
Appointed as outside Audit & Supervisory Board member,  
The Hyakujushi Bank, Ltd.  
June 2017 Appointed as outside director (Audit and Supervisory  
Committee member), The Hyakujushi Bank (incumbent)  
June 2018 Appointed as Audit & Supervisory Board member, NGK  
(incumbent)



Independent Auditor

### Masayoshi Sakaguchi

Audit & Supervisory  
Board Member, Outside

Attendance at Board of Directors  
meetings 100% (14/14)  
Attendance at Audit & Supervisory  
Board meetings  
100% (14/14)

April 1980 Joins the National Police Agency  
Feb. 1999 Appointed as chief of First Area Headquarters, Metropolitan  
Police Department  
Sept. 2001 Appointed as chief of Akita Prefectural Police Headquarters  
Jan. 2003 Appointed as chief Criminal Investigations, Osaka  
Prefectural Police Headquarters  
Oct. 2011 Appointed as chief of Osaka Prefectural Police Headquarters  
Jan. 2013 Appointed as commissioner-general's secretariat,  
National Police Agency  
Jan. 2015 Appointed as deputy commissioner-general,  
National Police Agency  
Aug. 2016 Appointed as commissioner-general, National Police Agency  
May 2018 Appointed as senior advisor, Nippon Life Insurance  
Company  
June 2019 Appointed as Audit & Supervisory Board member, NGK  
(incumbent)  
Appointed as vice president, Japan Automobile Federation  
(incumbent)

## Executive Officers (as of June 30, 2021)

### Shuhei Ishikawa

Senior Vice President  
Group Executive,  
Electronics Business Group

### Hiroshi Kurachi

Senior Vice President  
General Manager,  
Sensor Div.,  
Ceramic Products Business Group

### Masanobu Inoue

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

### Iwao Ohwada

Vice President  
General Manager, Advanced Device  
Components Div.,  
Electronics Business Group

### Hirofumi Sakamoto

Vice President  
General Manager, Engineering Div.,  
Ceramic Products Business Group

### David Miller

Vice President  
President, FM Industries, Inc.

### Atsushi Matsuda

Senior Vice President  
Group Executive,  
Energy Infrastructure Business Group

### Hiroyuki Kato

Senior Vice President  
Group Vice Executive, Process Technology  
Business Group, General Manager,  
High Performance Ceramics Div.

### Hiroharu Kato

Vice President  
General Manager, Business Strategy Dept.  
Global Sales & Marketing Div., Ceramic Products  
Business Group

### Tatsumi Ichioka

Vice President  
General Manager, Energy Storage Div.,  
Energy Infrastructure Business Group,  
General Manager, Komaki Site

### Hideki Shimizu

Vice President  
President,  
NGK Electronics Devices, Inc.

### Takao Onishi

Vice President  
General Manager, Electronics Components Div.,  
Electronics Business Group

### Tsutomu Nanataki

Senior Vice President  
Group Executive, Corporate R&D,  
Development Committee Chair

### Tadaaki Yamada

Senior Vice President  
General Manager, Human Resources Dept.,  
In Charge of General Affairs Dept.  
HR Committee Chair, General Manager,  
Osaka Branch

### Atsushi Miyajima

Vice President  
Group Executive, Corporate  
Manufacturing Engineering,  
Facilities Committee Chair

### Ryo Ishihara

Vice President  
General Manager, ESG Management Dept.,  
In Charge of Secretarial Office,  
General Manager, Tokyo Main Office

### Kazushi Tada

Vice President  
General Manager, Insulator Div.,  
Energy Infrastructure Business Group

### Jun Mori

Senior Vice President  
Group Executive, Ceramic Products Business Group,  
General Manager, Nagoya Site

### Akira Kato

Senior Vice President  
Group Vice Executive, Electronics Business Group,  
General Manager, New Metals Div.,  
General Manager,  
Chita Site

### Hiroyuki Shinohara

Vice President  
General Manager,  
Corporate Planning Office,  
In Charge of New Business Planning Dept.

### Mayumi Inagaki

Vice President  
In Charge of Auditing Dept.,  
Group Compliance Dept., Legal Dept.,  
and Intellectual Property Dept.

### Ryugo Takeda

Vice President  
President, NGK Europe GmbH



# Corporate Governance

## Reasons for Appointment of Directors and Audit & Supervisory Board Members

(As of June 30, 2021)

Name	Age*	Years in office	Reasons for appointment	Committee	
				Nomination and Compensation Advisory Committee	Business Ethics Committee
Taku Oshima	64	7	Served as Representative Director and President from 2014, and has been serving as Representative Director and Chairman since April 2021. Has abundant experience at the Company and insights into business operations.	○	—
Shigeru Kobayashi	60	1	Has been serving as Representative Director and President since April 2021. Has ample experience at the Company, as well as a wealth of knowledge and personal contacts for business operations.	○	—
Hiroshi Kanie	63	7	Has served as Representative Director and Executive Vice President since 2018 and has ample experience at the Company and knowledge in business operations.	—	○
Chiaki Niwa	61	6	Has been serving as Representative Director and Executive Vice President since 2020 and has ample experience at the Company, as well as deep knowledge in project management and manufacturing technology.	—	—
Ryohei Iwasaki	61	12	Has ample experience at the Company and knowledge in business operations.	—	—
Hideaki Shindo	56	Newly appointed	Has abundant knowledge and experience in business operations at the Company.	—	—
Hiroyuki Kamano	75	10	Possesses a wealth of experience and achievements in the legal community, and international insight. Has been offering suggestions to the Company's business operation and properly overseeing the management of the Company.	○	○
Emiko Hamada	62	4	Has accumulated insight through research and development and product commercialization at operating companies, and through research via industry-academia-government collaborations. This insight helps her appropriately offer suggestions to the Company's business operation and oversee the management of the Company.	○	○
Kazuo Furukawa	74	2	Has extensive knowledge of technical fields including ICT, as well as experience leading large organizations. With his insights and experience, has been offering suggestions to the Company's business operation and properly overseeing the management of the Company.	○	○
Nobumitsu Saji	62	Newly appointed	Recognized for his ability to contribute to strengthening governance by auditing the management of the Company based on ample experience and insights on business operations and compliance.	—	—
Takeshi Shimazaki	61	2	Recognized for his ability to apply his experience towards the performance of management-related auditing based on his extensive experience and knowledge in financial accounting and operational auditing, thus contributing to increased corporate value for NGK.	—	—
Junichi Itoh	70	3	Engaged in management at financial institutions and operating companies for many years, his wealth of experience and expertise as a corporate management specialist make him well-suited to a role in which he will contribute to stronger corporate governance at NGK.	—	○
Masayoshi Sakaguchi	63	2	Has extensive experience in public administration and management of large organizations. Recognized for his ability to apply his experience towards management-related auditing, providing a legal compliance and risk management-focused perspective that contributes to increased corporate value for NGK.	—	○

## Expertise of Directors

(As of June 30, 2021)

Name	Independent outside directors	Field of experience				Specialized knowledge				
		Overall management	Overseas business/international experience	Marketing	Manufacturing technology R&D	Finance	Legal compliance	HR/labor	TICT	Environmental/energy conservation
Taku Oshima		○	○		○		○	○		○
Shigeru Kobayashi		○	○	○						○
Hiroshi Kanie		○	○	○			○	○		
Chiaki Niwa		○			○		○		○	○
Ryohei Iwasaki		○	○	○				○		
Hideaki Shindo		○	○			○		○		
Hiroyuki Kamano	○	○	○				○			
Emiko Hamada	○	○	○		○				○	○
Kazuo Furukawa	○	○	○		○				○	○

\*Age as of June 30, 2021

Note: Managerial experience: At time of appointment (June 30, 2021), has experience running large organizations (business group, general manager, head of multiple divisions) or has served in upper management of Group companies.

## Policies for Determining Remuneration of Directors

The remuneration system for directors (excluding outside directors) and corporate officers has been established for the purpose of contributing to the Group's sustainable growth and the enhancement of its medium-to-long-term corporate value by practicing the NGK Group Philosophy and realizing the NGK Group Vision. NGK reviews the level and composition, etc. of remuneration, etc. as necessary to determine whether they are appropriate in view of this purpose. NGK also endeavors to ensure the transparency and fairness of remuneration governance.

The remuneration of directors (excluding outside directors) and corporate officers consists of the following three components: basic remuneration, which is a fixed annual amount in accordance with their position; a performance-linked bonus that varies depending on business performance each fiscal year; and stock-related remuneration, which is designed to raise sensitivity toward the Company's stock price, share with shareholders not only the benefits of a rise in the stock price but also the risks associated with a fall in the stock price, and motivate directors and corporate officers to enhance corporate value over the medium-to-long-term through appropriate corporate management.

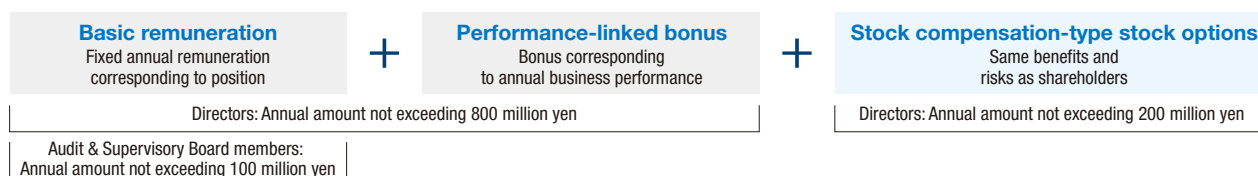
NGK does not pay any performance-linked bonus or stock compensation-type stock options to outside directors and

Audit & Supervisory Board members and only pays fixed annual basic remuneration from a perspective that emphasizes independence because they assume roles in supervising and auditing management.

NGK emphasizes the stability and enhancement of medium-to-long-term business performance, and has designed the variable part of remuneration so that the sum of the performance-linked bonus amount and the conversion value of stock compensation-type stock options accounts for an appropriate proportion of the total amount of remuneration, etc. The total amount of remuneration, including basic remuneration, is based on data from a reliable external organization, and is set according to the position and rank of the recipient, while taking into consideration the level of remuneration according to the size of the company.

The Nomination and Compensation Advisory Committee is composed of a majority of independent outside directors. At the request of the Board of Directors, the committee deliberates on the policies and procedures for determining compensation; proposes the range of remuneration for all directors and Audit & Supervisory Board members; and proposes the amounts and details of individual remuneration for each director and corporate officer. The committee then reports its decisions on these matters to the Board of Directors.

### Composition of remuneration



### Performance-linked bonus calculation method (Fiscal 2021)

The following indicators are used in calculating the performance-linked bonus.

<b>Short-term perspective</b>	<ul style="list-style-type: none"> <li>Consolidated performance indicators for fiscal 2021: net sales, operating income, net income, and return on invested capital*</li> <li>Consolidated performance results for fiscal 2020: net sales, operating income, and net income</li> </ul>
<b>Medium-to-long-term perspective</b>	<ul style="list-style-type: none"> <li>Medium-to-long-term performance targets established under the NGK Group Vision: operating income</li> <li>Creation of new products and businesses – Keep Up 30</li> <li>Initiatives to reduce CO<sub>2</sub> emissions</li> </ul>

\*NGK version ROIC calculated based on operating income and business assets (sales receivables, inventories, and fixed assets)

Basic bonus amount	Short-term perspective		Medium-to-long-term perspective		Individual evaluation (100%)
	Percentage returned on invested capital (100%)	Increase/decrease from previous fiscal year results (100%)	Percentage achieved of medium-to-long-term performance targets (100%)	Percentage achieved on important issues for the current fiscal year (100%)	
Amount paid	Achievement of return on invested capital ← -100 to +100% →	Change from the previous year's results ← -100 to +100% →	Achievement of medium-to-long-term performance targets ← -100 to +100% →	Achievement level of priority issues in the current fiscal year ← -100 to +100% →	Personal assessment ← -100 to +100% →

(Each allocated item varies between -100% and 100%, as a result, the actual amount of performance-linked bonuses paid fluctuates within a range of -100% to 100% of the basic bonus amount.)

### Overview of stock options

- Exercise price: 1 yen/share
- Number of stock options granted according to position
- Condition for exercise of rights: Rights are vested for five years, in principle, beginning on the day when one year has elapsed after the recipient's retirement as an officer of NGK.

## Amount of Remuneration for Directors and Audit & Supervisory Board Members

### Remuneration of Directors and Audit & Supervisory Board Members

(Fiscal 2020)

Director category	Total remuneration (million yen)	Total remuneration by type (million yen)			Applicable directors (people)
		Fixed remuneration	Performance-linked remuneration	Stock options	
Directors (excluding Outside Directors)	591	425	123	42	11
Outside Directors	39	39	–	–	3
Audit & Supervisory Board Members (excluding Outside Audit & Supervisory Board Members)	59	59	–	–	2
Outside Audit & Supervisory Board Members	26	26	–	–	2

### Directors Receiving Total Remuneration of ¥100 Million or More

(Fiscal 2020)

Name	Director category	Company category	Total remuneration by type (million yen)			Total remuneration (million yen)
			Fixed remuneration	Performance-linked remuneration	Stock options	
Taku Oshima	Director	Submitting companies	68	26	7	103

## Management Succession Planning

In December 2018, the Board of Directors approved the NGK Group Chief Executive Officer Succession Plan, which establishes the required qualities, development policies, selection procedures, and other items for chief executive

officer successors. Based on this, the President provides the Nomination and Compensation Advisory Committee with a planning progress report each year, and its appropriateness is reviewed.

## Training Policies for Executives

Taking into account that directors and Audit & Supervisory Board members assume the duty of care of a good manager as a fiduciary of NGK, NGK has established training policies to provide the following opportunities to improve their skills and knowledge so that they can adequately fulfill their respective responsibilities as experts in management or as supervisors of business execution.

1. Training for internal officers relating to the Companies Act, Financial Instruments and Exchange Act, competition laws, and corporate governance and compliance.
2. The provision of individual explanations from the relevant divisions to outside directors/Audit & Supervisory Board members, mainly relating to the items brought up at the Board of Directors' meetings as well as the periodic provision of information to, and opportunities to exchange opinions with, outside directors/Audit & Supervisory Board members on the business environment and other issues.

## 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 Code of Conduct (revised in January 2019) was 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 to ensure it remains a company that is beneficial to society, even in the pursuit of its economic goals. The task of ensuring

Group-wide compliance with the NGK Group Code of Conduct, along with laws, regulations and corporate ethics, is the responsibility of the Compliance Activity Promotion Subcommittee, which was established by the Compliance Committee and comprises managers from NGK divisions. The Business Ethics Committee handles matters of improper acts and legal violations involving NGK executives, and the ensuring of compliance with competition laws and overseas anti-corruption laws.

Please note that at a Board of Directors meeting in April 2021, members adopted an amendment to the "Resolution for the Development of Systems to Ensure the Appropriateness of Operations."

## Audit Structure

At NGK, we conduct separate Audit & Supervisory Board audits, accounting audits, and internal audits. Each of the main groups overseeing these audits—Audit & Supervisory Board members, accounting auditors, and internal auditing department members—engages in regular information exchange related to auditing policy, planning, results, and other areas pertinent to improving auditing effectiveness and efficiency.

NGK's Audit & Supervisory Board is comprised of two full-time members and two outside members. They are supplemented by one dedicated staff member who possesses the appropriate knowledge, skills, and experience to assist them.

Approval of the Audit & Supervisory Board is obtained with regard to staff reassignment, evaluations, and other decisions

in order to more fully ensure that such decisions are independent of directors and that the instructions of the Audit & Supervisory Board carry more force.

Internal auditing is carried out by the 15 members of the Auditing Department. The general manager of the Auditing Department is also a member of the Internal Controls Committee. Quality, environmental, and health and safety-related auditing is performed on an as-needed basis within the NGK Group by departments with specialized knowledge in these areas.

As of July 2021, accounting audits are overseen by three certified public accountants from Deloitte Touche Tohmatsu LLC. They are accompanied by 16 other certified public accountants and 35 assistants.

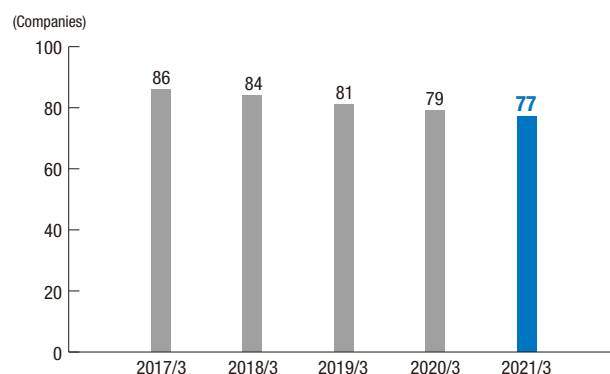
## Policy on Cross-Shareholdings

NGK holds shares of listed companies that contribute to the NGK Group's long-term business development as cross-shareholdings, primarily in order to maintain and strengthen business relationships. In addition, NGK holds the shares of each company in the Morimura Group, which was established by the same founders of NGK, for the mutual benefit of enhancing management quality, as the Morimura Group brand forms a part of NGK's corporate value through its philosophy and heritage. As all cross-shareholdings are a part of the asset portfolio, they are positioned as assets to supplement the amount of liquidity considered necessary in the business plan. NGK constantly strives to reduce the scale of cross-shareholdings from the perspective of capital efficiency. Furthermore, the scale of cross-shareholdings may fluctuate due to factors including changes in overall business trends and risks, financial conditions, and the status of NGK's business

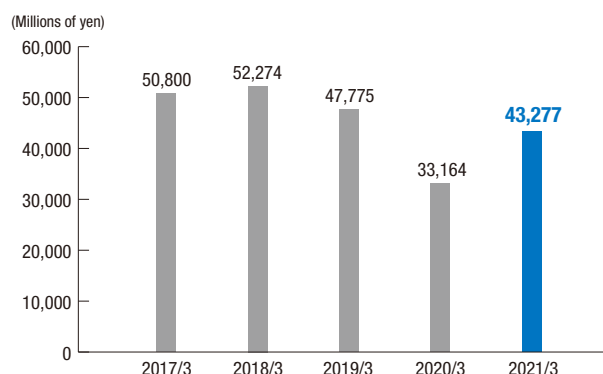
relationship with each business partner. Regarding the specific stocks held, at its Board of Directors' meeting, NGK regularly reviews the appropriateness of the continuous holding of shares as cross-shareholdings along with the capital policy, by determining the significance of holding from the business relationship, the safety of ratings and so forth, and the efficiency of dividend yields and so forth. On the other hand, when comparing cross-shareholdings to NGK's cost of capital, evaluations based solely on shares are not conducted. Instead, ROIC management is conducted for each business with differing risks and expected returns, and cross-shareholdings are evaluated after being included in each business's balance sheet. After verification, in fiscal 2020, four specified equity securities held for investment purposes were sold for a total of 2.033 billion yen.

## Status of Cross-Shareholding

### Number of Cross-Shareholding Companies



### Reported Cross-Shareholdings Balance





Comments from Outside Directors

### Topic: Towards realization of the NGK Group Vision



**Hiroyuki Kamano**  
Outside Director

#### Leadership from the top is key to realizing the NGK Group Vision

The first time I heard about the NGK Group Vision was at a meeting of the Board of Directors in December 2019. It was still in the early stages of development, but I remember saying that it should emphasize input from young employees, as they are the future of the company, connect the Group Vision with the NGK Group Philosophy announced that year, and make sure carbon neutrality is a key focus.

After further work and refinement, the resulting NGK Group Vision was exceptionally good. With all of the changes that are taking place in society, like the rapid rise of electric vehicles (EV), I had a vague sense of unease about the future of the company, that would it be able to continue 20 or 30 years from now. However, this revolutionary Group Vision tackles these concerns head-on and articulates a clear direction for the future.

The challenge for us now is to make the NGK Group Vision a reality. Actually reaching a point by 2050 where 80% of all sales are from carbon neutrality and digital society-related business will be an extremely daunting task. The NGK Group has a large number of new products and products in development that hold promise for addressing social issues, and I believe that achieving the numerical targets of the NGK Group Vision is not a mere fantasy. But this all crucially depends on NGK putting in place the basic mechanisms necessary for converting its business structure.

Starting this fiscal year, a greater percentage of director compensation is tied to corporate performance, and the inclusion of CO<sub>2</sub> emissions reduction targets into performance targets represents a good first step towards business structure conversion. Yet implementation of ESG initiatives will incur excessive costs that are at odds with the goal of business revenue generation. Overcoming this will require a clear prioritization of issues to be addressed and a thorough, Group-wide entrenchment of an ESG-focused mindset. This, in turn, requires leadership from the top, and I have great hopes for new President Kobayashi in that regard.

The new change in composition of the Board of Directors allows deeper debate and discussion. Now I and the other outside directors can play a more active part in the Board's debate and discussion, helping to facilitate a frank exchange of ideas and opinions that will contribute to realization of the NGK Group Vision.

Also, prior to the presidential transition which took place in April 2021, the names of candidates were presented to the Nomination and Compensation Advisory Committee well in advance and provided opportunities to discuss them. This made for a more transparent process compared with previous presidential transitions. Moving forward, I will continue to use my outsider's perspective to promote even greater governance reform.



**Emiko Hamada**  
Outside Director

### **Resolutely pursuing commercialization one product at a time**

A medium-to-long-term vision is an important goal that we share with employees and other diverse stakeholders. That is why I feel it is all the more difficult to effectively phrase this vision. And, needless to say, there are not many companies that have publicly announced goals extending all the way out to 2050. From that standpoint, the content of the NGK Group Vision provides an expanded, future image looking towards 2050. NGK has always been strong in environmental areas, but it is to be praised for setting goals that boldly incorporate the digital domain as well. Transforming a business mix built primarily around products aimed at internal combustion engine vehicles into a business mix centered on carbon neutrality and digital society-related business is a daunting challenge.

I offered my opinion on each and every sentence of the NGK Group Vision over the course of the entire drafting process. My view is that NGK will never communicate anything if it maintains such a cautious and inward-focused corporate culture. I feel that I was able to be deeply involved in the formulation of the NGK Group Vision.

As NGK now works to concretely incorporate this Group Vision into its business, it is essential that NGK become an “open company” that works not only within the Group but also with external human resources and companies to develop new fields. The NGK Group Vision reveals a readiness and determination to do just that. I feel that increasing interactions and communication with external stakeholders will, as a matter of course, lead to a greater emphasis on diversity in the NGK Group.

At the same time, however, it is essential that NGK not overemphasize new product development. This is particularly true with regard to carbon neutrality-related products, for which the marketplace is already crowded with competition. NGK’s EnerCera® lithium-ion rechargeable batteries have been well received on the market, but they have not yet generated large sales. When development targets keep changing one after another, it brings into question just how flexibly NGK can adapt.

In that sense, the “New Value 1000” goal to attain 100 billion yen of sales in newly launched business in 2030 is extremely ambitious. But, regardless of how difficult it may be, the only way to achieve it is by resolutely pursuing commercialization, one product at a time. And I believe that the employees of the NGK Group have the tenacity required to achieve that goal.



**Kazuo Furukawa**  
Outside Director

### **Using CO<sub>2</sub> emissions reductions as a gauge of commitment to the NGK Group Vision**

I was involved right from the start of discussion and planning for the NGK Group Vision, and one point of feedback I offered was that it should be more specific. I feel that the resulting Group Vision is extremely good. As the details of the vision began taking shape, the global trend toward carbon neutrality and digital society accelerated, and we were able to align our vision with this trend.

Making 2050 the target year and then back-casting to figure out targets for 2025 is an appropriate approach. Quantifiable business targets like 600 billion yen in sales and 90 billion yen in operating income are easy to understand and easy to share with all employees. These targets are daunting, but I think they create a positive sort of pressure that will motivate employees.

One plan for achieving carbon neutrality involves switching over to different energy sources, but this comes with a lot of challenges, which will require infrastructure that will take a long time to put in place. The Fifth Five-Year Environmental Action Plan, which was released at the same time as the NGK Group Vision, commits the NGK Group to reducing its annual CO<sub>2</sub> emissions between fiscal 2019 and fiscal 2025 from 850,000 metric tons to 550,000 metric tons. This is the sort of target that cannot be achieved with anything less than total commitment. I want NGK to go after this goal with the realization that it will serve as a gauge of the Group’s commitment to its Vision.

Getting to the point where 80% of all sales in 2050 will come from carbon neutrality and digital society-related business will also be an extremely tough task. NGK will not be able to get there by simply changing our existing product models. It will only be possible through business that embodies the NGK Group Slogan: “Surprising Ceramics.” Meanwhile, there is also the possibility that the expected decline in demand for internal combustion engine vehicle-related products will come faster than anticipated. This is a risk the Board of Directors will carefully and thoroughly discuss how to manage. I look forward to the innovative ideas and hard work of everyone in the NGK Group as they pursue the NGK Group Vision, boldly tackling the challenges that await on the journey into NGK’s next 100 years.

### Interview with NGK's Vice President in Charge

## Compliance as an indispensable part of realizing the NGK Group Vision

As a vice president, I am responsible for overseeing four departments, including the Group Compliance Department, and I serve as the vice-chair of the Compliance Committee and as the competition law chief compliance officer.

When checking the status of Group compliance, I focus on the appropriateness of each initiative being undertaken. That is, I look at whether the activity is being appropriately carried out in line with laws and regulations, company rules, etc. Beyond that, I look at compliance in the broader sense of corporate ethics to see if the activity comports with the expectations of external stakeholders and, by extension, society. As expressed in the NGK Group Philosophy, "Social trust is our foundation," and a company which loses the trust of society cannot survive. Appropriate compliance is the most fundamental component of corporate activity.

### Vision and Compliance

Compliance also plays a key role in realizing the NGK Group Vision announced in April. The NGK Group Vision includes "Five Transformations" which we will implement in order to convert our business structure. When we convert our business structure, this will enable us to move into new markets where we will likely face increased compliance violation risks, such as unintentionally violating laws and regulations within an unfamiliar legal and business environment or going too far when building new business relationships. Thus, to realize the NGK Group Vision, it is crucial to make appropriate efforts to ensure compliance with the NGK Group Philosophy, Code of Conduct, etc., in any and all business environments.

Also, the focus of compliance varies according to the functions of the target location; for example, the focus at a production base would include quality, health and safety, and environment, while the focus at a sales site would include competition law and anti-corruption practices. The risk of compliance violation also varies by the country or territory in which we operate. We are developing and improving a compliance structure that not only NGK but also NGK Group companies can independently implement, allowing them to create rules, provide training, etc., on a site-by-site basis in accordance with local conditions.

### NGK Group Basic Guidelines for Compliance Activities

In addition to the NGK Group Vision, new "NGK Group Basic Guidelines for Compliance Activities" were also released in April. The Basic Guidelines serve to codify in writing the NGK Group's basic stance on, and approach to compliance activities. Given that the NGK Group conducts business all over the globe, it is essential that



Vice President  
Mayumi Inagaki



we have in place a compliance structure which aligns with international norms. The Basic Guidelines incorporate six compliance elements that are standard worldwide, including commitment and message from company top management, education and training, and monitoring. It was developed using other major guidelines, both Japanese and international, such as the US Department of Justice's "Evaluation of Corporate Compliance Programs," as a reference. Traditionally, competition laws-related rules and other such rules were established separately of one another; now, however, for the first time the Basic Guidelines on Compliance Activities will serve as the central "spine" supporting a unified approach to compliance activities. The Basic Guidelines are remarkably innovative in terms of its content, focusing on appropriate implementation of compliance to accommodate changing trends in society and the law.

As we convert our business structure in order to realize the NGK Group Vision, the business practices of the NGK Group will move beyond simply selling "products" to selling "solutions" that offer new value. In order to appropriately adapt to the changes in business environment that will come with this, we will monitor changing international norms with regard to compliance and will foster an even greater compliance-focused mindset among everyone who works in the NGK Group.

Compliance is what ensures that everyone can go about their job in the business world with the utmost confidence. Moving forward, our focus on compliance will only grow stronger as we cultivate a shared attitude throughout the NGK Group that "compliance is key."

Viewing compliance as the foundation of CSR, the NGK Group positions enhancing trustworthiness as the most important initiative, and takes concrete measures to disseminate compliance awareness among employees and ensure that we abide by international norms and the laws and regulations of all countries and regions.

## Compliance Promotion Structure

In order to ensure strict observance of laws, regulations, and corporate ethics within the Group, we have established the Compliance Committee, and under this we have established the Compliance Activity Promotion Subcommittee to serve as the committee body that ensures the proper implementation of the Compliance Committee's decisions.

### Establishment of the global compliance system

With the aim of building a group-wide foundation for an effective compliance scheme, the Group Compliance Department conducts education on compliance at each NGK site.

### Compliance Promotion Structure



## Observing Competition Laws and Other Laws and Regulations Pertaining to Business Transactions

In addition to mandating compliance with competition laws in the NGK Group Code of Conduct, we have established the Competition Laws Compliance Rules, set forth to comply with international standards, which are strictly enforced by the NGK Group 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 (hereinafter, "PwC") as

our independent compliance professional. PwC is engaged to annually review the implementation status of the NGK Group's competition law compliance program per the Competition Laws 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 in order to: 1) assess the tone of each director's approach toward competition law compliance; and 2) to further enhance their awareness of these efforts. The results of these reviews are being leveraged for a variety of purposes, such as operating and improving the competition law compliance program.

## Quality Compliance

Based on the lessons we learned from dealing with issues of non-conformity in the testing procedures of insulators and related products in 2018, we are strengthening ongoing top management-led quality compliance activities, Quality

Committee direct guidance, and other initiatives. We are also working to improve corporate culture through a variety of efforts, including ensuring senior management and employees receive thorough quality-related training.

## Corruption Prevention Structure

The NGK Group Code of Conduct states that "We will never in any manner undertake bribery" and "We will undertake business activities with common sense and based on strict compliance and ethics." To this end, we implement anti-bribery measures in order to ensure fair and transparent transactions. In fiscal 2015,

we formulated anti-bribery rules for dealing with foreign public officials in order to ensure compliance with anti-bribery laws as well as ethical standards for business conduct. Further, in fiscal 2017 our Auditing Department began a review of overseas money transfers and entertainment expenses.

## Conducting Anti-Bribery Training

Besides to having in-house lecturers provide job grade-specific training to NGK employees, in fiscal 2019 we began training to employees belonging to sales departments in which outside lawyers give interactive lectures and lead group discussions on

case studies. In addition, we also arranged for attorney-led seminars and other training at all Group companies outside Japan.



## Anti-Harassment Measures

Our measures to combat harassment in the workplace include providing anti-harassment training to all executives and employees in NGK and NGK Group companies in Japan (including contract employees and temporary workers).

Since fiscal 2017, we have held anti-harassment training sessions aimed at managers of Group companies in Japan, and we have maintained a schedule that seeks to ensure the rest of the employees receive anti-harassment training within

four years. As a countermeasure to COVID-19, in fiscal 2020 we offered online video training. There were 7,249 participants in power harassment training and 7,730 participants in sexual harassment training. The aim of training is to contribute to a better workplace environment by providing both managers and employees with a proper understanding of what harassment is and how to prevent it.

## Whistleblowing System

### Helpline

We have established a helpline to receive inquiries and reports from employees aimed at curtailing and preventing activities contrary to a spirit of the NGK Group Code of Conduct and to facilitate the quick resolution when issues occur. Each Group company outside Japan has its own helpline. Our company rules guarantee protection of those seeking advice or reporting issues.

### Hotline

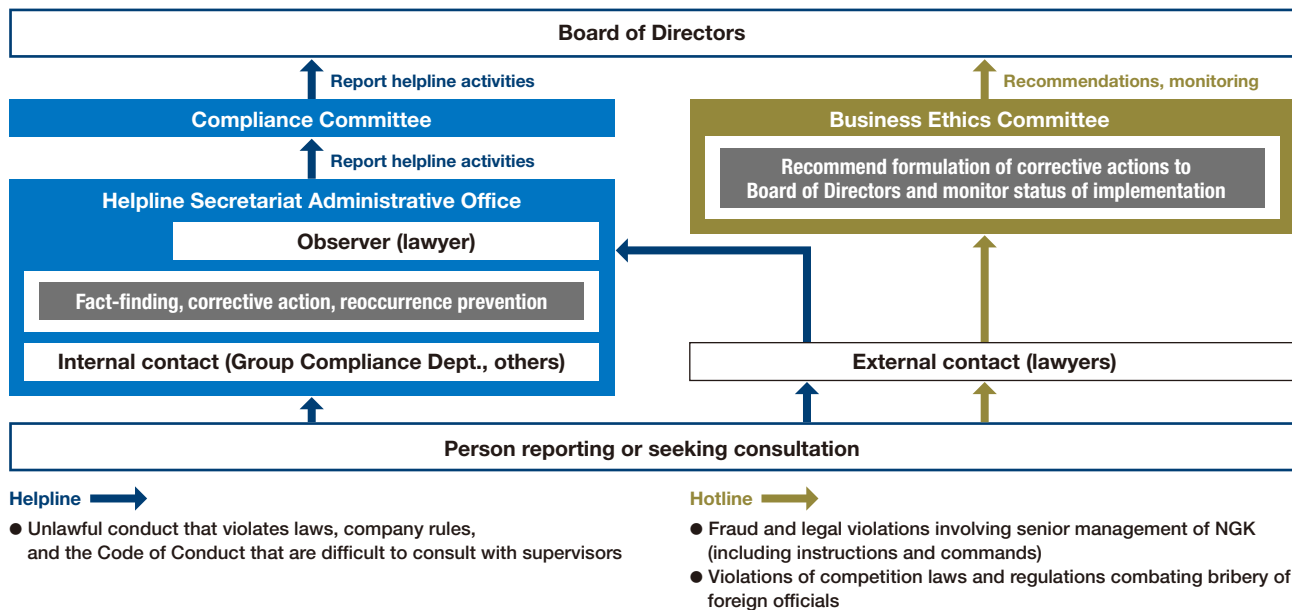
We have established a hotline as a whistleblowing system for responding to fraud and legal infractions committed by senior management of NGK, and competition law and anti-corruption law-related violations. The hotline is taken care by outside lawyers, with issues handled by the Business Ethics Committee, composed mainly of outside directors, who report directly to the Board of Directors.

With consideration for the circumstances in each country, we are continuing to set up hotlines at Group companies outside Japan to respond to fraud and legal infractions committed by senior management. Hotlines have been set up at all Group companies outside Japan for matters related to competition laws and anti-corruption law-related violations.

### Number of Helpline Consultation Cases (NGK)

FY2018	FY2019	FY2020
75	55	28

### Organization of Whistleblowing System



## Information Security Governance, Security Measures

Within the NGK Group, proper management and operation of information assets is a collaborative effort carried out by the General Affairs Department and ICT Department, in conjunction with other relevant administrative divisions and in line with the Basic NGK Group Information Security Policy.

Every employee who uses a computer or other information-processing devices as part of their job is provided with our “Electronic Information Security Handbook” and is encouraged in the proper use of his or her device, as well as made aware of the need to contact the General Affairs Department and ICT Department if the device is lost, infected with a computer virus or otherwise compromised. Also, under the rules of employment, employees are subject to disciplinary action if their improper use of an information device results in the leaking of confidential information or some other result that significantly impacts the company.

Meanwhile, personnel from NGK’s ICT Department visit

several Group companies each year to conduct on-site checks and provide guidance on their implementation of IT security measures. In fiscal 2020, due to the impact of the global COVID-19 pandemic, these visits to overseas Group companies were not carried out. However, online sessions were held with 12 Group companies in order to share with them the IT security enhancement policies and measures implemented by the Head Office, and a survey was conducted to ascertain the state of IT security-related device maintenance and operations at each company.

In order to further encourage IT security-related initiatives, a clearly defined committee body is scheduled to be established in fiscal 2021 to discuss related issues and measures.



Reference URL Basic NGK Group Information Security Policy  
<https://www.ngk-insulators.com/en/info/policies/>

## Formulation of Basic NGK Group IT Security Standards

The rapid advance in information communication technologies and devices has made the quest for consistent IT security on a Group-wide level an urgent concern. Thus in fiscal 2010 we formulated the NGK Group IT Security Standards with the goal of developing an IT security structure based on commonly shared Group standards and enhancing IT security.

Every year, each Group company drafts action plans for the enactment of countermeasures in an attempt to systematically strengthen security. Through these action plans, NGK confirms initiatives at each Group company and provides guidance as necessary.

## IT Security Training

Training sessions listed at the right are conducted throughout the year to ensure strict adherence to IT security among all employees.

Training for newly hired employees and newly promoted supervisors and managers are offered to NGK employees while e-learning is offered to NGK employees and employees of some Group companies in Japan.

Training for newly hired employees	Number of participants: 147 (participation rate: 100%)
Training for newly promoted supervisors	Number of participants: 118 (participation rate: 100%)
Training for newly promoted managers	Number of participants: 55 (participation rate: 100%)
E-learning	Number of participants: 5,320 (participation rate: 100%)

Note: Excluding employees who were away on maternity leave, childcare leave, long-term business trips, etc.

## Ensure IT Security Against Cyberattacks

The NGK Group has built systems for protecting against and detecting cyberattacks. We are making the necessary capital investment and infrastructure upgrades so as to further strengthen the systems’ detection functions in fiscal 2021. We plan to carry out the necessary document enhancement and

structural reinforcement to ensure we are prepared to deal with an IT security incident and can restore our IT systems. Following completion, annual training is planned that will teach employees how to handle IT security incidents.

## Privacy Policy and Organization for Personal Information Protection

The NGK Group has established internal rules in an effort to ensure strict handling and management of personal information obtained from customers. In fiscal 2015, NGK formulated and published our Basic Policy on the Proper Handling of Specific Personal Information in response to the enforcement of the

Japan’s Act on the Use of Numbers to Identify a Specific Individual in Administrative Procedures. Moreover, our policies are in full compliance with the revised Act on the Protection of Personal Information, which came into effect in Japan on May 30, 2017.



Reference URL Privacy Policy

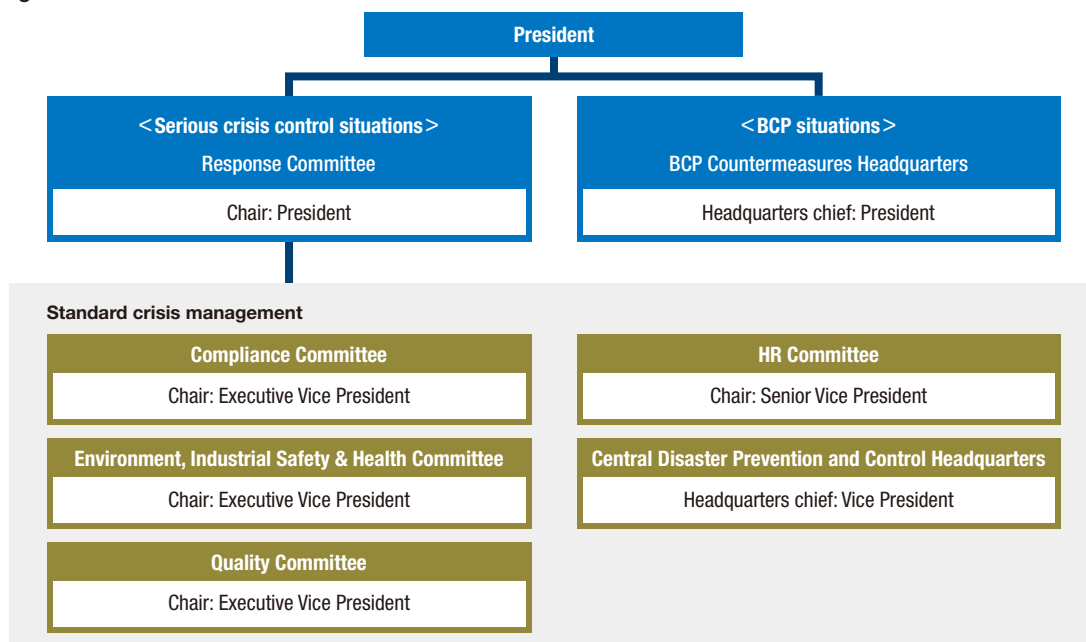
<https://www.ngk-global.com/privacypolicy/ngk-and-group-companies.html>

## Approach to Risk Management

The NGK Group addresses the issue of serious risk by empowering the following committees to facilitate risk avoidance and prevention, in accordance with the Basic Rules of Crisis Management. Additionally, in the event of some particularly significant risk, the vice president in charge of the Corporate Planning Office can call a meeting, which would include the president, to develop countermeasures.

In times of increasing socio-economic uncertainty, it is important to have a heightened awareness of risk and to act before risks turn into crises. Therefore, in addition to the five committees, which we maintain in order to oversee matters of day-to-day risk, we also have in place a system by which top management can coordinate a rapid response to growing risks.

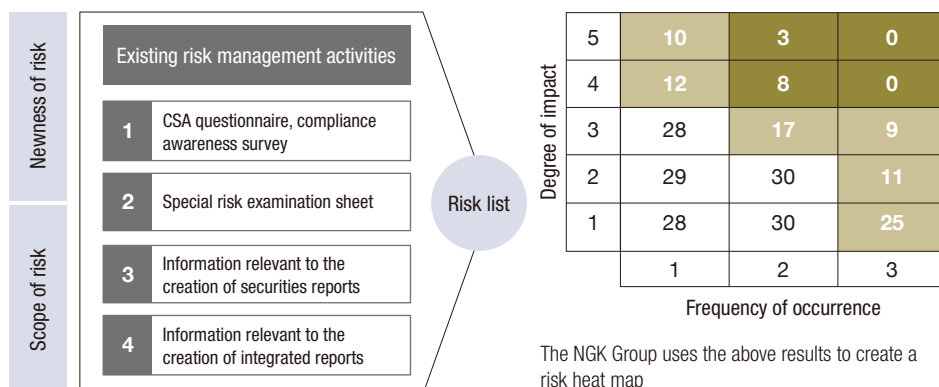
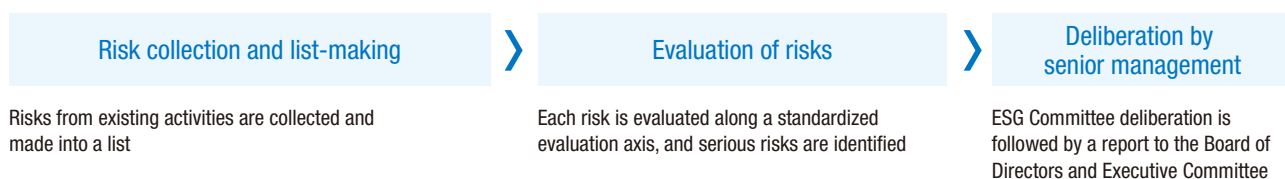
### Risk Management Framework Chart



## Risk Identification Process

All risks discovered through the standard risk management process, which have the potential to affect the operational or financial situation of the Group are collected and reevaluated in

order to identify any which may be serious risks. The ESG Committee will then deliberate and designate those risks that need to be managed by the Group as a whole.



## Risks, Risk Summaries, Risk Responses

1 Business operation risks 2 R&D-related risks 3 Legal compliance, human rights and safety, and quality-related risks  
4 Information systems-related risks 5 Currency exchange, capital, and procurement-related risks 6 Climate change and disaster-related risks

Risk	Summary	Response
1	<b>All operations</b> <ul style="list-style-type: none"> <li>Demonstrations, terrorism, war, infectious or communicable disease, and other unforeseen matters</li> </ul>	<ul style="list-style-type: none"> <li>Construct globally distributed, alternative systems</li> </ul>
	<b>1 Ceramic Products Business</b> <ul style="list-style-type: none"> <li>Drop in demand for NGK Group products due to decline in demand for internal combustion engine vehicles</li> <li>Drop in market share due to rising competition from Chinese market</li> <li>Inability to recover prior investment due to downturn in business, delayed timing of regulations, or other factors</li> </ul>	<ul style="list-style-type: none"> <li>Compensate for drop in demand by increasing number of new and high-performance products in line with stronger exhaust regulations</li> <li>Strengthen competitiveness via technical responsiveness that anticipates environmental regulations, and via supply stability</li> <li>Respond appropriately to automaker planning and changing business conditions, and then make revisions to capital investment planning</li> </ul>
	<b>2 Process Technology Business</b> <ul style="list-style-type: none"> <li>Deterioration in performance and financial status due to declining demand for semiconductors</li> <li>Delayed responsiveness to customer needs</li> <li>Emergence of innovative semiconductor manufacturing process</li> <li>Drop in market share due to growth of competition in kilns for lithium-ion battery cathode materials and electronic components</li> </ul>	<ul style="list-style-type: none"> <li>Work together with direct customers who manufacture semiconductor manufacturing equipment, and make revisions to equipment capacity and personnel and production systems, etc., where appropriate</li> <li>Carefully monitor semiconductor manufacturing process trends and revise production systems where appropriate to ensure quick response to changes in demand</li> <li>Carefully monitor customer trends and pursue production system innovation where appropriate to ensure quick response to changes in demand</li> </ul>
	<b>3 Electronics Business</b> <ul style="list-style-type: none"> <li>Sudden drop in base station and data server demand</li> <li>Inability to develop new technology or release products compatible with customer technology innovations</li> </ul>	<ul style="list-style-type: none"> <li>Carefully monitor customer trends and pursue production system innovation where appropriate to ensure quick response to changes in demand</li> <li>Carefully monitor customer trends and pursue timely technological development</li> </ul>
	<b>4 Energy Infrastructure Business</b> <ul style="list-style-type: none"> <li>Change in energy policies overseas</li> <li>Capital investment cutbacks by power companies in Japan</li> <li>Trends among competitor companies and products</li> <li>Delay in timing of market expansion for large-capacity and long-life batteries</li> <li>Spread of competitors' products, such as lithium-ion batteries, that use innovative technologies</li> </ul>	<ul style="list-style-type: none"> <li>Carefully monitor energy policy trends in each country and revise production systems where appropriate to ensure quick response to changes in demand</li> <li>Strengthen competitiveness via technical responsiveness and supply stability</li> <li>Carefully monitor customer trends and revise production systems where appropriate to ensure quick response to changes in demand</li> <li>Strengthen partnerships with leading overseas companies</li> </ul>
2	<ul style="list-style-type: none"> <li>Inability to achieve adequate results with the input received due to increasingly complicated technological competition</li> </ul>	<ul style="list-style-type: none"> <li>A total of 300 billion yen will be set aside for research and development expenses over the next 10 years, 80% of which will be allotted to the carbon neutrality (CN) and digital society (DS)</li> <li>Set a target of 100 billion yen in sales from new products and new businesses by 2030</li> </ul>
3	<b>1 Legal compliance-related risks</b> <ul style="list-style-type: none"> <li>Decline in NGK Group's reputation due to actions in opposition to society's expectations with regard to legal and regulatory compliance, respect for human rights, contract compliance, etc.</li> </ul>	<ul style="list-style-type: none"> <li>Utilize employee training and handbook distribution to ensure employees are familiar with relevant laws and regulations and have a more compliance-focused mindset</li> <li>The Business Ethics Committee, which comprises outside directors and compliance officers, investigates serious improprieties or legal/regulatory violations that could have a significant impact on management, and recommends preventive and corrective measures.</li> <li>Reducing the possibility of compliance violations through a whistleblowing system</li> </ul>
	<b>2 Human rights and safety-related risks</b> <ul style="list-style-type: none"> <li>Human rights violations in the Group's business activities</li> <li>Employee occupational hazards, illness, or physical and mental health problems</li> </ul>	<ul style="list-style-type: none"> <li>Formulation of the NGK Group human rights policy</li> <li>Undertake human rights due diligence via HR Committee</li> <li>In accordance with NGK Safety and Health Policy, identify serious hazard risks and use risk assessment to facilitate strengthening of preventative measures</li> <li>Follow up on employees who work long hours, and conduct job grade-specific mental health education</li> </ul>
	<b>3 Quality-related risks</b> <ul style="list-style-type: none"> <li>Quality-related risks such as loss of trust or profits, or contraction in growth, due to serious market complaint, contractual violation, or other unsatisfactory operations</li> </ul>	<ul style="list-style-type: none"> <li>Have Quality Management Department perform monitoring of each Business Group's quality activities, in line with NGK Quality Policy and under direct supervision of senior management</li> <li>Regarding serious issues, convene quality review meetings in order to find a solution quickly</li> <li>Company-wide deployment of quality risk elimination process activities</li> </ul>
4	<ul style="list-style-type: none"> <li>Negative impact on societal trust or business continuity due to shutdown of data processing, or to theft, destruction, manipulation, loss, etc., of data, following external cyber-attack or unauthorized system access, or after unexpected system failure or security issue</li> </ul>	<ul style="list-style-type: none"> <li>Establishment of an IT security system based on the Basic NGK Group Information Security Policy</li> <li>Conduct information security training for employees</li> </ul>
5	<ul style="list-style-type: none"> <li>Decreased sales and profits and deterioration of business performance due to strong yen</li> <li>Risk of negative impact on business operations, performance, and financial situation of NGK Group as a result of financing difficulties stemming from serious regional financial crises and other factors</li> <li>Rising production costs due to rise in prices of certain materials and equipment</li> </ul>	<ul style="list-style-type: none"> <li>Keep production close to local demand centers, perform financing in local currency, and optimize purchasing according to currency exchange situation</li> <li>Hedge risks with forward foreign exchange contracts and other financial instruments</li> <li>Reflect risk in sale price</li> <li>Reduce costs through competitive purchasing, increased productivity, and other means</li> </ul>
6	<ul style="list-style-type: none"> <li>Deterioration in business performance due to additional costs incurred by future international GHG regulations, environmental taxes, carbon taxes, etc.</li> <li>Operational decline due to global warming-caused sea level rise, increased size and magnitude of typhoons, increased frequency of local torrential rains, etc.</li> <li>Deterioration in business performance due to shutdown of production following major disaster, fire, or other serious incident or accident</li> <li>Serious damage to facilities at major production bases due to disasters, fires, or other serious incident or accident</li> <li>Decline in operations and negative impact on product manufacturing and sales due to emergence and spread of major infectious disease, such as influenza or COVID-19 pandemic</li> </ul>	<ul style="list-style-type: none"> <li>Formulation of the NGK Group Environmental Vision</li> <li>Begin looking into disclosing information on risks and opportunities based on recommendations from the Task Force on Climate-related Financial Disclosures (TCFD)</li> <li>Development and introduction of products and services that contribute to the realization of a carbon-neutral society</li> <li>Establishment of a production system that enables alternative production</li> <li>Promote business continuity plan (BCP) for entire Group</li> </ul>



In line with the NGK Group Environmental Vision announced in April 2021, the NGK Group has revised its Core Policy on the Environment. On the basis of this new 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.

### NGK's Core Policy on the Environment (revised April 2021)

With the aim of fostering coexistence between humans and nature, the NGK Group will promote initiatives that contribute to carbon neutrality, a recycling-oriented society and coexistence with nature.

### Guidelines for Environmental Action

1. Strive to develop, design, and manufacture products that contribute to the environment and products with low environmental impact.
2. Work to reduce the environmental impact arising from business activities. Conduct design reviews to scientifically study and evaluate the environmental impact of business activities
  - Promote energy conservation measures for all processes and facilities, and make efforts to control CO<sub>2</sub> emissions.
  - Promote resource saving and recycling, and make efforts to control the generation of by-products.
  - Manage the risks of water resources and strive to make effective use of water resources through our business activities.
  - Through the appropriate use and control of chemical agents, work to reduce the risks inherent in toxic substances.
  - Give precedence to environmentally friendly materials, parts, products, and facilities in procurement and purchasing, strengthening cooperative alliances with our business partners.
3. Enhance environmental management systems from a global perspective while continuously reducing our environmental impact.
4. Not only abide by environmental laws, regulations, and other requirements, but also institute voluntary standards and work to improve our own environmental conservation.
5. Provide environmental information to the public at the appropriate time and pursue dialogue with all stakeholders. Proactively develop social action programs. Also, engage in education and publicity in order to improve employees' environmental consciousness.

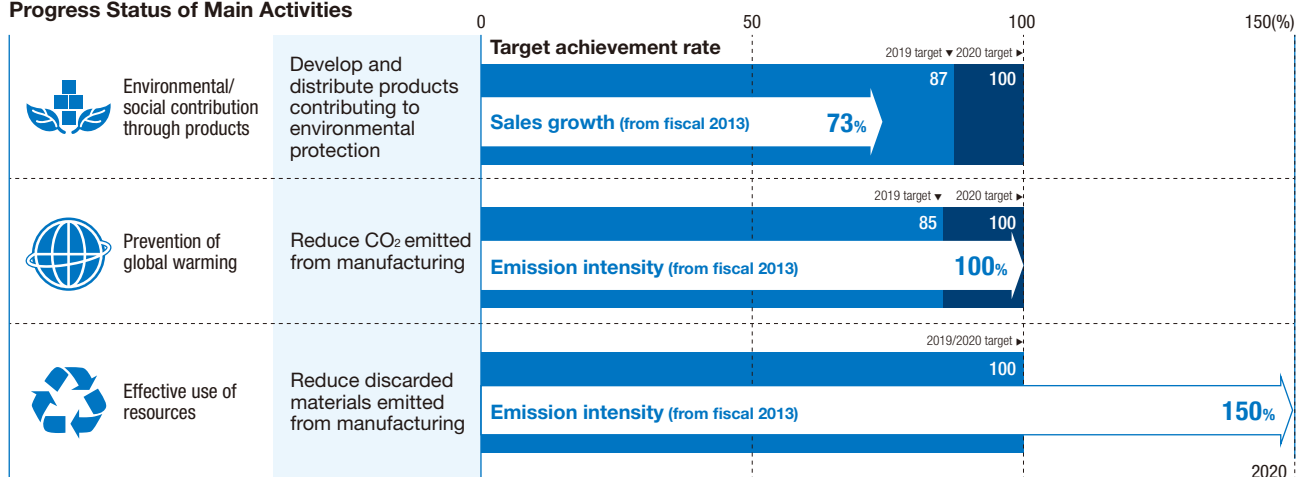
### Fourth Five-Year Environmental Action Plan Final Year Results (Fiscal 2016–2020)

Fiscal 2020 was the final year of the five-year plan, and, despite demand recovery and on-site restoration in the latter half of the year following a drop in distribution volume due to the impact of the COVID-19 pandemic in the first half of the year, the growth rate in environmentally friendly products was not enough to meet the target by year's end. On the other hand, however, with regard to basic unit per net sales for CO<sub>2</sub>

and waste emissions volume, the installation of high efficiency equipment and facilities produced a significant improvement and enabled us to meet our target.

The Fifth Five-Year Environmental Action Plan began in fiscal 2021, and the entire NGK Group is working together to pursue environmental activities that will ensure we achieve the aims of our NGK Group Environmental Vision.

#### Progress Status of Main Activities



## New Environmental Action Plan (Fiscal 2021–2025)

We have established the Fifth Five-Year Environmental Action Plan, which encompasses our environmental action targets for fiscal 2021 through 2025.

This is the first five-year plan aimed at realizing the NGK Group Environmental Vision (announced in April 2021), which aims for net zero CO<sub>2</sub> emissions by 2050. The Environmental Vision's key themes are “carbon neutrality,” “a recycling-oriented society,” and “harmony with nature”.

### Base Year, Target Year, Control Scope

Base Year: Fiscal 2013 (for some, Fiscal 2019)

Target Year: Fiscal 2025

Control Scope: Consolidated

### NGK Group Environmental Vision

P19

NGK Group Environmental Vision

Core Policy on the Environment




























### Fifth Five-Year Environmental Action Plan

#### Achieve NGK Group Environmental Vision

- Initiatives toward carbon neutrality
- Initiatives toward a recycling-oriented society
- Initiatives toward harmony with nature

#### Connect with Society

- Contributions to environmental society
- Promotion of environmental communication

Category	Item	KPI	FY2025 Target	FY2021 Target	Related SDGs
 Initiatives toward carbon neutrality	Reduce CO <sub>2</sub> emitted by manufacturing activities	CO <sub>2</sub> emissions (consolidated)	550,000 metric tons (Reduce by 25% from FY2013)	700,000 metric tons (Reduce by 4% from FY2013)	   
		Renewable energy use rate (consolidated)	50%	25%	
	Reduce CO <sub>2</sub> emitted across value chain	Plan progress (%)	• Expand Scope 3 calculation range • Life-cycle assessment (LCA) of major products	Initiate life-cycle assessment (LCA) of major products	
 Initiatives toward a recycling-oriented society	Reduce discarded materials emitted from manufacturing	Basic unit per net sales of discarded materials emitted	Reduce by 50% from FY2013	Reduce by 44% from FY2013	    
		Reduction rate against BAU for discarded materials emitted	Reduce by 30% from FY2013	Reduce by 25% from FY2013	
	Promote resource recycling	Recycling rate (Japan)	Maintain at least 99%	At least 99%	
	Manage and respond to water resource risks	Basic unit per net sales of water consumption (consolidated)	Maintain FY2019 levels	FY2019 levels	
 Initiatives toward harmony with nature	Promote biodiversity conservation	Plan progress (%)	Expand and enhance actions aimed at Post-2020 Global Biodiversity Framework targets	Research on Japan and overseas trends	 
 Contributions to environmental society	Develop and distribute products/services contributing to environmental protection	Number of registered products	Increase number of carbon neutrality-related products registered	Increase in number of registered products	        
	Promote CSR procurement	Plan progress (%)	Evaluate environmental data from suppliers	Reviewing the details of the survey of suppliers	
 Promotion of environmental communication	Contribute to local communities	Plan progress (%)	Continually enhance actions partnering with local communities	Collaboration with Aichi Sustina Research Institute and EPOC	 
	Raise environmental awareness	Plan progress (%)	Continually enhance environmental training and information disclosure	Publicize the NGK Group Environmental Vision	

## Initiatives Toward Carbon Neutrality

The conventional KPI used for CO<sub>2</sub> has been basic unit per net sales; however, we have changed this to CO<sub>2</sub> emissions volume in order to link it to our environmental vision target. The intent of this change is to make it easier to gauge our progress towards our goal of net zero emissions by 2050, as well as our milestone target of a 50% reduction (370,000\* metric tons) in CO<sub>2</sub> emissions volume by 2030 compared with the base year of fiscal 2013. Also, in order to facilitate action aimed at expanding the use of renewable energy, we have established a

target for renewable energy use rate of total energy usage throughout the Group. Achieving this target will not only bring the NGK Group closer to achieving net zero carbon emissions but also help promote more widespread adoption of renewable energy in society.

\* Emissions are a revision of the calculation standard. Specifically, the power emission factor (coefficient for converting power consumption into CO<sub>2</sub>) will be changed from the conventional fixed value to the actual value of the power company every year. This will reflect the renewable energy utilization rate.

## Initiatives toward a Recycling-oriented Society

Within the NGK Group, we perform water risk assessments for all of our production bases, 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 bases, and at bases 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.

## Initiatives toward Harmony with Nature

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).

Since fiscal 2016 under the current Five-Year Action Plan, we have done biodiversity surveys of company-owned sites, taken part in the Ministry of the Environment's "My Action Declaration" initiative, and worked in unison with our suppliers.

### Promoting Participation 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. The aim of this initiative is to encourage citizens to take a personal interest in the biodiversity around them and to help in protecting it.

NGK continues to use this initiative as an opportunity to raise awareness among employees and has expanded it throughout NGK Group companies in Japan, attracting a cumulative total of 6,800 Group employee declarations thus far.

Aichi Targets	NGK Group Activities
1. Spread awareness	<ul style="list-style-type: none"> <li>● Employee environmental education ● Next-generation education</li> <li>● Cooperation with suppliers ● Promoting participation in My Action Declaration initiative</li> </ul>
4. Sustainable production and consumption	<ul style="list-style-type: none"> <li>● Expanding sales of products contributing to environmental protection</li> <li>● CO<sub>2</sub> reduction ● Effective use of resources ● Cooperation with suppliers</li> </ul>
5. Inhibit loss of all natural habitats	<ul style="list-style-type: none"> <li>● Voluntary employee participation in forestation and other environmental conservation activities</li> <li>● Biodiversity survey/appropriate control of company-owned site</li> </ul>
8. Control pollution by chemical substances, etc.	<ul style="list-style-type: none"> <li>● Chemical substance management ● Management of exhaust and wastewater</li> <li>● Expanding sales of products that prevent air pollution ● Cooperation with suppliers</li> </ul>
9. Alien species	<ul style="list-style-type: none"> <li>● Biodiversity survey/appropriate control of company-owned site</li> </ul>
11. Conserve protected areas	<ul style="list-style-type: none"> <li>● Voluntary employee participation in forestation and other environmental conservation activities</li> </ul>
14. Ecosystem services	<ul style="list-style-type: none"> <li>● Voluntary employee participation in forestation and other environmental conservation activities</li> <li>● Biodiversity survey/appropriate control of company-owned site</li> </ul>

Note: Source: "Guidelines for Action by the E&E Industries concerning Biodiversity Conservation" (The Biodiversity Working Group, The 4 Electrical and Electronic Industry Associations)

## Environmental/Social Contribution and Environmental Communication

We are focused on social connection through contributions to environmental society and promotion of environmental communication. In terms of contributions to environmental society, we have traditionally used the growth rate in sales of products contributing to environmental protection as a target; however, in order to bring this more in line with our

environmental vision, we have introduced growth in carbon-neutrality-related products as a target. With regard to CSR procurement, we are seeking to understand the environmental impact, including CO<sub>2</sub> emissions, exerted by our suppliers.

## Consideration of Internal Carbon Pricing Introduction

Internal carbon pricing (ICP) involves the independent establishment and use of in-house carbon pricing for the purpose of promoting decarbonization-focused investment and policies. By establishing our own per-volume price internally on greenhouse gas (GHG) emissions, these emissions become capable of affecting our financial indicators. The TCFD also recommends the adoption of ICP as a tool for ascertaining risks and opportunities, as well as influencing behavior,

accompanying the transition of companies to a low-carbon society.

NGK is considering the use of ICP as a means of incentivizing investment in high efficiency equipment and facilities and renewable energy-related infrastructure that will help us realize our Environmental Vision target of net zero CO<sub>2</sub> emissions by 2050.

## NGK Endorses TCFD\*

The NGK Group is committed to making even greater efforts amidst government and private sector actions to achieve the goals of the Paris Agreement. The Group's top management determined the importance of endorsing the recommendations of the Task Force on Climate-Related Financial Disclosures (TCFD), which encourages the disclosure of climate-change related risks and opportunities towards making plans for reducing CO<sub>2</sub> emissions. In February 2020 the Group announced its endorsement of the recommendations of the TCFD.

The TCFD Task Force (TCFD-TF) was established in fiscal 2021, comprised primarily of members drawn from the Head

Office, and has begun looking into TCFD-based information disclosure.



\* TCFD: The Task Force on Climate-Related Financial Disclosures was established by the Financial Stability Board (FSB). The G20 Osaka Summit in June 2019 provided the impetus for many Japanese companies to announce their endorsement of the TCFD recommendations. (As of July 26, 2021, 451 companies and organizations have announced endorsement.)



# Human Rights

In April 2021, the NGK Group created the “NGK Group Human Rights Policy,” which codifies the thinking and actions of the NGK Group with regard to human rights.

## NGK Group Human Rights Policy (excerpt)

The NGK Group hereby establishes this “NGK Group Human Rights Policy” based on the “United Nations Guiding Principles on Business and Human Rights” and will promote initiatives to respect human rights to prevent violation or abuse of human rights of anyone impacted by the NGK Group’s business operations.



Reference URL NGK Group Human Rights Policy (full text)

<https://www.ngk-insulators.com/en/info/policies/>

## Due Diligence Processes and Assessment

The NGK Group shall make a variety of efforts to identify, prevent and mitigate practices within the NGK’s business operations that negatively impact human rights.

We carry out a Corporate Risk Survey (CRS) once every two years in order to help ascertain any latent risks to employees’ human rights.

In addition, a total of 17 Group companies in Japan, including NGK, conduct a 54 question self-assessment survey which is based on the RBA\* Code of Conduct and which looks at the three categories of labor, safety and health, and ethics.

We are working to facilitate and confirm improvement in the areas identified from the survey results, and we are also

working to expand the scope of this self-assessment survey to a number of NGK Group companies outside of Japan.

We also request our suppliers, particularly new suppliers, to sign an agreement to comply with the CSR Procurement Guidelines every year. In conjunction with this, we survey suppliers in order to ascertain the degree to which they understand and incorporate CSR procurement, and we then work to support CSR procurement-related improvement across all suppliers.

\* Responsible Business Alliance: Focusing primarily on the electronic equipment industry, the RBA establishes standards and conducts audits with the aim of promoting safe working environments, worker protection, and environmental responsibility.

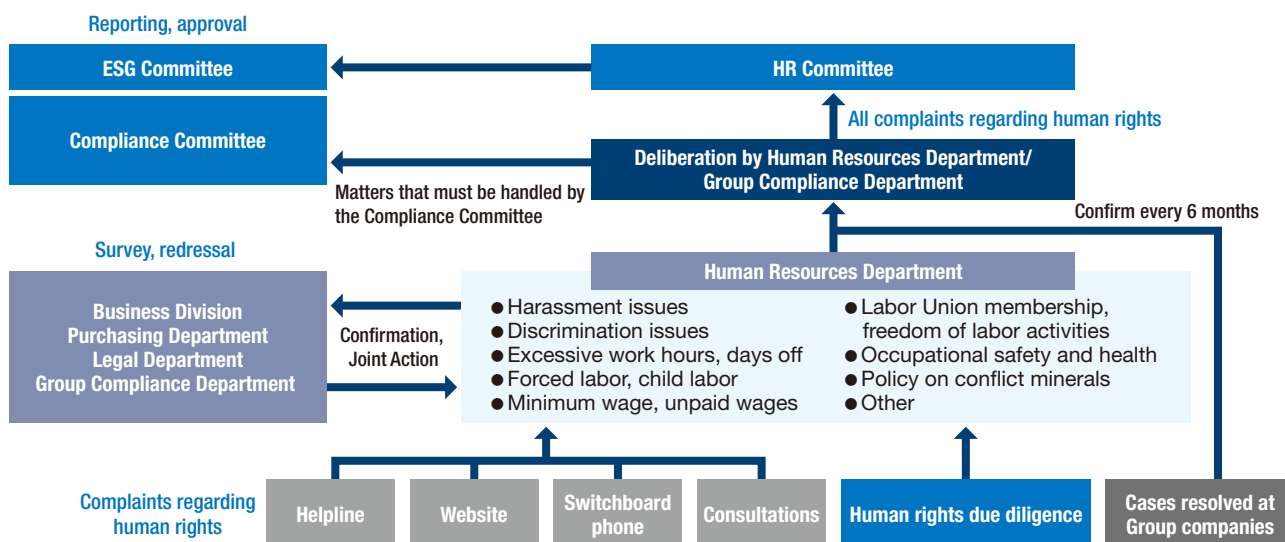
## Information Disclosure

In addition to releasing the “NGK Group Human Rights Policy”, the NGK Group also conducts assessments of human rights-related risks. We also utilize an ESG Committee and Compliance Committee to address human rights-related complaints. Furthermore, we develop our relationship with our suppliers by staying in constant communication with them via visits to individual suppliers, conducting safety support activities and performing CSR procurement-related surveys.

Also, even though the results of the self-assessment

carried out by NGK Group companies in Japan revealed no legally problematic issues or situations, there were some issues identified which do not align with the RBA Code of Conduct. The minor, easily fixed matters are addressed by the individual companies, while those not amenable to a quick, structural fix, but instead require medium-to-long-term study and discussion are addressed by the NGK Group using an integrated, standardized approach.

## Complaints Response System



## Supply Chain

With a basic policy centered on the three principles of openness and fairness, partnership, and relationship with society, the NGK Group is engaged in fair, free, and transparent transactions with the procurement partners in our supply chain.

### Basic Purchasing Policy

Open and Fair	Partnership	Relationship with Society
<ul style="list-style-type: none"> <li>● Open, fair, and honest procurement</li> <li>● Pursuit of competition principles and profitability</li> </ul>	<ul style="list-style-type: none"> <li>● Mutual prosperity based on mutual trust with suppliers</li> </ul>	<ul style="list-style-type: none"> <li>● Compliance with laws</li> <li>● Preservation of the global environment</li> </ul>

## Supply Chain Management System

At NGK, the Purchasing Department is responsible for managing tier 1 suppliers. It also manages tier 2 and beyond suppliers that provide critical items such as raw materials. All

supplier management is done in line with NGK's Supplier Management Regulations.

### CSR Procurement Guidelines

The NGK Group created the CSR Procurement Guidelines in fiscal 2010 as a guide to promote CSR procurement across the Group. The Guidelines specifically describe our obligations as a socially responsible buyer, such as environmental obligations relating to greenhouse gas emissions reductions, as well as clearly specify our expectations of all socially responsible suppliers.

In fiscal 2013, the Guidelines were expanded by being

integrated with the previous Green Procurement Guidelines, which set forth rules for preferential purchase of environmentally friendly products and services, and adding provisions of conflict minerals, anti-corruption, human rights, and labor issues.

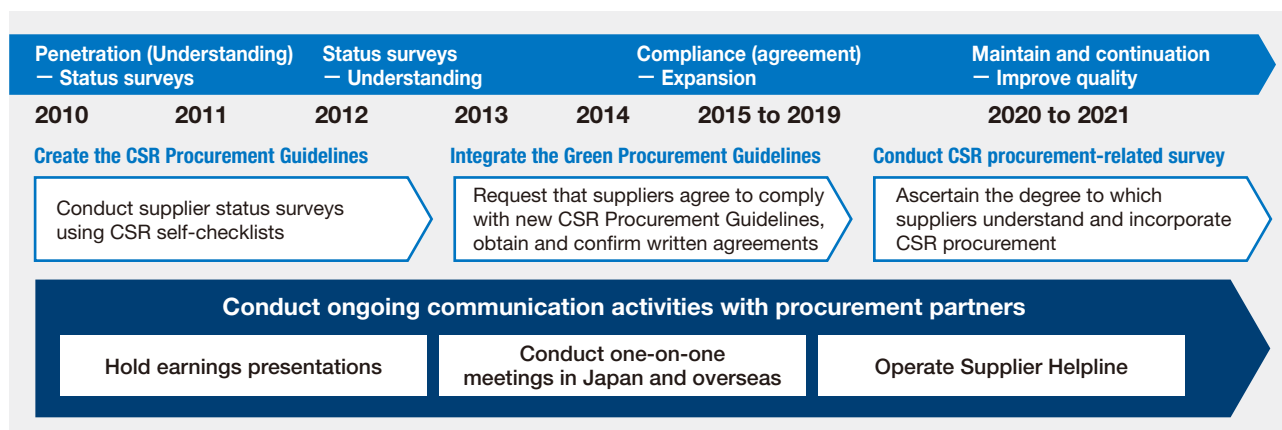
The expanded CSR Procurement Guidelines are publicly available on our website in multiple languages (Japanese, English, and Chinese).

### Improving CSR procurement

At the NGK Group, we develop activities to promote CSR procurement, such as visiting individual suppliers and conducting on-site inspections. We also request our suppliers, particularly new companies, to sign an agreement to comply with the CSR Procurement Guidelines.

We are preparing to conduct a survey for suppliers in fiscal 2021 in order to ascertain the degree to which they understand and incorporate CSR procurement. In fiscal 2022, we will complete measures that can be implemented to make the necessary improvements.

### Ongoing Promotion of CSR Procurement



Reference URL CSR Procurement Guidelines Supplemental Materials

<https://www.ngk-insulators.com/en/info/procure/>

## Safe and Comfortable Workplaces

The NGK Group endeavors to provide all employees with a safe and accommodating workplace environment.

### Enhancing Safety and Health Activities

One of the top priorities for NGK is having stronger safety and health activities, which is why one of the top policy focuses for the second 3-Year Action Plan created in fiscal 2019 is to “strengthen risk management and governance systems” and for which we pursue measures aimed at preventing or mitigating workplace hazard and occupational accident that result in serious injury.

#### Results of Fiscal 2020 Activities

Medium-Term Action Plan	Fiscal Year Implementation Items	Key Initiatives
Strengthen Risk Management	Reduce risk of workplace hazard and occupational accident that result in serious injury	We completed a reexamination of equipment/operations that present workers with potential workplace hazard and occupational accident leading to serious injury, such as being caught in rotating machinery, electrocution or explosions, and we put in place operational safeguards (e.g., organizational or administrative measures) at all production sites to control these risks. We are also largely finished with the implementation of engineering or technical measures (e.g., equipment update or remodeling), except at some overseas sites.
Strengthen Group Governance	Entrench Group Company Governance Mechanisms	In addition to safety and health-related auditing of Group companies by Safety & Health Department at the Head Office, Group company governance was strengthened in other ways, such as through internal auditing of Group companies by Business Group specialized teams responsible for overseeing them.
	Acquire Safety and Health Management System International Certification (ISO45001)	As of June 2021, safety and health management system international certification has been obtained for all production sites of Group companies in Japan and overseas.

### Initiatives for Persons with Disabilities

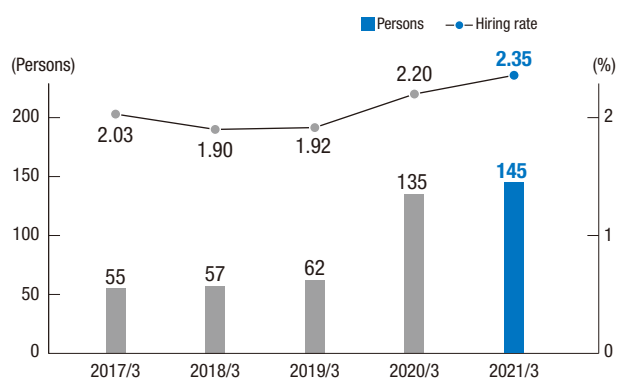
NGK undertakes a variety of initiatives aimed at employing people with disabilities, such as accepting students from special-needs schools as trainees and attending employment seminars for people with disabilities.

In fiscal 2020, we hired two new employees with disabilities. Among our special subsidiaries, the number of new hires was eight. These hiring activities helped us achieve a statutory hiring rate of 2.3%\*.

In fiscal 2021, NGK and NGK Ceramic Device will each hire one new graduate, as will NGK Yu-Service, and, when combined with the planned hiring of six mid-career employees with disabilities, we anticipate achieving a statutory hiring rate of 2.42% by the end of fiscal 2021.

\*The number of employees with disabilities in fiscal 2020 was 141, which is a statutory hiring rate of 2.35%. Both the employee number and rate are derived from the combined total for NGK, NGK Yu-Service, and NGK Ceramic Device.

#### Number of Disabled Employees/Hiring rate (NGK, NGK Yu-Service, NGK Ceramic Device)



### 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 (managers) in NGK in fiscal 2020 was 29.

#### NGK Ratio of Female Key Personnel (Managers)

	FY2017	FY2018	FY2019	FY2020
Number of female key personnel	17	20	26	29
Ratio of female key personnel	2.0%	2.2%	2.9%	3.0%

#### Ratio of Female Key Personnel (Managers) at Group Companies Outside Japan

	FY2017	FY2018	FY2019	FY2020
	21.0%	16.0%	20.2%	23.1%

# Human Resource Development

The NGK Group puts its Group Philosophy into action by ensuring that Quality of People remain our top priority as we pursue the mission of “Enriching Human Life by Adding New Value to Society.” We do this not only through the educational programs that we offer but also by cultivating work environments and supportive supervisors capable of ensuring that each employee is able to contribute and independently grow through the work that they undertake within the environment in which they are placed.



NGK undertakes systematic human resource development, including Group companies in Japan, which encompasses every job category from employment to every promotion milestone in their career.

The education and training that we provide employees across the NGK Group, in conjunction with their departments and with the aim of putting the Group Philosophy into practice, is divided into

three areas: “Human Skills” needed to tenaciously pursue results through teamwork, “Professional Competence” needed to cultivate a distinctive skill set and a proactive approach to problems, and “Compliance Requirements in Job Performance” needed to recognize and act upon responsibilities as a member of society.

## Manufacturing Training

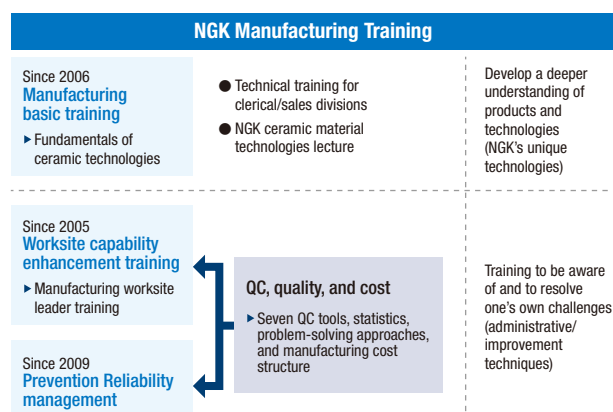
We pursue training aimed at conveying the central importance of safety, the environment, quality, timely delivery, and cost in manufacturing while passing on the traditions and spirit of NGK manufacturing. This training also aims to grow employees into individuals who can support the creation of new value.

Towards this end, we provide training in specific technologies that will deepen employees’ understanding of NGK products and technologies, as well as provide training in administrative and improvement techniques that will equip employees with the mindset and means to improve their workplaces.

Manufacturing basic training is centered on practical training tied to the actual manufacturing process. It involves teaching participants about ceramic technologies and manufacturing in general at NGK so that they will have a broad perspective, which they can apply in their work.

Worksite capability enhancement training cultivates human resources capable of making managerial contributions as

manufacturing worksite leaders who independently pursue worksite capability improvements together with others both in and outside of their plant’s organizational framework.



## Innovation Training

The aim of innovation training is the cultivation of leaders suited to an era of transformation and speed. This is achieved by fostering outside-the-box thinking coupled with an ability to think and act to bring an idea to fruition.

In the program for young employees with leadership potential,

participants learn about the essential innovation processes involved in generating new business. The program is held jointly with other companies. This allows interaction with employees from other companies who have different experiences and values, thus helping NGK employees develop a more multifaceted perspective.

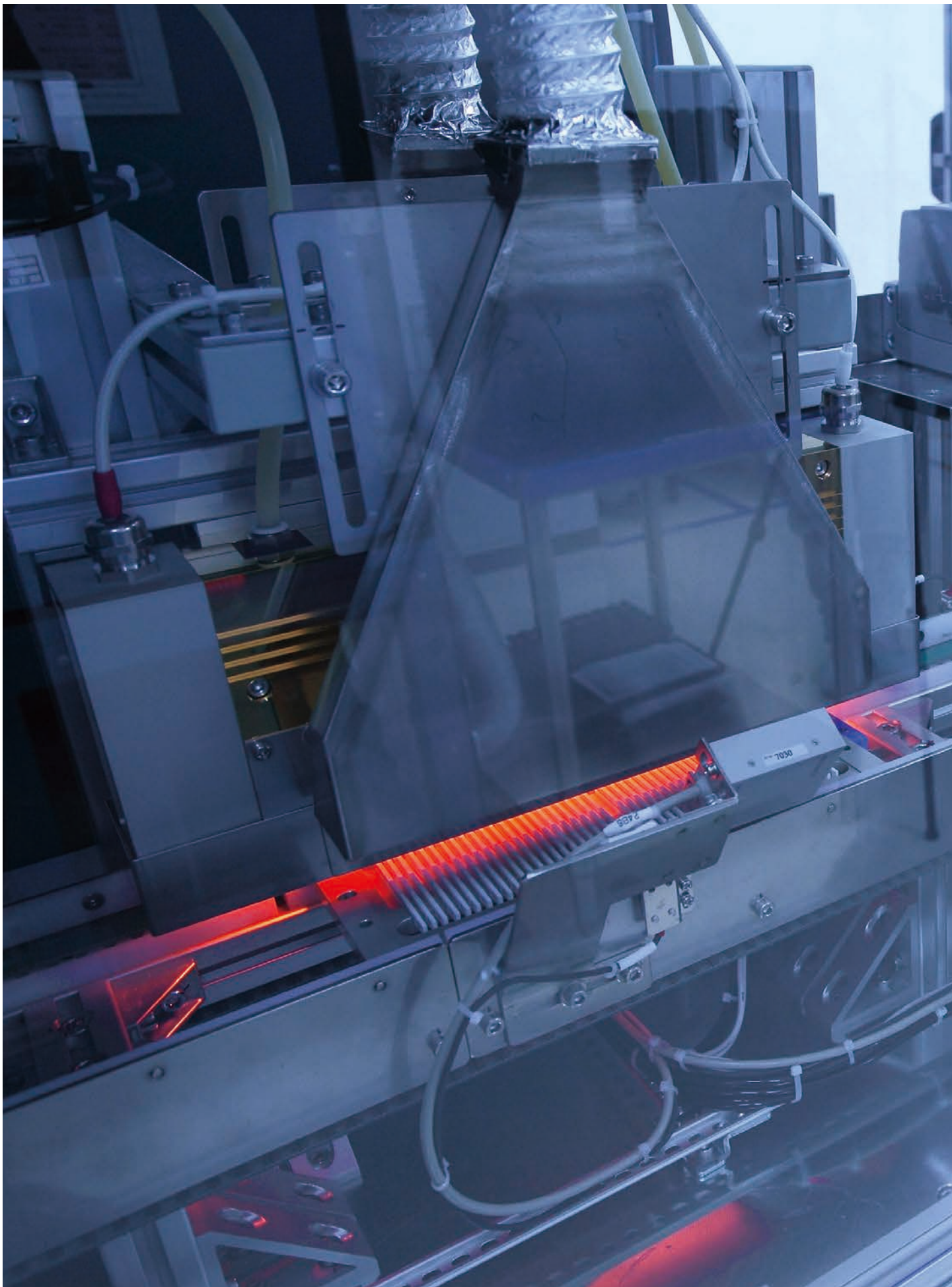
## Corporate History Training

This training program looks at the history of NGK in order to reexamine the origins of our corporate activities, to reinforce our shared values, and then to prompt participants to think about how this impacts the way they go about their jobs. The program for newly appointed managerial personnel incorporates corporate history materials related to topics such

as globalization and diversity, which are assigned to each participant group, along with a worksheet, that they discuss in depth in relation to the distinctive character of NGK.

Education programs for other job grades are being steadily introduced, as well as programs geared towards Group companies outside Japan.





The background of the slide is a blue-tinted photograph of industrial machinery, likely a manufacturing or assembly line, with various metal frames, pipes, and components visible.

# Business Overview

Although the impact of COVID-19 on the economy will continue to be a concern, we aim to achieve further growth through expanding sales of high-function products and products that contribute to the environment.



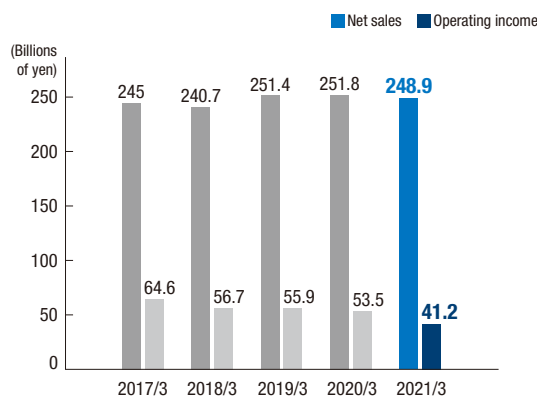


# Ceramic Products Business

In fiscal 2020, net sales slightly declined, because the global automotive sales volume dropped in the first half of the year, despite a rapid recovery in demand mainly in the Chinese market during the latter half. Operating income declined as a result of various factors, including lower sales and increased depreciation expense.

**Fiscal year ended March 2021 results**  
(after elimination of intersegment sales)

**Net sales** **248.9** billion yen **Operating income** **41.2** billion yen

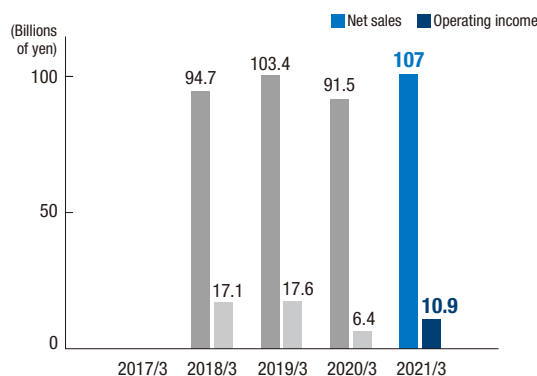


# Process Technology Business

Sales of products for semiconductor manufacturing equipment increased due to a recovery in demand driven by strong foundry and memory investments. As for industrial process-related products, net sales were at the same level as the previous fiscal period. Operating income increased due to several factors including an increase in shipment volume.

**Fiscal year ended March 2021 results**  
(after elimination of intersegment sales)

**Net sales** **107** billion yen **Operating income** **10.9** billion yen



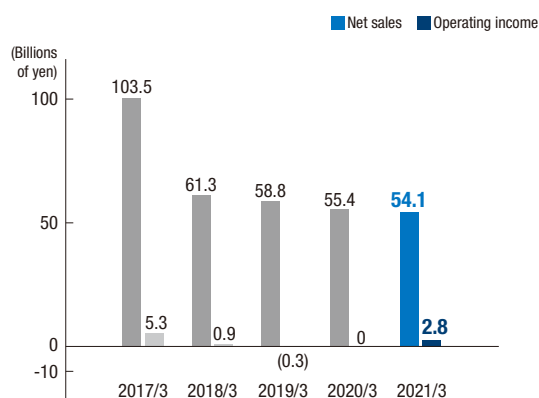
Note: Effective from the fiscal year ended March 31, 2019, due to organizational changes, the business segment of the NGK Group has been changed from "Power Business", "Ceramics Product Business" and "Electronics Business" to "Power Business", "Ceramics Business", "Electronics Business" and "Process Technology Business". The figures for the fiscal year ended March 31, 2018 have been made based on the new business segmentation.

# Electronics Business

In electronic components-related business, the demand for bonded wafers for surface acoustic wave (SAW) filters and piezoelectric micro-actuators for hard disk drives (HDDs) increased; however, the demand for ceramic packages dropped against a backdrop of stagnant capital expenditure for mobile phone base stations. This was also accompanied by sales of shares and fourth quarter exclusion from consolidation of Soshin Electric Co., Ltd., resulting in reduced sales. Operating income increased due to a variety of factors, including a change in product mix.

**Fiscal year ended March 2021 results**  
(after elimination of intersegment sales)

**Net sales** **54.1 billion yen** **Operating income** **2.8 billion yen**



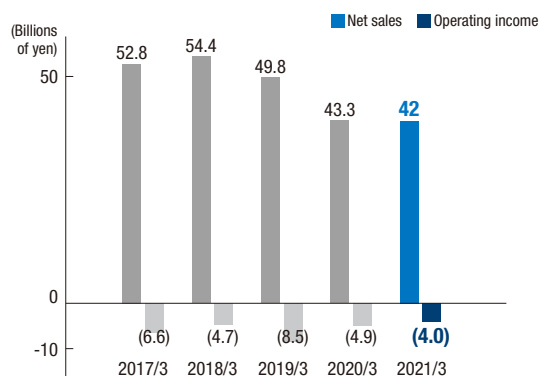
# Energy Infrastructure Business

(Name changed from the Power Business in April 2020)

Sales of insulators remained low due to the continued restraint on capital investment by domestic electric power companies and the discontinuation of unprofitable products. Sales of NAS<sup>®</sup> batteries were sluggish due to a lack of shipments for large-scale projects both in Japan and overseas. As a result of a decline in insulators losses, the operating loss decreased.

**Fiscal year ended March 2021 results**  
(after elimination of intersegment sales)

**Net sales** **42 billion yen** **Operating income** **(4.0) billion yen**





# Pursuing new products to launch, while maintaining the position of profit center

## Main market

[Market for NGK products for emission control systems]  
Global market size: 500 billion yen  
(2020 NGK estimate)

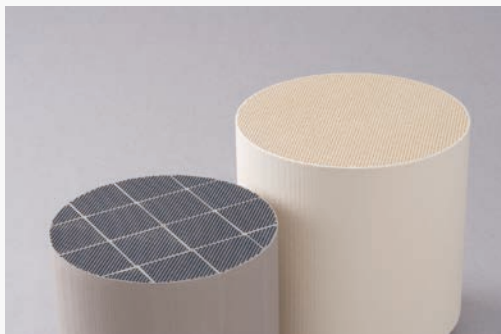
## Primary customers

[Products for emission control systems]  
Manufacturers of cars, trucks, and agricultural and construction equipment in and outside Japan

## Core products

### Diesel particulate filters (DPFs)

Removes up to 99% of particulate matter (PM). The more heat-resistant silicon carbide filters (left-hand side of photograph) are mainly used in passenger cars, while the lightweight cordierite filters are used in large vehicles.



### In-vehicle high-precision NOx sensors

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



## Inaugural aspirations

### Be positive, without being afraid of change

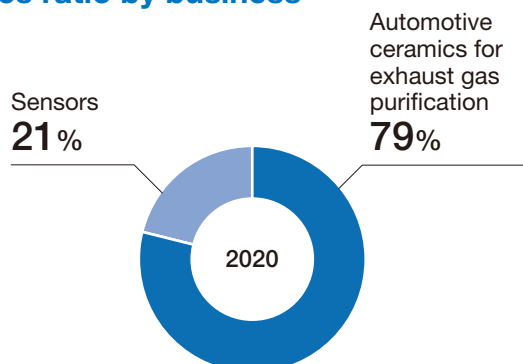
Forty-five years ago in 1976, HONEYCERAM®, a honeycomb catalyst substrate for controlling automotive emissions, went on the market. We have continued to refine and improve our technology over the intervening years while adapting to changes in society and in the business environment. However, the automotive industry is currently undergoing a once-in-a-century paradigm shift. We must not ignore this change, nor should we fear it. I believe the Ceramic Products Business Group is a frank and open organization where members can express ideas and opinions freely. We will move forward by following and preparing for change through discussions involving all members.

## Towards realization of the NGK Group Vision Provide products that contribute to carbon neutrality via unique technology

The NGK Group Vision anticipates a scenario in which there is zero demand for internal combustion engines by the year 2050. We aim to transform our business in line with this scenario, so that carbon neutrality and digital society-related products account for 50% of sales in 2030.

During the transition period, the Ceramic Products Business Group has a responsibility to recover past investment

## Sales ratio by business



A portrait of Jun Mori, a middle-aged man with grey hair and glasses, wearing a dark blue suit, white shirt, and patterned tie. He is gesturing with his hands while speaking.

## Jun Mori

Senior Vice President;  
Group Executive,  
Ceramic Products Business Group

and to continue supporting the NGK Group financially as its profit center.

Beyond that, our aim is to make use of our unique technologies to develop new products that we will bring to market. Specifically, we will focus on the following three areas.

First, we will develop products used in plug-in hybrid electric vehicles (PHVs) as well as synthetic fuel (e-Fuel) vehicles. In the future, we anticipate that there will still be some internal combustion engine-powered vehicles such as PHVs and e-Fuel vehicles in use; hence, there will be a need for products for emission control systems. However, as these will need to be more technologically advanced, we will continue to provide new products adapted to our customers' needs.

Second, we will develop products for electric vehicles (EVs). One example is products for thermal management, which conduct electricity through a honeycomb structure in order to achieve heat modulation. Because EVs have the disadvantage of a short cruising distance, this creates a challenge for managing heat using as little electricity as possible. This is something we are pursuing development on while in contact with automakers.

Third, we will develop products unrelated to automobiles. Examples of new products put forward in the NGK Group Vision in developing jointly with other departments include CO<sub>2</sub> adsorption modules and solid oxide electrolysis cells (SOEC), as well as honeycomb structural reactors for e-Fuel, to facilitate adsorption and recovery of CO<sub>2</sub>.

In order to achieve these we will need to search for new business and refine our core technology. Our future task is to determine what kind of technology we can use for carbon neutrality-related products.

While refining our core technology for that future, we are also continuing to improve our production efficiency. In a project called "Honeycomb Process Digital Transformation" (HPDX), we will, by analyzing production process data, automate and reduce the amount of labor required to perform adjustment of material viscosity, shape, water volume, temperature, extrusion speed, etc. These are all tasks which we have been dependent upon veteran employees to carry out. We are aiming for the completion of HPDX in three years' time.

Also, we are investigating alternative fuels that we can use for our kilns in order to promote the carbon neutrality of our manufacturing sites. At present, we use natural gas, which emits a large amount of CO<sub>2</sub>. We would switch this to another fuel, such as hydrogen or ammonia. Or, we could use electric kilns that would allow us to switch to in-house energy production and renewable energy use derived from a combination of NAS<sup>®</sup> batteries and solar cells. Given that our overseas plants occupy large enough areas to install NAS batteries, and for which renewable energy can be easily and inexpensively obtained, this is a feasible option.

## Current situation and future outlook

### Adequately adapting to changing demand

As a result of the impact of the COVID-19 pandemic, the first quarter of the period ended March 2021 saw unavoidable suspensions of operations at a majority of the overseas plants, with the exceptions of China and Poland; however, sales of passenger vehicles and trucks recovered during the latter half of the year, primarily in China, and this resulted in a rapid recovery in demand for our business group's products. It was thanks to the efforts of our employees that we were able to accommodate this resurgence in demand while still adhering to infection control measures. Although sales and profits were lower than those of the previous year, they were above what we predicted at the start of the fiscal year.

Currently, there is healthy demand for catalyst substrates for controlling automotive emissions and NOx sensors. Our

gasoline particulate filter (GPF) business is also up and running. Our aim is to ensure optimal production according to demand.

Additionally, we are moving ahead with start-up of our "dew-point-free" NOx sensor, which begins operating as soon as the engine starts. We are also planning to develop and bring to market electrically heated catalysts (EHCs) sometime between 2025 and 2027.

Our core competencies go beyond our current product lineups to encompass various ceramic technologies that cover the areas of development, production and evaluation, as well as the ability to communicate well with customers. Using these, we will create products that contribute to carbon neutrality.

# Set “CN” and “DS” on a springboard to achieve the NGK Group Vision

## Main market

[Capital investment in 300 mm wafer fab equipment]  
Global market size: \$56.7 billion  
(2020 SEMI estimate)

## Primary customers

Ceramic heaters  
[Manufacturers of semiconductor manufacturing equipment]

## Core products

### Ceramic heaters

Pedestals used to uniformly control the temperature of silicon wafers in the deposition process. The unique structure of a shaft bonded to the bottom of the heated pedestal, where wafers are placed, protects terminals and conducting wires from halogen gas.



### Low-level radwaste treatment system

The system has been adopted at nuclear power facilities throughout Japan and has been lauded for contributing to reducing waste by the highly recognized for its extremely effective dust removal and safety.



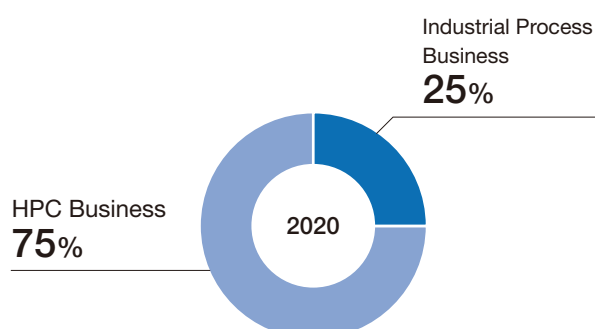
## Towards realization of the NGK Group Vision Contributing to the development in semiconductors and the achievement of carbon neutrality


The environment around NGK Group is changing at a tremendous speed towards carbon neutral and digital society. It is difficult to predict exactly what society will be like in 2050, but VR (virtual reality) and AR (augmented reality) will be integrated into our daily lives, and automation will have advanced in all aspects, including autonomous driving. I also believe that the rules to protect the global environment will become stricter than we can anticipate. In such a society, the goal of the HPC Business, one of the businesses of this business group, is to contribute to the development of semiconductors used as the key devices in the social infrastructure that support people's lives, and the goal of the Industrial Process Business is to create a series of products and services that contribute to the realization of carbon neutrality.

HPC Business progresses the conversion toward smart factory through DX from this fiscal year. In addition to the introduction of automated warehouses and warehousing using QR labels and RFID tags, we will "visualize" the manufacturing history by utilizing the vast amount of data related to the manufacturing of each product.

Our aim is to achieve quick transfer of alert information to the previous and subsequent production process in order to prevent manufacturing defects.

## Sales ratio by business



A portrait of Ryohei Iwasaki, an older man with grey hair and glasses, wearing a light blue suit, white shirt, and pink tie. He is gesturing with his hands while speaking.

## Ryohei Iwasaki

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

The chamber components and thermal spraying businesses of FM Industries, our U.S. subsidiary, have been highly reputed for their ability to respond quickly to customer requirements, and we expect to expand our business in the future. We are preparing for future needs by expanding our facilities in California and Arizona.

With regard to Industrial Process Business, our aim is to contribute, through a succession of products and services, to carbon neutrality. We have established a marketing department and pursue cross-channel sales expansion of our business fields. Moving forward, we will expand our main focus beyond

the domestic Japanese market to overseas markets, including Europe and the U.S., in order to concentrate on expanding existing business applications and sales, as well as development of new products and business. The innovative ceramic membranes that NGK is developing represent a core competency that we will capitalize upon through products and equipment capable of contributing to society's environmental needs, such as CO<sub>2</sub> and nitrogen separation and the creation of a bioeconomy, and, thereby, reliably grow our carbon neutrality-related business.

## Current situation and future outlook

### The impact of COVID-19 for the economy was not as negative as estimated

At the start of the financial period ended March 2021, the impact of the COVID-19 pandemic was concerned; however, as the business which our business group is engaged in is fundamentally close to an essential business, we were not significantly impacted. Rather, the demand by people staying at home has been a tailwind, and has driven up sales and profits overall.

The HPC Business saw significant growth in both ceramics for semiconductor manufacturing equipment and chamber components due to a recovery in investment in foundries and memory segments. On the other hand, fiscal 2021 will be a challenging year in terms of profit due to increased amortization of prior capital investments, increased development input to enhance competitiveness, and additional capacity expansion at FM Industries, whose business is rapidly expanding. We will strive to improve productivity and prepare

for the expansion of semiconductor demand in the medium term.

With regard to Industrial Process Business, there was robust demand for membrane separating systems, particularly for purifying water for use in pharmaceutical production, and glass linings; however, because of a lack of demand for industrial heating systems, refractory products and energy plant-related systems, sales for the year were flat, with profits falling short of expectations. The main challenge for fiscal 2021 is reconstructing NGK Technocera Suzhou. Amidst increasingly active investment in lithium-ion batteries in anticipation of growing demand for EV, we have reached a 'moment of truth' where we must figure out how we will overcome our Chinese competitors.

Our business group is also anticipating a favorable market environment for the period ending March 2022.

## Message

### What sort of value can we deliver to our customers?

In the past few years, countries around the world have publicly committed themselves to reducing greenhouse gases, and this has catalyzed a major shift in global awareness and attitude. As NGK make efforts to meet its corporate responsibilities with regard to carbon neutrality, our business group has the potential to contribute such activities through our wide-ranged products and business domains.

This high aim to reduce 50% of CO<sub>2</sub> emissions by 2030

would bring us great opportunities to take a big leap forward if our products and services meet our customers' expectations. Also, we should consider adopting a service-oriented business model that will enable us to receive consistent revenue.

We will continue to expand our business by clear understanding of the market's necessity, providing appropriate products and services, and receiving return by sharing such value we provide.



# Riding the wave of a changing environment to threefold growth in sales by 2030

## Main market

[Amount of digital data generated and transmitted worldwide]  
Average annual growth rate of approximately 30%  
Amount in 2025 will be more than five times that of 2018: 175 ZB (zettabytes: 1 trillion gigabytes) (IDEMA Japan estimate)

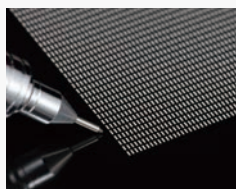
## Primary customers

[Piezoelectric devices for HDDs, bonded wafers, etc.]  
Manufacturers of HDDs, communication devices

## Core products

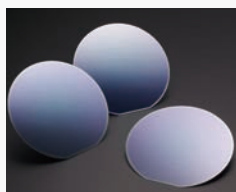
### Piezoelectric micro-actuators for HDDs

Micro-actuators are indispensable for performing precise control of magnetic heads in HDDs. As the key device enabling both high capacity and reliability in HDDs, our ultra-compact micro-actuators are used in data centers throughout the world.



### Bonded wafers

Bonded wafers are substrates for electronic devices developed by proprietary bonding technologies and ultra-high-precision wafer polishing technologies cultivated in the ceramics business. Combining different materials makes it possible for bonded wafers to deliver performance and functionality beyond wafers made from a single material.



### Beryllium copper alloy

From 0.045 mm sheets and coils to bars and wire a mere 0.05 mm in diameter, we can provide the right alloy mix with a variety of hardness to meet customer needs. Beryllium copper alloys boast outstanding strength, conductivity, fatigue resistance, high-temperature characteristics, workability, and resistance to corrosion.



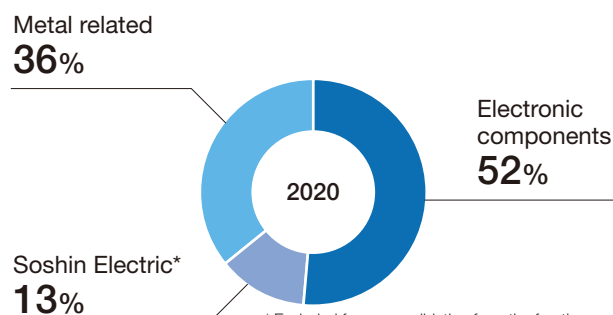
## Towards realization of the NGK Group Vision Pursuing new possibilities with new products that support a digital society

As we move toward the future society of 2050, the environment all around us is undergoing major changes, including advances in high-speed, high-capacity communications, an accelerating shift towards EV, transitioning to natural energy and the arrival of a hydrogen-based society. Our business group has developed a long-term business plan and set targets for 2030 based on how we anticipate society will change. We aim to grow our sales approximately threefold by 2030 compared to their current level.

When you consider the key characteristics of our business group's product lineups in light of the NGK Group Vision's focus on carbon neutrality (CN) and digital society (DS), you see that we have a lot to offer in these fields, particularly in the area of digital society. With 5G becoming increasingly widespread, the number of high-performance filters used on a single smartphone is increasing, which means we anticipate medium-to-long-term growth in demand for bonded wafers. And, of course, even more possibilities open up for us to pursue when we look past 5G to 6G and at the introduction of new telecommunications standards such as those related to millimeter waves, as well as when we think about potential applications for various sensing devices. In addition, we are working on combining our unique process technologies with new materials to come up with structural and functional products aimed at the semiconductor and health care fields and developing business in entirely new fields.

For our commercially available EnerCera® lithium-ion rechargeable batteries, beyond smart card and wearables

## Sales ratio by business



\* Excluded from consolidation from the fourth quarter of the fiscal year ended March 31, 2021

## Shuhei Ishikawa

Senior Vice President;  
Group Executive,  
Electronics Business Group



applications, we are looking into industrial applications, such as IoT (Internet of things) applications in factories and stores and quality control applications in shipping, as well as applications in a variety of other fields.

With technological innovation being driven by advancements in high-speed, high-capacity telecommunications and increasingly diverse data utilization scenarios, this is a perfect growth opportunity for bonded wafers, hard disk drive (HDD) piezoelectric micro-actuators and EnerCera to be further developed as products contributing to the realization of a digital society.

We are also pursuing product development in the area of carbon neutrality, which represents the other pillar of the NGK Group Vision. For the time being, our main focus is DCB and

AMB substrates (for power modules). The growth in demand for vehicular power modules that will accompany the trend towards electric motor adoption clearly signals an expansion in customer adoption for EV (electric vehicles), HEV (hybrid electric vehicles) and PHV (plug-in hybrid vehicles).

Also, amidst ongoing carbon recycling-related initiatives and other initiatives aimed at realizing a low-carbon society, we anticipate growth in hydrogen-related infrastructural systems. We will work on expanding applications of beryllium copper alloy materials, taking advantage of the fact that they offer high thermal conductivity, excellent strength properties and do not degrade when exposed to hydrogen, in order to contribute to the creation of a hydrogen-based society.

## Message

### Helping achieve our vision through stronger ‘product manufacturing’ and ‘solutions manufacturing’

With the aim of helping realize the NGK Group Vision, we are pursuing future growth that is based not only on ‘product manufacturing,’ by which we will continue to offer products that give us competitive strength, but also on ‘solutions manufacturing,’ by which we go beyond offering products to also the accompanying applications. Currently, the main products underpinning our business group include piezoelectric micro-actuators for HDDs, bonded wafers and beryllium copper strips, all of which have set customers and applications and, through the use of technology which sets us apart from our

competitors by meeting highly difficult specifications, have fostered our growth thus far. However, EnerCera differs notably from these products in that it requires “marketing which motivates customers.” In other words, we must work on the customers, develop applications and build a market for EnerCera. Customers will not be able to completely utilize the batteries if we simply sell them and ask them to try them out. It is important that we develop and demonstrate applications that the customers themselves are not yet aware of.

## Current situation and future outlook

### Anticipating increased profits due to increased demand and improved profitability

For the fiscal year ended March 2021, during the first quarter, the spread of the COVID-19 pandemic resulted in a drop in shipments to China and South Korea for our Electronics Business as a whole, as well as other effects, including a suspension in operations at the Malaysian production facility of our Package Business. The latter half of the year saw an incremental recovery in the market, centering on the Chinese automotive industry. With regard to specific products, while demand for piezoelectric micro-actuators for HDDs and bonded wafers increased, demand for mobile phone base station ceramic packages declined. This was also accompanied by sales of shares and fourth quarter exclusion from consolidation of Soshin Electric, resulting in reduced sales, while operating income increased due to higher demand and reduced costs.

For the fiscal year ending March 2022, we anticipate that electronic components-related business will see increased demand for piezoelectric micro-actuators for HDDs and package-related products, while metal-related business will see favorable movement upward in sales of beryllium copper alloy products. On the other hand, however, as a result of the change in the basis by which bonded wafer sales are recorded, as well as the exclusion from consolidation of Soshin Electric, we foresee decreased revenue for our business group as a whole. As for profitability, we anticipate that increased demand in metal-related business and electronic components-related business, as well as the return to profit of NGK Group company NGK Electronics Devices, will help provide us with increased profits.

# Expanding energy infrastructure-related business to help realize carbon neutrality

## Main market

[Global market for large rechargeable batteries]  
Storage system market size: 1.882 trillion yen  
(Estimate for 2030 by Fuji Keizai Management)

## Primary customers

[Stationary rechargeable batteries]  
Power utilities, engineering companies, etc.

## Core products

### NAS® batteries

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.



### Zinc rechargeable batteries

Zinc normally causes short-circuiting during charging when used in rechargeable batteries. However, NGK has solved this problem and developed a zinc rechargeable battery by utilizing its proprietary hydroxide ion conducting ceramics. Featuring high capacity and inherent safety, the zinc rechargeable battery is an optimal storage solution for indoor installations.



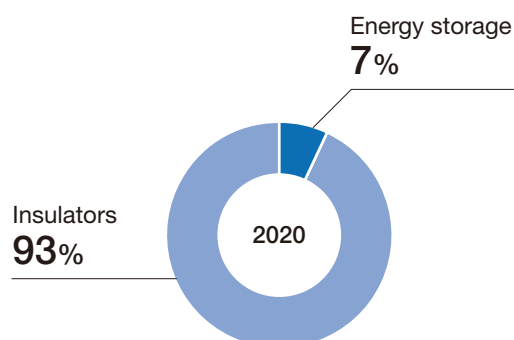
## Inaugural resolutions

### Constructing and executing a grand business design

I have worked in the Ceramic Products Business Group from the time I joined NGK up until April of 2021, when I was put in charge of the Energy Infrastructure Business Group. While this means I have no experience in power-related business, it also means I am able to view things from a different perspective to someone who has spent their entire career in it, which will, hopefully, stimulate new ideas and innovation.

In fiscal 2020 our business group was renamed from “Power Business” to “Energy Infrastructure Business.” This was done to reflect the fact that, in the 100 years since NGK was founded, we have grown to handle more than just power-related products. My immediate goal is to create a grand design which is focused on the future of energy as a whole. This will be refined into concrete scenarios and action plans to be promptly implemented.

## Sales ratio by business



A portrait of Atsushi Matsuda, a middle-aged man with dark hair and glasses, wearing a dark suit, white shirt, and patterned tie. He is sitting and has his hands clasped in front of him.

## Atsushi Matsuda

Senior Vice President;  
Group Executive,  
Energy Infrastructure Business Group

### **Towards realization of the NGK Group Vision Making “comprehensive energy business” our goal for the future**

The world is rapidly moving towards the realization of a decarbonized society, and the NGK Group Vision itself puts forward contributing to carbon neutrality as one aspect of “what we want to be.” What the Energy Infrastructure Business Group can do right now to ensure the health and habitability of the environment that our grandchildren will inherit is to contribute to carbon neutrality through an expansion of our energy storage systems.

For our storage battery business, we will expand our “product-focused” sales approach to encompass a broader “solutions-focused” approach. One example of this is a new approach to regional power producers and suppliers. What we are aiming at is not simply to sell storage batteries; rather, it is to contribute value to local governments by facilitating business continuity planning, renewable energy decarbonization and other efforts. There are a number of other business models that we are also developing into projects which combine NAS batteries with renewable energy, and we are driving for the transformation of our business portfolio by utilizing these models.

We also have plans for even further into the future. An example is the synthesis of methane gas and “e-fuel” synthetic

fuel via our ceramic expertise. It has been estimated that the cost of solar powered energy production in the Middle East, North Africa and other regions which enjoy a lot of sunlight could be around one-third that of Europe and other regions with less sunlight. Thus, we first would use our NAS batteries to store the low-cost, renewable energy produced in those sunny regions. As the next step, we would use our subnano-ceramic membranes to concentrate CO<sub>2</sub> in exhaust gases from production sites and in the atmosphere. The renewable energy stored in the NAS batteries can then be used to power our ion-conducting ceramic solid oxide electrolysis cells (SOEC) which efficiently electrolyze water with CO<sub>2</sub> to produce hydrogen (H<sub>2</sub>) and carbon monoxide (CO). When we introduce our honeycomb structural reactors at this point to perform methanation (methane synthesis) of the electrolyzed byproducts, we will have a whole process for creating synthetic methane gas and “e-fuel” synthetic fuel. Finally, by deploying those ceramics products that incorporate our Group’s core technology into plant equipment, we can expand our scope into the plant engineering business. Our goal for the future is to provide comprehensive energy services, including producing fuel at a plant we construct ourselves.

### **Current situation and future outlook Putting NGK insulator business into the black and expediting commercialization of zinc rechargeable batteries**

The period ended March 2021 saw only limited impact from the COVID-19 pandemic; however, the business group continued to operate in the red due to significant, existing difficulties in the business environment. With regard to insulator business, capital investment by domestic electric power companies remains low, while at the same time adoption of polymer insulators is steadily increasing. Similarly, in the energy storage business, full-scale demand for long-lasting storage batteries has yet to materialize, while NAS battery plant operating rate remains low.

On the other hand, however, one significant positive result is the price revisions for insulators which nearly all customers in Japan and overseas had agreed to as of the preceding fiscal period.

Although no major change in business environment trends is expected for the period ending March 2022, we predict that, thanks to the rebuilding efforts that we have undertaken up to this point, insulator business will be put back into the black for the first time in six years. Also, with regard to our zinc rechargeable batteries, demonstration testing is ongoing. We anticipate these batteries will find uses as backup power supply systems in mobile phone base stations and as emergency power supply systems in buildings thanks to their high degree of safety. Based on performance results from the current fiscal year, we will pursue commercialization and begin sales from next fiscal year for a limited number of customers and applications.







# Corporate Data

Let's look at a range of data from the NGK Group, including major financial and non-financial indicators.



## Financial and Non-Financial Data

### Financial Indicators

	March 2011	March 2012	March 2013	March 2014
Net sales	239,363	248,948	252,789	308,671
Cost of sales	160,804	172,456	178,052	208,052
Selling, general, and administrative expenses	46,456	49,986	54,041	56,366
Operating income	32,102	26,504	20,695	44,252
Net income attributable to owners of the parent	24,428	(35,351)	11,422	27,045
Capital expenditures	25,284	28,839	31,216	28,434
Research and development expenses	11,437	11,428	11,315	12,060
Net cash provided by operating activities	36,650	13,850	3,681	32,647
Net cash used in investing activities	(17,886)	(45,438)	(582)	(21,185)
Net cash provided by financing activities	(5,146)	56,608	12,448	2,026
Total assets	479,793	523,322	563,030	614,219
Interest-bearing debt	69,229	131,436	155,816	167,295
Net assets	323,945	264,381	303,073	344,453
Profit per share (yen)	74.80	(108.27)	34.98	82.82
Cash dividends per share (yen)	20	20	20	22
Ratio dividends to net worth (%)	26.7	—	57.2	26.6
Return on equity (ROE) (%)	8.0	(12.6)	4.2	8.6
Equity ratio (%)	64.0	48.5	52.0	54.3
Price-earnings ratio (PER)	19.9	—	29.0	26.0
Price-book value ratio (PBR)	1.6	1.5	1.1	2.1
Closing stock (yen)	1,487	1,181	1,013	2,150
Number of employees, end of year (persons)	11,666	12,372	13,159	13,210

### Non-Financial Indicators

	March 2011	March 2012	March 2013	March 2014
GHG emissions (Scope 1: Energy-origin CO <sub>2</sub> ) (10,000 metric tons, NGK Group)	—	27.5	29.6	30.2
GHG emissions (Scope 2: Energy-origin CO <sub>2</sub> ) (10,000 metric tons, NGK Group)	—	31.7	36.7	43.0
GHG emissions (Scope 3) (10,000 metric tons, non-consolidated)	—	—	—	—
Total water usage (10,000 m <sup>3</sup> , NGK Group)	155* <sup>1</sup>	305	327.3	318.2
VOC emissions (metric tons, NGK Group)	0.94* <sup>1</sup>	5.7	4.8	5.3
PRTR substance emissions (metric tons, NGK Group)	4.8* <sup>1</sup>	17.3	14.8	14.3
Total water discharge (10,000 m <sup>3</sup> , NGK Group)	165* <sup>1</sup>	172	215	223
Waste emissions (10,000 metric tons, NGK Group)	4.8	3.6	3.9	4.2
Number of employees (persons, non-consolidated)	3,293	3,351	3,426	3,531
Employee breakdown (female) (% , non-consolidated)	13.3	13.1	13.4	13.3
Percentage of women among managers (% , non-consolidated)	1.1	1.1	1.0	1.5
Percentage of women among managers (% , overseas NGK Group companies)	—	—	—	—
Number/percentage of disabled employees (persons/%, non-consolidated)	42 (1.45)	43 (1.51)	49 (1.91)	53 (2.07)
Lost time incident rate (non-consolidated)* <sup>2</sup>	0.42	0.14	0.27	0.42
Social contribution expenditure (100 million yen, non-consolidated)	—	—	3.46	3.48
Number of directors (persons, non-consolidated)	13	13	11	12
Number of outside directors (persons, non-consolidated)	2	2	2	2
Total remuneration of directors (million yen, non-consolidated)	761	643	668	624
Number of patents held (Japan) (non-consolidated)	2,270	2,303	2,454	2,685
Number of patents held (overseas) (non-consolidated)	3,829	3,981	4,087	3,990

Note: The values for energy-origin CO<sub>2</sub> and Scope 2 (energy-origin CO<sub>2</sub>) were calculated by changing the emission factor for electricity

(a factor that converts the amount of electricity used into CO<sub>2</sub>) from a conventional fixed value to the actual value of electricity companies for each fiscal year.

\*1 Non-consolidated basis

\*2 Based on a calendar year

(Millions of yen)

	March 2015	March 2016	March 2017	March 2018	March 2019	March 2020	March 2021
	378,665	435,797	401,266	451,125	463,504	441,956	452,043
	254,386	289,266	272,434	312,107	323,224	313,458	329,061
	62,700	65,633	65,619	68,991	75,574	73,496	72,158
	61,577	80,898	63,212	70,026	64,705	55,000	50,823
	41,504	53,316	36,379	45,814	35,506	27,135	38,496
	30,366	45,437	60,101	71,713	105,336	93,997	50,831
	13,942	17,410	18,653	21,100	23,271	22,928	22,448
	73,002	59,445	80,172	50,554	61,224	53,200	85,641
	(39,495)	(47,772)	(56,452)	(49,413)	(109,743)	(60,830)	(51,724)
	(26,000)	(373)	(13,013)	22,546	3,564	(18,796)	12,250
	702,234	711,897	759,434	826,243	863,636	833,085	908,967
	156,203	163,973	174,150	211,573	229,423	234,400	264,244
	404,001	417,972	427,593	472,863	489,245	469,118	517,892
	127.11	163.28	112.71	142.42	110.35	84.73	121.61
	28	38	40	44	50	50	30
	22.0	23.3	35.5	30.9	45.3	59.0	24.7
	11.4	13.3	8.8	10.4	7.6	5.8	7.9
	55.8	57.1	54.9	55.8	55.3	55.0	56.3
	20.2	12.7	22.4	12.9	14.6	16.7	16.6
	2.1	1.7	1.9	1.3	1.1	1.0	1.3
	2,565	2,079	2,520	1,834	1,608	1,417	2,024
	16,217	16,657	17,517	18,783	20,115	20,000	19,695

(Millions of yen)

	March 2015	March 2016	March 2017	March 2018	March 2019	March 2020	March 2021
	29.0	31.1	31.7	32.0	32.3	30.9	26.4
	39.4	44.9	48.7	52	54.5	56.4	49.2
	—	—	—	87.7	104.7	97.7	89.3
	276	285	409	432	453	433	378
	6.3	6.8	155.4	145.3	145.2	68.4	82.9
	15.4	14.0	163.1	154.2	127.5	76.3	89.4
	196	197	279	287	281	314	253
	5.7	5.9	5.9	5.9	5.8	5.4	4.6
	3,569	3,700	3,937	4,142	4,119	4,224	4,316
	12.9	12.6	12.7	12.5	12.6	12.8	13.0
	1.8	1.8	2.0	2.0	2.2	2.9	3.0
	—	16.6	15.3	21.0	16.0	20.2	23.1
	56(2.23)	56(2.18)	55(2.03)	57(1.90)	62(1.92)	135(2.20)	145(2.35)
	0.00	0.29	0.34	0.11	0.40	0.00	0.10
	3.31	3.46	3.15	3.00	3.02	2.73	2.96
	12	12	13	12	12	13	11
	2	2	2	3	3	3	3
	581	723	803	799	698	660	715
	2,719	2,907	3,038	3,191	3,352	3,513	3,521
	3,911	4,042	4,134	4,186	4,346	4,485	4,452



# History of the NGK Group

## ■ Until 1969 since establishment



Inaugural managers

### 1919

NGK Insulators Ltd. was established as a spin-off of Noritake's Insulator Division.

### 1929

1,000 kV-class high voltage insulator testing facilities were completed.

### 1931

Started manufacturing and marketing of sulfuric acid corrosion-resistant apparatus for the chemical industry.

### 1935

Suspension insulators exported to India.

### 1942

Construction of Chita Plant, located in Handa, Aichi Prefecture, was completed.

### 1958

Began manufacturing and marketing of beryllium copper products.

### 1962

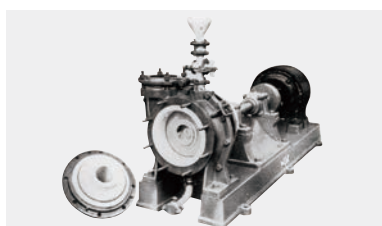
Construction of Komaki Plant, located in Komaki, Aichi Prefecture, was completed.

### 1963

Construction of High Voltage Laboratory was completed.

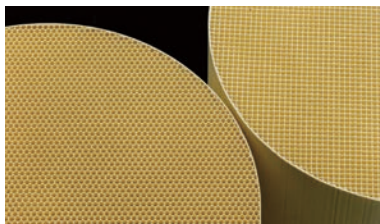
### 1965

NGK-Locke, Inc. (the former NGK Insulators of America, Ltd.) was established in the U.S.A.



Acid-proof pump

## ■ 1970s to 1990s



HONEYCERAM®

### 1971

Manufacturing and marketing of translucent alumina ceramics HICERAM begins.

### 1976

Began manufacturing and marketing of HONEYCERAM®, honeycomb catalyst substrates for controlling automobile emissions.

### 1978

Distributed a low-level radioactive waste incineration system to Tsuruga Power Station of the Japan Atomic Power Company.

### 1981

Developed a new manufacturing technology for ferrite used in magnetic heads.

### 1986

A written style of Japanese trade name was changed. (Katakana is now used for the part, "Gaishi (i.e. Insulator)," where Chinese characters were formerly used.).

### 1987

Nastech Corp. was established in Japan jointly with BBC (now ABB), based in the former West Germany, initiating research for NAS® batteries.

### 1988

Accumulated production of suspension insulators reached 150 million units.

### 1989

Production of diesel particulate filters begins.



High-voltage insulator



Beryllium-copper master alloy

### 1990

Distributed a high-pressure compaction system for treatment of non-combustible solid waste to Fukushima Daiichi Nuclear Power Station of the Tokyo Electric Power Company.

### 1992

Began testing of a prototype of NAS battery for commercial use in an actual transmission system at Kawasaki Substation of the Tokyo Electric Power Company.

### 1994

An environmental inspection system was introduced.

### 1995

Delivered the world's largest gas bushings for the UHV transmission (11.5 m in overall length) to the Tokyo Electric Power Company's Shinharuna Substation.

### 1996

- Mass production of ceramics for semiconductor production devices begins.
- Development of vehicle exhaust gas NOx sensors begins.

### 1998

- NGK Foundation for International Students was established.
- Production of piezoelectric micro-actuators for inkjet printers begins.

### 1999

NGK International House (a residence for international students) was completed.

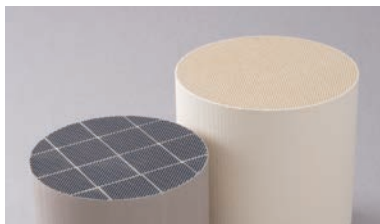


Ceramics for semiconductor manufacturing equipment

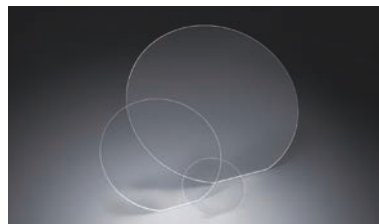
## ■ 2000s–



NAS® batteries



Diesel particulate filters (DPF)



Gallium nitride (GaN) wafers

### 2002

- Achieved the management rights to FM Industries, a US based manufacturer of modules for semiconductor manufacturing equipment.
- Launched home-use water purifiers “C1®.”

### 2003

Mass production of NAS battery system begins.

### 2004

Received the 50th Okochi Memorial Grand Production Prize for the development and practical application of NAS batteries.

### 2005

- Reduced the number of directors and introduced a corporate officer system.
- Developed piezoelectric micro-actuators for hard disk drives (HDDs).

### 2006

Developed world’s largest subnano-ceramic membranes.

### 2008

Commercialized the world’s first in-vehicle high-precision NOx sensors.

### 2009

- Accepted orders for NAS Batteries from Abu Dhabi Water and Electricity Authority (ADWEA) in UAE, and from MTA New York City Transit for bus depot.
- The first mass-produced version of HONEYCERAM was registered with the National Museum of Nature and Science as an Essential Historical Material for Science and Technology.

### 2010

Agreed to develop large scale NAS battery assets to provide ancillary services in the UK.

### 2011

Launched “NGK Innovation Laboratory” in Nagoya Institute of Technology for strategic task force R&D joint project.

### 2012

- FM Industries acquired semiconductor manufacturing equipment-related business from a U.S. industrial gas manufacturer.
- Developed GaN wafer for ultra-high brightness LEDs.
- Developed drying equipment system applying variable wavelength technology.
- Production of gasoline particulate filters begins.

### 2013

Developed ultra-high strength and highly conductive copper-zirconium alloy wire.

### 2014

Commercialization of bounded wafers.

### 2016

- Started production of gasoline particulate filters (GPF) in Poland.
- Began manufacturing of copper-nickel-tin alloy.

### 2018

Gallium nitride (GaN) wafers and microlens for ultraviolet LEDs are commercialized.

### 2019

- NGK Group Philosophy is established
- Lithium-ion rechargeable batteries, “EnerCera®” is commercialized.
- 100th anniversary

### 2021

- NGK Group Vision is formulated.
- NGK Group Environmental Vision is formulated.



In-vehicle high-precision NOx sensors



Gasoline particulate filters (GPF)



Lithium-ion rechargeable batteries, “EnerCera®”

## Corporate Outline

Company name	NGK Insulators, Ltd.	Consolidated subsidiaries	45
Address	2-56 Suda-cho, Mizuho, Nagoya 467-8530, Japan Telephone + (81) 52-872-7181	Equity-method affiliates	2
Established	May 5, 1919	Employees	NGK 4,316 Consolidated 19,695
Paid-in capital	69.8 billion yen	Stock exchange code	5333
Net sales	452.0 billion yen (consolidated, for FY2020)		

## Stock Information

Total number of shares authorized  
735,030,000 shares

Total number of shares issued  
322,211,996 shares  
(Including 5,639,001 shares of  
treasury stock)

Total number of shareholders  
40,310 persons

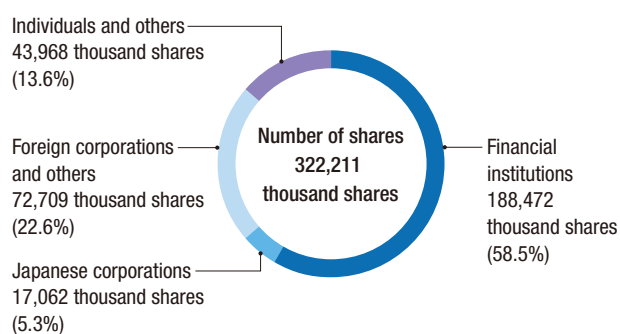
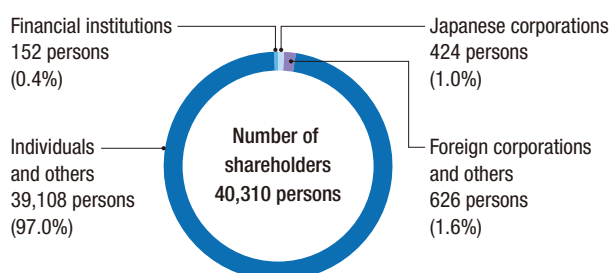
Listed stock exchanges  
Tokyo Stock Exchange,  
Nagoya Stock Exchange

## Major Shareholders

Names of shareholders	Number of shares held (1,000 shares)	Ratio to total (%)
The Master Trust Bank of Japan, Ltd. (Trust Account)	43,739	13.81
Custody Bank of Japan, Ltd. (Trust Account)	31,026	9.80
Meiji Yasuda Life Insurance Company	21,695	6.85
The Dai-ichi Life Insurance Company, Limited	21,457	6.77
MUFG Bank, Ltd.	7,204	2.27
National Mutual Insurance Federation of Agricultural Cooperatives	7,029	2.22
Aioi Nissay Dowa Insurance Co., Ltd.	4,387	1.38
Nippon Life Insurance Company	4,313	1.36
Custody Bank of Japan, Ltd. (Trust Account 7)	4,146	1.30
State Street Bank West Client – Treaty 505234	3,791	1.19

Note: The above list of major shareholders does not include NGK, which has a total of 5,639,001 treasury shares.  
The shareholding ratios above are calculated based on the number of shares derived by deducting the number of treasury shares from the total number of shares issued and by rounding down the calculation results to two decimal places.

## Distribution of Shares





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

**Dr. Kazuhiko Takano**

### 1. Notable highlights of NGK Report 2021

A significant transformation has been taking place in society over the past several years. Since about 2016, the amount of sustainability-related investment in Japan has grown rapidly, reaching approximately 310 trillion yen by March 31, 2020 and accounting for 24.3% of all operating assets\*. From a corporate value standpoint, Japanese society appears to be increasingly supportive of companies that actively address ESG (environmental, social, and governance) related issues.

The NGK Group aims to address ESG-related issues through its core business. The seriousness with which NGK treats these issues is evident from this report. It can be seen in the NGK Group Vision: Road to 2050, which is the new medium-to-long-term vision for the Group. Under this vision, the NGK Group seeks to contribute to carbon neutrality through three key development initiatives; namely, subnano-ceramic membranes capable of separating CO<sub>2</sub> at the molecular level, safe and highly efficient zinc rechargeable batteries, and ultra-small, ultra-thin batteries that can contribute to a more digital society. I feel that society will be strongly supportive of this vision and the NGK Group's efforts, as a global leader, to put its unique ceramic technologies to use in achieving it.

The Group is also undertaking restructuring as part of its efforts to realize this vision. For example, the ESG Management Department was established in April 2021 to implement ESG-related activities across the NGK Group. Typically, the

departments responsible for CSR, compliance, and similar concerns are referred to as cost centers. However, NGK is adopting a new paradigm that treats the ESG Management Department as a contributing part of the value-creation process.

NGK is also actively addressing governance-related issues. For example, independent outside directors now make up one-third of all directors (three out of nine directors), and there is a growing number of female and non-Japanese vice president appointments. One particularly noteworthy aspect of NGK corporate governance is the great frequency with which directors and vice president meet to deal with management-related issues. These include discussions between outside directors, the president, and executive vice presidents in the Corporate Council; opinion exchanges between outside directors in the Conference of Outside Directors and Outside Audit & Supervisory Board Members; and interviews with relevant company personnel by Audit & Supervisory Board members and outside directors who are part of the Hearings Convened by Audit & Supervisory Board Members and Outside Directors. Some of the most commonly identified governance-related issues include outside directors' limited ability to gather information and to actually influence executive actions through their proposals, but NGK's efforts show that it is making a serious effort to address these issues.

\*Source: Global Sustainable Investment Review 2020

### 2. Expectations for further development

The NGK Group deserves praise for having continued to provide a stable supply of products throughout the prolonged COVID-19 pandemic. It is reasonable to attribute the Group's success in implementing thorough infection control measures at its production and business sites in Japan and overseas, as well as smoothly adapting in other ways, like transitioning to work-from-home arrangements, to the active emphasis that it has historically placed on BCM (business continuity management).

President Shigeru Kobayashi, who is continuing the corporate culture reforms pursued by Chairman Taku Oshima, states in this report that his aim is to promote a climate of openness, characterized by free and honest discussion, where employees are empowered to tackle challenges and are stimulated creatively. As we adapt to new ways of working in this era of the "new normal," I hope that questions about how best to create such workplace environments will be explored even further. In 1999, Professor Amy Edmondson argued that

organizational efficiency is improved when there is "a shared belief held by members of a team that the team is safe for interpersonal risk taking," and I believe that cultivating this sort of corporate environment is the key to further growth and development of the NGK Group.

The NGK Group has also expanded the scope of its compliance-related efforts. In April 2021, NGK created its Basic Guidelines for Compliance Activities, which are based in part on guidelines put out by the U.S. Department of Justice and which represent a wonderful effort at summarizing how the NGK Group approaches compliance. In the future, NGK business will offer customers not only products but also services and solutions, and moving into new areas of business will bring with it new compliance-related risks. However, by establishing a shared, basic approach to compliance, the Group can feel confident as it moves into these new areas. I hope that these Basic Guidelines for Compliance Activities will permeate throughout the entire Group.

### 3. Encouragement

In 2019, NGK marked the 100th anniversary of its founding. I praise the company for having not rested on its laurels as a global leader, but instead having used its 100th anniversary as an opportunity to actively pursue transformation as part of a third foundational period by revising its NGK Group Philosophy and creating the new NGK Group Vision: Road to 2050. I also think it is wonderful that the Group Vision was formulated from a process that involved collective discussion by top management and a

diverse cross-section of employees about NGK's 30-year vision for "what we want to be."

The NGK Report for this fiscal year does an outstanding job of presenting the road ahead for the Group as it pursues core business activities, which will help address the anticipated social challenges of the world 30 years hence. I offer my best wishes to the NGK Group and look forward to seeing it grow and develop even further as it pursues its new medium-to-long-term vision.



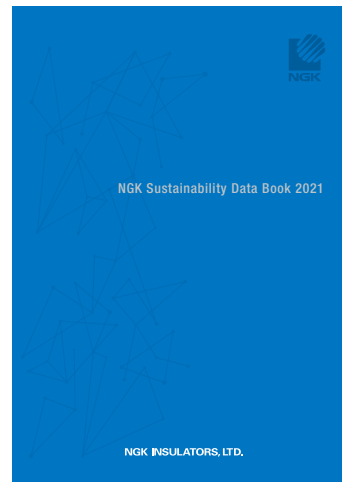
# NGK Group Website

For more detailed information of the NGK Group, please visit the following websites.  
NGK Sustainability Data Book 2021 (PDF) is also available. It gives detailed ESG information.



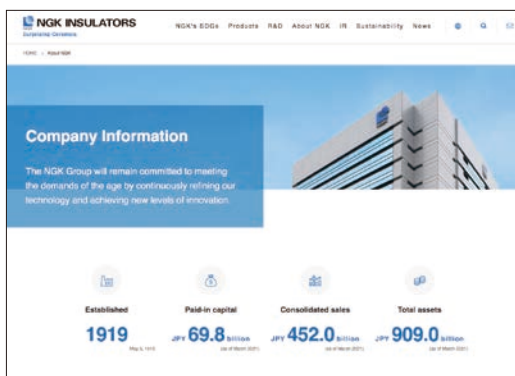
## Sustainability

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



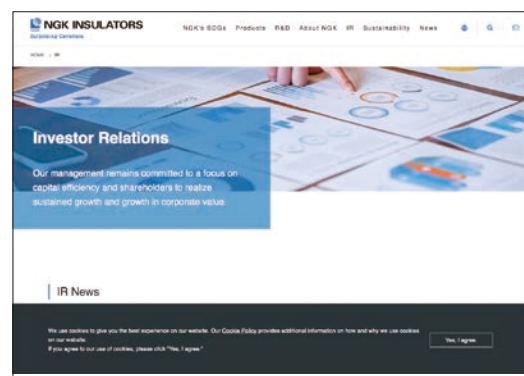
## NGK Sustainability Data Book 2021

<https://www.ngk-insulators.com/en/sustainability/pdf/2021/ngk2021.pdf>



## Company Information

<https://www.ngk-insulators.com/en/info/>



## Investor Relations

<https://www.ngk-insulators.com/en/ir/>

## NGK Insulators

Head Office / 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

### Japan

ENERGY SUPPORT CORPORATION  
KANSAI ENERGYS CORPORATION  
KYUSHU ENERGYS CO., LTD.  
HOKURIKU ENERGYS CORPORATION  
ENERGYS SANGYO CORPORATION  
AKECHI INSULATORS, LTD.  
NGK OKHOTSK, LTD.  
NGK METEX CORPORATION  
NGK FINE MOLDS, LTD.  
NGK CERAMIC DEVICE CO., LTD.  
NGK ELECTRONICS DEVICES, INC.  
NGK CHEMITECH, LTD.  
NGK FILTECH, LTD.  
NGK ADREC CO., LTD.  
NGK KILNTECH CORPORATION  
NGK LIFE CO., LTD.  
NGK YU-SERVICE CO., LTD.  
NGK LOGISTICS, LTD.

### America

NGK-LOCKE, INC.  
NGK CERAMICS USA, INC.  
NGK AUTOMOTIVE CERAMICS USA, INC.  
NGK MATERIAL 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.

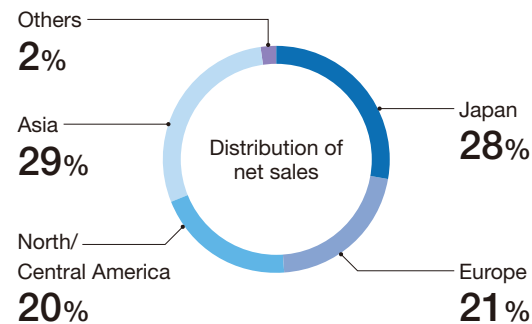
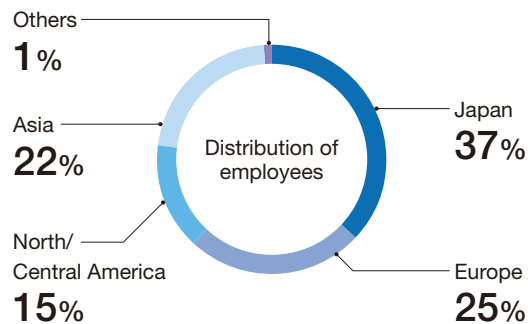
### Europe, Africa

NGK ITALY S.R.L.  
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.

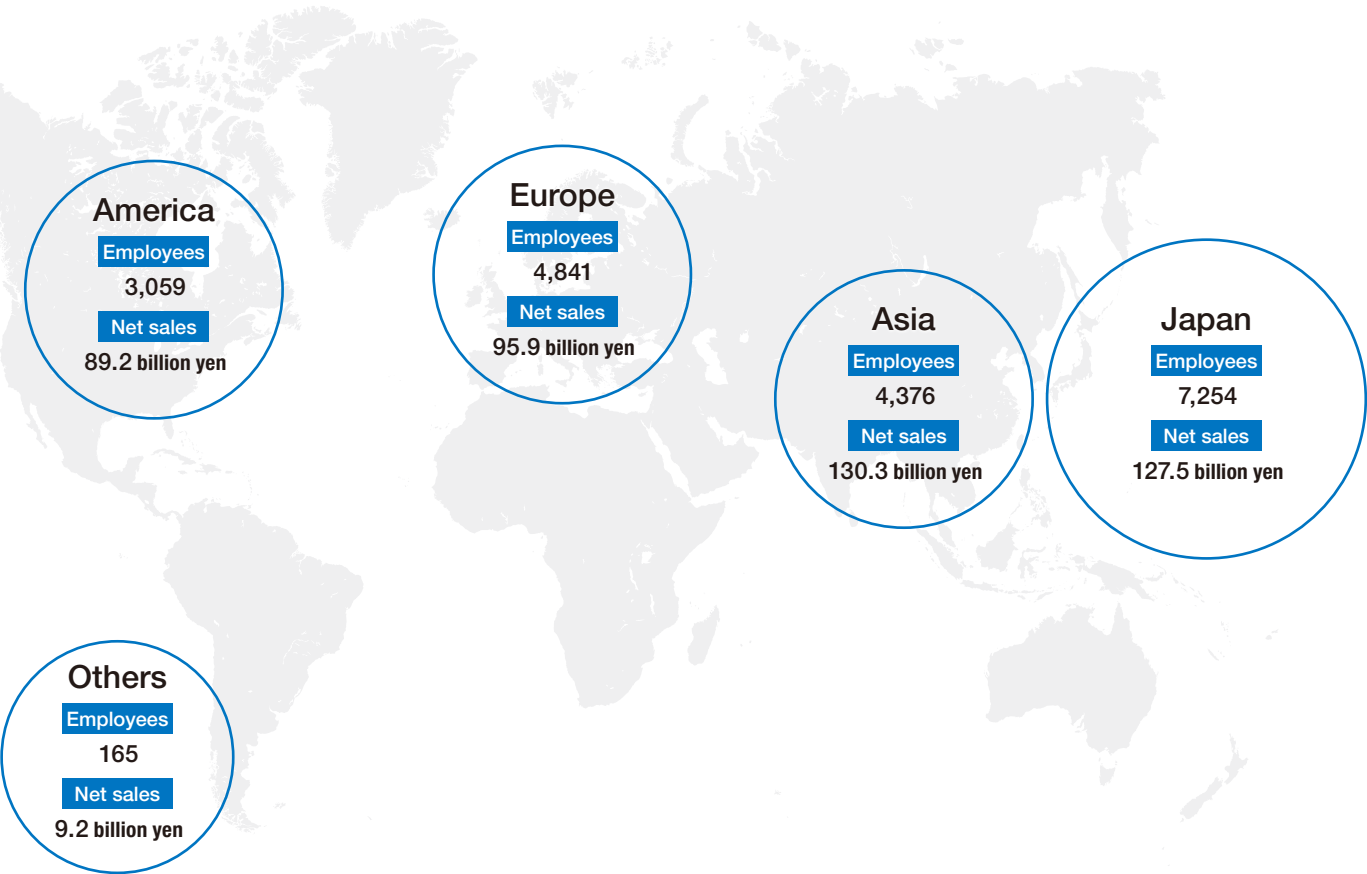
### Asia, Oceania

NGK INSULATORS (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.  
ENERGYS ELECTRIC SHANGHAI CORPORATION  
NGK ENERGYS MYANMAR CO., LTD.  
NGK ELECTRONICS DEVICES (M) SDN. BHD.  
NGK GLOBETRONICS TECHNOLOGY SDN. BHD.

# Data by Area



<div>Number of employees</div> <div>19,695</div> <div>(down 1.5% year-on-year)</div> <div>Note: Full-time regular employees</div>	<div>Consolidated net sales</div> <div>452</div> <div>billion yen</div> <div>(up 2.3% year-on-year)</div>	<div>Consolidated subsidiaries</div> <div>45</div> <div>Equity-method affiliates</div> <div>2</div>
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### External Evaluation

In November 2020, NGK was selected for the 5th consecutive year for the Dow Jones Sustainability Asia Pacific Index in the Dow Jones Sustainability Indices, a major index for socially responsible investment.

NGK has been honored with other selections. These include the MSCI Japan ESG Select Leaders Index, an operator of Japan's Government Pension Investment Fund (GPIF); the MSCI Japan Empowering Women (WIN) Index; and the 2021 Certified Health & Productivity Management Outstanding Organizations Recognition Program (White 500), managed by Japan's Ministry of Economy, Trade and Industry (METI) and the Nippon Kenko Kaigi.

Member of  
**Dow Jones  
Sustainability Indices**  
Powered by the S&P Global CSA

**2021 CONSTITUENT MSCI JAPAN  
ESG SELECT LEADERS INDEX**

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**2021 CONSTITUENT MSCI JAPAN  
EMPOWERING WOMEN INDEX (WIN)**



Ministry of Health, Labor and Welfare "L-boshi" certification of corporate excellence in the promotion of women's active participation Certification level 3



Ministry of Health, Labor and Welfare Next-generation support certification logo "Kurumin"

### Editorial Policy

The publication of the NGK Report 2021 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) and the Guidance for Collaborative Value Creation of Japan's Ministry of Economy, Trade and Industry. Detailed ESG information is given in the NGK Sustainability Data Book 2021.

#### ■ Target Organization

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

#### ■ Target Period

April 1, 2020 to March 31, 2021

#### ■ Forward-looking Statements

This report contains forward-looking statements such as performance forecasts. These forward-looking statements are based on things such as information currently available to NGK and on certain assumptions judged to be rational.

Please note that actual performance may differ from forecasts due to various unforeseen reasons.

Environment  
Social  
Governance



価値協創ガイダンス  
Guidance for  
Collaborative Value Creation





This Consolidated Financial Statements is printed on FSC-approved paper using vegetable oil inks.

## NGK INSULATORS, LTD.

2-56, Suda-cho, Mizuho, Nagoya 467-8530, Japan

For inquiries about this report, please contact

**ESG Management Department**

Tel: +(81) 52-872-7597 E-mail: [pr-office@ngk.co.jp](mailto:pr-office@ngk.co.jp)

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

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**Printing:** A waterless printing method has been adopted to significantly reduce the usage of developer chemicals and processing water, thereby decreasing the amount of hazardous effluent, compared with conventional methods.

**Ink:** To replace petroleum-based inks, vegetable-based inks with the volatile organic compounds (VOCs) content reduced to below 1% have been employed.

**Design:** This report has been designed, with a focus on typeface, color scheme and diagram style, to improve legibility and readability.